

Task Force on External Lighting

(set up by the Environment Bureau of HKSARG)

Document for Engaging Stakeholders and the Public



**This document invites
comments from
stakeholders and the
public on the findings
and recommendations of
the Task Force on
External Lighting.**

Background

2. The lighting in our city, be it from households or commercial establishments, is part and parcel of the spectacular night scene of Hong Kong. It also contributes to the safe environment in our streets after nightfall. That said, the community is also aware of the impact external lighting may have on our daily life. Excessive external lighting is increasingly a community concern. While “excessive external lighting” cannot always be clearly defined, there are two major issues in it –
 - (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.

3. In view of increased public concern about light nuisance and energy wastage caused by external lighting, the Government has taken a series of actions to ascertain the problems arising from external lighting and to identify possible measures to address the problems. These include -
 - (a) the commissioning of a consultancy study on energy wastage and light nuisance of external lighting in 2009 (the Study), covering (i) the experience of metropolises similar to Hong Kong in handling external lighting problems; (ii) a survey on views of relevant stakeholders; and (iii) research on the usage of external lighting in various representative areas in Hong Kong. Major findings of the Study are at **Annex 1**; and
 - (b) the promulgation of the Guidelines on Industry Best Practices for External Lighting in January 2012 to encourage early action to minimise light nuisance and energy wastage. The Guidelines set out some general good practices on the design, installation and operation of external lighting installations for reference of lighting designers, contractors, owners and users. They cover operating

hours for lighting, automatic controls for lighting, light pollution control measures, energy efficiency measures, lighting project design planning, glare prevention to road users, and advertising signs. A copy of the Guidelines is at **Annex 2**.

Task Force on External Lighting

4. In addition, the Government set up the Task Force on External Lighting (the Task Force) in August 2011 to advise it on the appropriate strategy and measures for tackling nuisance and energy wastage problems caused by external lighting, having regard to international experience and practices. Members of the Task Force are drawn from a wide cross section of the community, including professional bodies, relevant trades, the academic community and green groups. Current membership and Terms of Reference of the Task Force are at **Annex 3**.
5. 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 of complaints, including Causeway Bay, Wan Chai, Tsim Sha Tsui and Mongkok, etc, to assess the applicability of the parameters and standards to Hong Kong.



External Lighting in Hong Kong

External Lighting vs Light Pollution

The discussion about light pollution is a relatively new issue. There has yet to be a universally accepted definition of and regulatory framework for “light pollution”, and different places may define light pollution in different ways. As pointed out by the US Federal Government which defines light pollution as “the illumination of the night sky caused by artificial lighting sources”, light pollution is the side effect of industrial civilization; and the amount of outdoor lighting increases as a result of increasing population. However, there has yet to be a universally accepted and well established threshold for determining the level of external lighting that is scientifically deemed as “pollution”.

6. In Hong Kong, there have been increasing public concerns about the problem of light nuisance. Since 2009, the Environmental Protection Department (EPD) has been receiving around 200 complaints against external lighting annually. More detailed figures are set out in Table 1 below.

Table 1: Type of external lighting under complaint

Type of External Lighting	Number of complaints (%)			
	2009	2010	2011	2012
Shop signs and advertisement boards	49 (23%)	103 (46%)	94 (40%)	101 (45%)
Lighting for facades and features	48 (23%)	47 (21%)	58 (25%)	5 (2%)
Video wall	22 (10%)	7 (3%)	5 (2%)	12 (5%)
Lighting for construction site (some for illuminating signboards)	27 (13%)	20 (9%)	20 (9%)	16 (7%)
Lighting for sports fields and playgrounds	13 (6%)	11 (5%)	8 (3%)	4 (2%)
Lighting outside buildings (not for facades and features)	4 (2%)	3 (1%)	5 (2%)	12 (5%)
Others (such as street lighting, lighting for school, car park, swimming pool, race course, golf range and cargo handling area)	50 (23%)	35 (15%)	44 (19%)	75 (33%)
Total	213	226	234	225

7. A large proportion of complaints are about light nuisance, and the number of complaints that are related to energy wastage is much less significant, as shown in Table 2 below.

Table 2: Major concerns of the complainants

Concerns of Complainants	Number of complaints (%)	
	2011	2012
Light nuisance	194 (83%)	185 (82%)
Energy wastage	8 (3%)	13 (6%)
Light nuisance + energy wastage	24 (10%)	21 (9%)
Unknown	8 (3%)	6 (3%)
Total	234	225

8. As regards the geographical distribution of complaints, Table 3 shows that on average, around 40% of the complaint cases are located in Central, Wanchai and Yau Tsim Mong districts.

Table 3: Breakdown of complaints against external lighting by districts

District	Year	
	2011 (%)	2012 (%)
Yau Tsim Mong	41 (18%)	34 (15%)
Wan Chai	42 (18%)	30 (13%)
Central & Western	20 (9%)	23 (10%)
Eastern	20 (9%)	22 (10%)
Yuen Long	11 (5%)	18 (8%)
Kowloon City	15 (6%)	16 (7%)
Sha Tin	18 (8%)	16 (7%)
Tuen Mun	8 (3%)	13 (6%)
Sham Shui Po	4 (2%)	9 (4%)
Southern	9 (4%)	8 (4%)
Kwun Tong	7 (3%)	7 (3%)
Kwai Tsing	4 (2%)	7 (3%)
North	2 (1%)	6 (3%)
Sai Kung	6 (3%)	4 (2%)
Tai Po	2 (1%)	4 (2%)
Wong Tai Sin	7 (3%)	4 (2%)
Islands	5 (2%)	2 (1%)
Tsuen Wan	13 (6%)	2 (1%)
Total	234 (100%)	225 (100%)

Lighting Environmental Zoning System

9. The Task Force observed that the regulatory regimes for external lighting adopted by overseas metropolises are basically unpinned by a lighting zoning system under which the limits on external lighting impacts for each lighting zone is determined having regard to the level of human activities, land use properties and prevailing environmental brightness. A lighting zoning system is usually adopted to categorize different locations and areas into various lighting zones. Different limits on external lighting impacts (such as light trespass, glare, sign luminance, etc.) are recommended for different lighting zones. The underlying reason for adopting a lighting zoning system to differentiate the level of control on external lighting is to reflect the different level of human activities, land use properties and prevailing environmental brightness in different areas within a city. Local residents within a particular neighbourhood will also have different expectation on the level of acceptable external lighting.
10. The International Commission on Illumination (CIE) and the Institution of Lighting Professionals¹ (ILP) both recommend the use of four lighting zones to classify different areas according to their prevailing environmental brightness as shown in the following table –

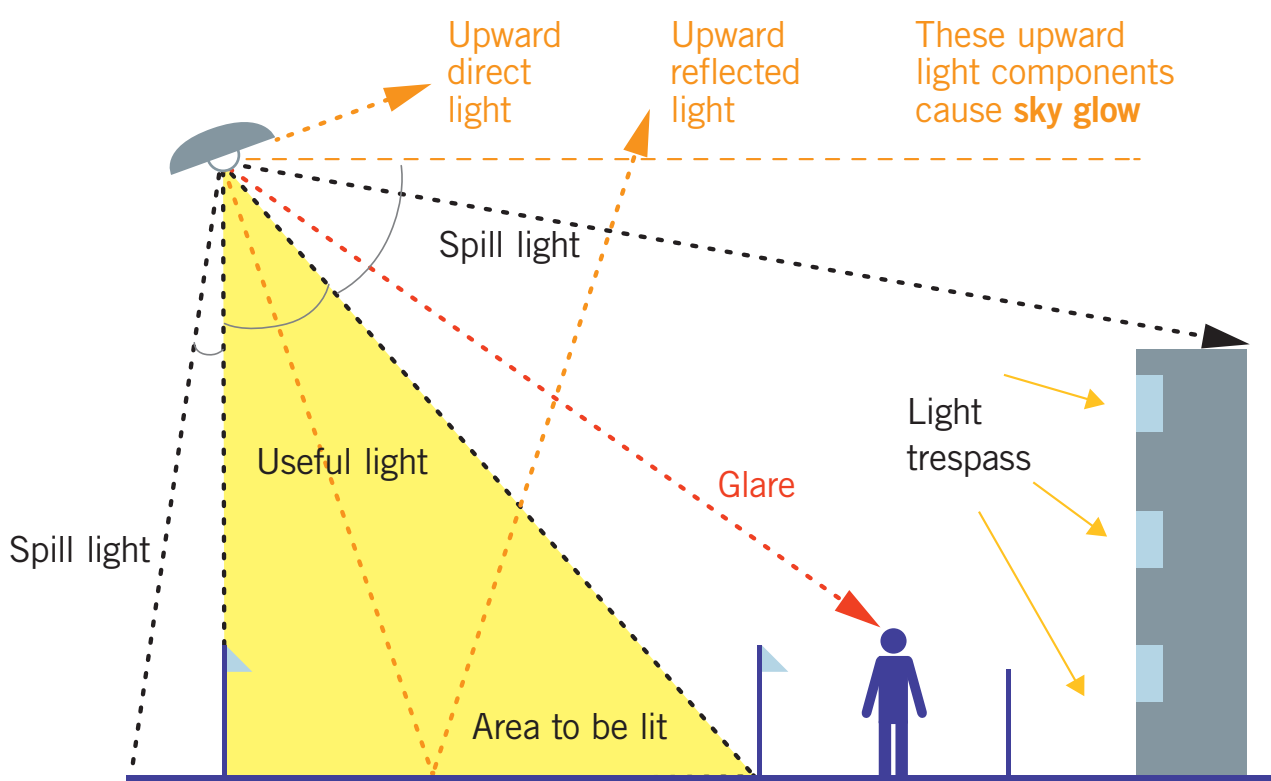
Category	Examples
E1: Intrinsically dark	National parks, areas of outstanding natural beauty
E2: Low district brightness	Rural, small villages, or relatively dark urban locations
E3: Medium district brightness	Small town centres or urban locations
E4: High district brightness	Town/city centres with high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

11. It should be noted that the lighting zones under the CIE/ILP's system are loosely defined. Each category is described in general terms. The CIE/ILP's zoning system has been adopted in some overseas regimes such as London. Some other cities like Shanghai and Sydney have not adopted the CIE/ILP standards and have developed their own zoning systems with regard to their local circumstances.

12. The Task Force has considered whether and how the various environmental lighting zones should be drawn up for Hong Kong. A number of options were explored and the assessment of the feasibility of those options is set out below.
13. One option is to classify each and every region in Hong Kong into different lighting zones, with a view to drawing up a “lighting zoning map” for reference by the interested parties such as light sensitive receivers, lighting owners, professionals or relevant government departments. However, due to the high density of buildings and co-existence of commercial and residential buildings, it might not be feasible to draw up a 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. For instance, apartments facing an open area may be having an entirely different lighting environment than those facing a large shopping centre nearby. It would therefore be difficult to come up with meaningful demarcation of lighting zones.
14. Another option is to draw up a “lighting zoning map” based on the intended land use of the areas as specified in the outline zoning plans (OZPs) promulgated by the Government, e.g. classifying a region zoned “Residential” in an OZP as “pure residential zone”², and a region zoned “Commercial” in an OZP as “mixed development zone”³, etc. The Task Force has considered the feasibility of determining the lighting zone with reference to the OZP. However, given that the purpose of the approved OZP is to provide a statutory land use planning framework to guide the development and redevelopment, it does not necessarily reflect existing land use. It is also noted that under the OZP, a district may be divided into a number of zones for different uses such as commercial and residential. Therefore, even if the Government intends to draw up different lighting zones on the basis of the OZP, the extent of the separation of commercial and residential buildings might not be sufficient to limit the impact of external lighting from commercial buildings onto the nearby residents.
15. 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 due to the high density of buildings and the close proximity of commercial and residential buildings in Hong Kong.

Light Nuisance

16. The Task Force observed in some overseas metropolises with mandatory regulation of external lighting, the regulatory regimes are usually underpinned by a set of technical standards and related supplementary parameters on obtrusive light such as those formulated by the CIE.
17. 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, colour 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. The major technical parameters from the light nuisance angle adopted in the reference standards recommended by CIE are light trespass, building façade and sign luminance, glare and sky glow. Different types of light nuisance are illustrated in the diagram below -



Light Trespass

18. Light trespass⁴ is the spill light entering the premises through the windows. It is measured on a vertical plane, such as window surface of dwelling.
19. The Task Force observed during the site visit that, due to the high building density and close proximity of commercial and residential premises, light trespass in a particular premise can be caused by multiple light sources in the vicinity located at varying distances from the premise. In most cases, light trespass cannot be attributed to a single light source. Moreover, even if light trespass produced by each nearby light source is below the limit prescribed by the CIE⁵, their cumulative effect on a particular premise may still exceed the limit.
20. It is further observed that due to the high building density in Hong Kong, the high level of light trespass caused by the ambient light is not uncommon. The Task Force is mindful about the enforceability of this parameter in Hong Kong as it can be caused by multiple light sources in this densely populated city with highly mixed development. It may not be always 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 not considered appropriate.

Building Façade and Sign Luminance

21. Building façade luminance and sign luminance⁶ are both emitter-based parameters used to assess the amount of light coming from the surface of building façade and signs.
22. The Task Force observed during the site visit that light nuisance in relation to a building façade may have been caused by the spill light of the light source of the building façade, rather than the brightness of the building façade surface. It was also observed 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.

23. 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 in Hong Kong may not be appropriate.

Glare

On Residents

24. Glare on residents⁷ 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. In fact, the perceived discomfort of glare is affected by the viewing angle rather than the actual value of glare of the light source. 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

25. Glare on road users⁷ 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.
26. 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. Specifically, section 11 of the Advertisements Regulation (Cap.132B) prohibits any person from erecting or maintaining on or in any premises any sign which interferes with road traffic. Section 14(2) provides that upon conviction of a person for having erected any sign (occluding or otherwise) which causes interference to road traffic, the court may make an order for the removal of the sign by the Police. In view of the availability of relevant statutory regulations, additional measures to tackle glare on road users should not be necessary.
27. As regards glare on pedestrians, the CIE has developed a parameter to assess the impact of low mounted luminaires where the risk exists when pedestrians are looking straight into the luminaires. It is used

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. The Task Force noted that discomfort glare on pedestrians is mostly transient in nature, and that major developed countries such as USA, UK, Australia and Japan have not adopted any parameter, including the CIE's proposed parameter, to assess discomfort glare. In this light, the Task Force believes that there is no firm basis for regulating glare on pedestrians at this stage.

Sky Glow

28. Sky glow is the brightening of the night sky caused by artificial lighting and natural atmospheric and celestial factors⁸. 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.
29. 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.

Energy Wastage

30. 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 Lighting Power Density (LPD) or Wattage/m² is a commonly used parameter for measuring energy efficiency for lighting of a vertical or horizontal area such as signs and building façade.

Energy consumed by external lighting

While it is difficult to estimate accurately the amount of electricity consumed by external lighting installations in Hong Kong, the amount of electricity consumed by street lighting may provide some useful reference. It is estimated that in 2012, street lighting provided by Highways Department consumed about 100 million kWh, or 0.25% of total electricity consumption in Hong Kong.

31. New York City (NYC) and Los Angeles (LA) have put in place statutory LPD limits from the energy wastage perspective (see **Annex 1**). The LPD standards for building façade are drawn up on the basis of the ambient lighting levels of different lighting zones, which in turn are defined with reference to the permitted developments in the respective zones (e.g. residential, agricultural, commercial, etc.). Based on the ambient lighting level of a particular zone, the relevant authorities will decide the permitted luminance level for building façades and then deduce the respective LPD level allowed accordingly. The maximum LPD allowed for building façade in a lighting zone with higher ambient lighting level is higher than that in a lighting zone with lower ambient level.
32. In NYC and LA, illuminated advertising signs are prohibited in zones with lower ambient illumination level such as agricultural, residential districts or some commercial districts. For areas where signs are permitted such as central commercial and commercial amusement districts, NYC has exempted lighting that is integral to advertising or directional signage from the LPD requirement, while LA requires such signs to comply with the relevant LPD standards drawn up with reference to the ambient lighting level of a particular lighting zone. On the other hand, LA has made clear in their legislation that, if more energy-efficient lighting installations⁹ are used, the illuminated signs are not required to follow the LPD requirement.

33. The Task Force has considered the feasibility of applying the LPD requirements as a technical parameter to regulate signs and building façade in Hong Kong, and found that it would be difficult to apply the LPD requirement to Hong Kong due to the following reasons –
- (a) The parameter has not been adopted widely as a means to regulate external lighting. In fact, there is no internationally-recognised LPD standard being used to regulate energy consumption of external lighting installations. It is worth noting that the CIE has only recommended lighting designers to use luminaries and light sources that can direct light efficiently into the concerned area in order to minimize energy consumption. Even for metropolises that have adopted LPD standards such as NYC and LA, there is significant variance in their respective LPD standards.
 - (b) The lack of objective reference to determine the appropriate LPD standards for building façade and illuminated signs creates practical difficulty in applying the LPD parameters. The starting point of establishing the standards for the building façade and illuminated signs is the appropriate ambient lighting level which is determined with reference to the permitted developments of a particular lighting zone as defined by the planning intention for that zone. However, the difficulty in developing lighting zones due to the close proximity of buildings in Hong Kong, and the fact that OZPs of the Planning Department does not necessarily reflect the current use of existing buildings have rendered it impractical for Hong Kong to adopt the zoning concept or define the appropriate luminance level.
34. This notwithstanding, the Task Force proposes 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.

Proposed Switch-off Requirement

35. Having reviewed all 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.

36. 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 the views of the stakeholders and the public 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;
 - (c) exemptions to be granted; and
 - (d) implementation approach.

Preset time

37. 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

38. 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.

39. The Task Force considers that the proposed switch-off requirement should not apply to lighting necessary for security, safety or operational reasons, such as road/street lighting, lighting at public transport interchange or terminus, airport and container port, air and marine traffic lighting, outdoor car parks, construction sites, buildings undergoing major retrofitting works, road/street number signs, and testing of external lighting that cannot be completed before the preset time due to requirements imposed by relevant government authorities, etc.
40. Notwithstanding the above elaboration on the scope of the proposed switch-off requirement, the Task Force recognizes 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..

Exemptions

Shop-front Sign

41. 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 floors of their buildings to indicate that they are still open after the preset time. 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.).

Decorative Lighting during Festive Seasons

42. To provide flexibility during the festive holidays, the Task Force believes that exemptions may 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

46. In the local context, the Task Force considers that 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 with regard to health impact, possible mitigation costs, and energy wasted;
- (b) apart from the environmental angle, 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.

“Light nuisance” in the UK

From the nuisance angle, reference may be drawn from the regulatory regime in the UK where light nuisance is a “statutory nuisance” under the Clean Neighbourhoods and Environment Act 2005. Light nuisance is defined as light emitted from premises so as to be prejudicial to health or nuisance; and 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. Therefore, complaints against light nuisance are usually lodged by residents affected by lighting and cannot be lodged by a man in the street. There are no numeric standards against which to measure light nuisance in the UK law, and local authorities may make reference to technical parameters and assessed each complaint on a case-by-case basis. The enforcement authorities at the local level will consider various factors like impact, locality, time, frequency, duration, convention, importance and avoidability to determine if the case in question is causing nuisance or not.

Health impact

Research studies conducted in different countries so far have not come to any conclusive view on any direct relationship between light exposure and health problems, but possible health effects of light pollution, if any, may include glare, nuisance and sleep problems. The possible effects or problems caused by artificial lighting at night are non-specific, and possible health problems (e.g. sleep problem) in an individual are often multi-factorial, which may or may not be related to light pollution. Some studies have indicated that while exposure of high level of light for a prolonged period of time at night may suppress melatonin, light trespass through residential windows is an unlikely cause of melatonin suppression given its low light level, particularly with the eyes of the residents closed.

Possible social and economic impacts

According to the findings of the opinion survey commissioned by the Government in 2009, respondents have mixed feelings and opinions towards external lighting in Hong Kong. More than 70% of respondents had the impression that there was “light pollution” in Hong Kong. At the same time, about 78% of residents in general considered that external lighting installations helped beautify the environment and about 87% of residents in general considered that external lighting helped provide safe environment and reduce crime. More than 90% of tourists considered external lighting helped promote tourism. A careful balance between the needs of different light receptors should be maintained.

Defining the issues and breaches in legal terms

Legislation requires unambiguous definitions of “external lighting”, “excessive” external lighting, “shop-front signs”, etc. to ensure effective enforcement and to provide regulatory certainty. Further study of the appropriate legal definitions would be necessary.

Punitive measures against non-compliance

If a mandatory approach is taken, it is for consideration whether non-compliance should attract criminal sanctions. The nature and the extent of the sanctions to be proposed would need to be commensurate with the gravity of the breaches.

Mitigation costs

Some people consider that receptors may mitigate the impacts of external lighting to a certain extent by blinds or curtain, though the effect may not be entirely satisfactory.

Lead time for legislative process

Compared to the voluntary approach, longer lead time is required for law drafting, including the development of clear definitions of the issues and breaches; and building of community consensus on the content of the legislation.

Regulatory and Enforcement Costs

There may be considerable enforcement difficulty in identifying responsible parties, gathering evidence and instigating legal proceedings, unless the scope of activities and persons subject to regulation are clearly defined.

47. The pros and cons of the options identified by the Task Force are set out more specifically below.

Option I: Mandatory Regulation to be Preceded by a Charter Scheme

48. Having examined the overseas regulatory experience and considered the issue set out above, some Task Force members feel strongly that a mandatory approach should be adopted to implement the switch-off requirement through the introduction of relevant legislation for the following reasons –

- (a) noting the long lead time required for the legislative process, they believe a charter scheme with pledges made by major stakeholders, including owners/operators of external lighting installations, should be introduced before the new legislation takes effect;

- (b) they are aware that the introduction of legislation to stipulate the switch-off requirement, the power of the enforcement authorities and the penalties for non-compliance can produce more deterrent effect in tackling the nuisance and energy wastage problems brought about by external lighting. Legislation can avoid the major drawback of any non-mandatory regulation, namely the lack of statutory sanctions to ensure compliance; and
 - (c) in the absence of legislative control or commitment to introduce legislation in the near future, they are concerned that certain building management/owners may refuse to pledge to switch off their external lighting installations under the charter scheme on the ground that the Government cannot provide a level-playing field for all owners/operators of the advertising and shop signs if some owners/operators can choose not to sign up to the charter. Difficulty in securing support from all owners and operators of external lighting installations for the charter scheme would render it necessary for the Government to pursue legislation.
49. The mandatory approach, due to its deterrent effect, is likely to be well received by the parties who are concerned about the energy wastage problem and those who are adversely affected by external lighting installations. Proposal for legislation will be taken by these stakeholders as a positive response to their complaints against the light nuisance and energy wastage problems caused by external lighting.

Option II: Implement a Charter Scheme and Consider Legislation in the Light of the Outcome of the Charter Scheme

50. On the other hand, other members of the Task Force believe that it would be more tenable to introduce a charter scheme to implement the switch-off requirement first. Whether legislation should be pursued would be contingent on the outcome of the charter scheme, i.e. the Government should pursue legislative control if the charter scheme has proved to be ineffective in addressing the problems of light nuisance and energy wastage arising from external lighting.
51. Some members of the Task Force believe that while it is necessary to enhance the regulation of external lighting, the justifications for pursuing legislation have yet to be fully developed and firmly

established. They believe it would be premature to propose legislative or mandatory control before the Government implements and examines the outcome of a charter scheme due to the following reasons -

- (a) on the basis of its document-based review as well as visits to places that are subject to light nuisance complaints, Members observe that judging from the complaint statistics, the problem of external lighting nuisance is in general localized in districts with dense and mixed commercial cum residential developments like Mongkok and Causeway Bay. However, in the absence of a lighting environmental zoning system, legislation to regulate external lighting is likely to entail mandatory switch-off requirement applicable to the entire territory, including areas of tourist interests and places that have not attracted any light nuisance complaints. In districts or areas where external lighting has not been a source for complaints, the owners of external lighting installations as well as the residents in the vicinity may find legislative control unnecessary or even undesirable;
- (b) proposing statutory control without first establishing the weakness of non-mandatory approach may attract strong reaction and resistance from stakeholders who have yet to adapt to the new requirement. This may lead to requests for extensive exemptions from the statutory requirements and sanctions, which will inevitably compromise the scope and the deterrent effect of any statutory regulation. On the other hand, if there is solid evidence to show that the charter scheme is unable to bring about sufficient improvement, the Government will have stronger ground to take a tougher stance when preparing the new legislation;
- (c) regulation of external lighting has yet to become an established or universally accepted practice, and there are a lot of uncertainties associated with the application of mandatory control to Hong Kong, including the definition of key terms and the actual impact on Hong Kong's night scene. The implementation of a charter scheme can help the Government accumulate regulatory experience and assess the feasibility of defining key terms such as light nuisance and the responsible parties, which are necessary for the purpose of law drafting. The implementation of the charter scheme can also serve as a "trial scheme" to help the community to visualize the impact of the mandatory switch-

Views invited

54. Having thoroughly studied and discussed the technical issues associated with the regulation of external lighting, **the Task Force firmly believes that the requirement to switch off external lighting of decorative, promotional or advertising purposes after the preset time is the appropriate way forward for Hong Kong.**
55. To take forward the above recommendation, the Task Force would like to listen to the views of the stakeholders and the public on the following issues –
- (a) the appropriate preset time (paragraph 37);
 - (b) scope of the switch-off requirement (paragraph 38-40);
 - (c) exemptions to be granted (paragraphs 41-43); and
 - (d) the implementation approach to be adopted, i.e. apart from implementing a charter scheme as soon as possible, whether the Government should commit at the same time the introduction of legislation to mandate the switch-off requirement (paragraphs 44-53).
56. The Task Force is aware that the issue of external lighting is a complicated one, and attracts a wide range of response from different sectors of the community. The Task Force would give careful consideration to comments received before drawing up recommendations for the Government's consideration. The Task Force looks forward to views and comments from stakeholders and the public for charting the way forward.
57. Please submit your views to the Task Force by 18 October 2013 through the methods below. Please specify on your submission "Task Force on External Lighting Stakeholders and the Public Engagement Exercise".

Email: hollyip@hkpc.org;

Fax: (852) 3187 4534; or

Mail: Environmental Management Division,
3/F., Hong Kong Productivity Council Building,
78 Tat Chee Avenue, Kowloon.

Quoting Your Views

58. Please note that the Task Force would wish, either during private or public discussion or in any subsequent reports, to be able to refer to and attribute views submitted in response to this Document for Engaging Stakeholders and the Public. Any request to treat all or part of a response in confidence will be respected, but if no such request is made, it will be assumed that the response is not intended to be confidential and the Task Force may disclose or publish all or part of the views received and disclose the identity of the source.

ANNEX 1

Consultancy study on external lighting commissioned by the Government in 2009

Scope of study

The issue of tackling energy wastage and light nuisance of external lighting is a complex one. In addition to having a wide-ranging impact on every sector of the community, the success of such measures will depend on the enforceability which, in turn, relies on the formulation of an objective or commonly-accepted definition of energy wastage or nuisance. To determine the way forward, the Government commissioned a consultancy study on energy wastage and light nuisances of external lighting in 2009. The study covers the following key areas that are important dimensions for consideration in formulating our measures to tackle the problem –

- (a) experience of metropolises similar to Hong Kong in handling external lighting problems;
- (b) survey on views of relevant stakeholders; and
- (c) research on the usage of external lighting in various representative areas in Hong Kong.

Major findings

Experience of Metropolises

2. Eight metropolises, namely Tokyo, Singapore, Shanghai, Sydney, New York, Los Angeles, London and Frankfurt, have been selected for studying their respective means to deal with external lighting problems. The study finds that the cities vary widely in their regulatory approaches and scope of coverage. The following summarizes the differences.

Mandatory vs voluntary

3. Of the cities surveyed, Tokyo and Singapore do not adopt any mandatory regulation over the management of external lighting. The Tokyo government adopts, for all external lighting installations, non-mandatory approach and guidelines without binding force; while Singapore made a policy statement without mandatory regulation or

intention of use of the external lighting installations in assessing the complaints.

7. A summary of legislative control on external lighting in the eight selected metropolises is set out in the table below –

Metropolis	Against energy wastage		Against light nuisance	
	Applicable to new installations	Applicable to existing installations	Applicable to new installations	Applicable to existing installations
Tokyo	No	No	No	No
Singapore	No	No	No	No
Sydney	No	No	The City of Sydney Exterior Lighting Strategy sets out requirements for consent from the City of Sydney Council in private sector development applications for illuminated signage, exterior lighting of buildings and under-awning lighting. Lighting proposals submitted for Development and/or Construction Certificate Approval are required to comply with the development control policies stated in the lighting strategy. The City of Sydney Council will consider lighting proposals and issue construction approval.	No
London	No	No	The law treats light nuisances as a kind of statutory nuisance and empowers the authority to order the abatement of nuisance. Enforcement relies on assessment on a case-by-case basis taking account of various factors, including guidelines or international reference standards. Offender of statutory nuisances is subject to imprisonment or a fine. New projects on external lighting are required to have planning approval by the local planning authority.	

Metropolis	Against energy wastage		Against light nuisance	
	Applicable to new installations	Applicable to existing installations	Applicable to new installations	Applicable to existing installations
Frankfurt	No	No	The law provides a framework of making reference to permissible illuminance and luminance limits and further restrictions on those limits during the night. Enforcement relies on assessment on a case-by-case basis taking account of various factors, including guidelines or international reference standards. The authority can issue orders to ensure compliance and in case of non-compliance, prohibit the operations of the installations.	
Shanghai	No	No	The law stipulates that external lighting “should not affect the normal living of nearby residents” and empowers the authority to order the abatement of nuisances.	
New York City	The law governs and prescribes the limits of energy consumption of new external lighting installations with reference to Energy Conservation Construction Code of New York State. In case of non-compliance, design professionals and contractors can be fined and/or denied certain privileges of licensing by the Department of Buildings.	No	No	No
Los Angeles	The law governs and prescribes the limits of energy consumption of new external lighting installations with reference to California Energy Code. In case of non-compliance, design professionals and contractors can be fined and revoked of Certificate of Occupancy by Los Angeles Department of Buildings and Safety.	No	No	No

Survey on Public Opinion

8. On the opinion survey, views had been collected from around 2 700 respondents from various sectors in Hong Kong, including residents, light sensitive receivers, shop owners, customers, building owners, property management sector, tourists, interest groups, professional institutions and relevant trade associations.
9. The survey finds that respondents have mixed feelings and opinions towards external lighting in Hong Kong. More than 70% of respondents had the impression that there was “light pollution” in Hong Kong. Some considered that there were too many external lighting installations, their sizes were too big and they were too bright. About 40% of residents in the “light sensitive receivers”¹² group considered that external lighting had adversely affected their daily life, work or health, but less than 10% of residents in general had the same opinion.
10. On the other hand, a large proportion of respondents acknowledged the benefits of external lighting. About 78% of residents in general considered that external lighting installations helped beautify the environment, boost Hong Kong’s image as a “dynamic metropolis” and promote tourism. About 87% of residents in general considered that external lighting helped provide safe environment and reduce crime. The corresponding percentages of tourists who held these views were even more overwhelming (more than 90%).

Research on External Lighting in Hong Kong

11. The consultancy study also researches into the usage of external lighting in Hong Kong. External lighting installations in a number of representative areas, as follows, have been measured and assessed by technical parameters –
 - (a) Shun Lee Estate in Kwun Tong (urban residential area);
 - (b) Des Voeux Road Central/ Charter Road in Central (commercial area);
 - (c) Peterson Street/ Great George Street in Causeway Bay (commercial-cum-residential area);
 - (d) Nathan Road/ Sai Yeung Choi Street South in Mongkok (commercial-cum-residential area);

- (e) Yan King Road/ Kai King Road in Tseung Kwan O (New Town area); and
 - (f) Clear Water Bay Country Park with nearby villages, Tai Hang Hau and Tai Wan Tau in Sai Kung (rural area).
12. The selected areas are considered representative of various districts in Hong Kong with different land use properties, including commercial, commercial-cum-residential, urban residential, new town and rural areas. The research in these areas sheds some light on the usage and impacts of external lighting in different districts.
 13. The technical parameters adopted include light trespass to residents, glare effect due to direct viewing from residents and sign/building façade luminance, etc. The measurements obtained have been compared with limits on lighting impacts recommended by the Commission Internationale de l'Eclairage (CIE) – International Commission on Illumination. The use of CIE guidelines as the basis of comparison is for reason of convenience in the absence of any local standards.
 14. The study finds that light nuisance is a “localized” problem, which mainly occurs in commercial-cum-residential areas like Mongkok and Causeway Bay. These areas have high building density and intermingling of shops, entertainment venues and residential buildings is common. In other areas where the use is predominately commercial or residential and in new towns, light nuisance may not be a prevalent problem. For example, the average assessed values on glare, sign luminance and building façade luminance were all within recommended limits in the surveyed areas except Mongkok. However, the assessed luminance of illuminated signs was found to be spreading over a wide range, indicating that there might be individual cases where the signs might be too bright.
 15. As regards light trespass, its levels have been assessed before and after certain preset times (say, after 11pm or midnight). Before the preset times, the light trespass levels on the vast majority of residents were found to be within recommended limits in all surveyed areas, except Mongkok and Causeway Bay. However, the proportion of residents affected by light trespasses with values exceeding recommended limits was found to increase substantially after the

preset times. A possible explanation of this phenomenon is that professional associations usually recommend more stringent limits on light trespass after certain hours to provide a darker environment at night. The findings also suggest that the ambient light level in Hong Kong at night is relatively high as many lighting installations have not been switched off after normal operation hours.

ANNEX 2

Guidelines on Industry Best Practices for External Lighting Installations

The guidelines below suggest some best practices on external lighting installations that Government departments and the private sector should observe.

Introduction

1. External lighting in Hong Kong exist in many different forms and some typical examples include signs (either internally illuminated or externally illuminated), lighting for facades and features, lighting outside buildings (including those for shops), lighting for sports fields and playgrounds, external video structures (e.g. video walls, display panel).
2. The guidelines in this document aim to outline some general good practices on design, installation and operation of external lighting for the reference of lighting designers, contractors, owners and users with a view to minimizing the adverse impacts arising from external lighting.
3. The guidelines are not intended to cover road lighting maintained by Highways Departments (HyD), which should comply with the Public Lighting Design Manual issued by HyD.
4. For easy reference, the guidelines are grouped under the following sub-headings: operating hours for lighting, automatic controls for lighting, light pollution control measures, energy efficiency measures, lighting project design planning, glare prevention to road users, and advertising signs.
5. The good practices stipulated in this document are not exhaustive. Relevant professionals, such as experienced practitioners and consultants in the lighting field, should be consulted for further advice if necessary.

Operating hours for lighting

6. Limiting the use of external lighting after a specified time at night could reduce the possibility of light pollution and energy consumption and in turn foster a good living environment for everyone. It is advisable to :
 - (a) Switch off the external lighting when not needed or after business hours.
 - (b) Switch off the external lighting after certain time at night (say, after 11pm as recommended by International Commission on Illumination (CIE))¹³.
 - (c) Maintain only essential lighting (e.g. lighting for safety and security) at the acceptable level as required.
 - (d) Feature lighting serve to enhance a particular feature/building/structure may be subject to even more stringent control as to their lit time.

Automatic controls for lighting

7. Automatic controls could help reduce adverse impacts of external lighting by optimizing the use of the external lighting. Examples of such measures include :
 - (a) Incorporate automatic control (e.g. timer switch) to switch off the external lighting when not needed or after business hours, or when concerned premises are not in use, or after certain time at night (say, 11p.m. as recommended by CIE).
 - (b) Incorporate automatic control (e.g. photo-sensor for maximizing daylight utilization) to switch on the external lighting only when necessary.
 - (c) Incorporation of occupancy sensor control (e.g. motion sensor or passive infra red sensor) to switch on the external lighting from off or dimmed state where applicable.

Light pollution control measures

8. Measures to reduce light pollution impacts (e.g. light overspill, light trespass, glare and sky glow) arising from external lighting include :
 - (a) Avoid over-illumination of signs, facades, shop fronts, video walls and facilities with lighting. Over-illumination will increase possibility of light pollution.
 - (b) Position and aim the lighting properly to avoid overspill of light to outside the area being lit up.
 - (c) For lighting up vertical structures (e.g. signs & façade), direct the beam to the structures and avoid overspill of light.
 - (d) Use lighting with appropriate shields, baffles, louvers and cut-off features to prevent light overspill to nearby residence and into the sky, and glare from the light source. Where necessary, consider to use luminaires with appropriate cut-off classification. To avoid imposing additional wind load which will affect the structure of the existing lighting columns and foundation, please consult relevant professionals in the design of shields, baffles, louvers, etc. for retrofit works.
 - (e) Switch off the lighting when it is not operationally required or dim down the lighting when a high illumination level is not essential (e.g. after business hours and where the lighting devices are not for security purposes).
 - (f) Avoid using video walls or signs with flickering, colour changing or movement effect in cases where the video walls or signs are facing directly at residents (e.g. when the lighting device and residential premises are on the opposite sides of a road or street). Where unavoidable, reduce the period of operation and/or the flickering rate.
 - (g) For signs with LEDs, use suitable type of LEDs (e.g. LEDs with baffles, louvers or optic diffusers to control light distribution) to reduce sign luminance and light overspill and to prevent glare from direct view of the light source.

- (h) Avoid directing light at glass curtain wall, shiny shop front display panel, or light colour fabric materials (e.g. used in shade structures in parks, amphitheatres or piazzas) etc. to prevent light overspill and nuisances caused by reflection of light.

Energy efficiency measures

- 9. Measures to enhance energy conservation and energy efficiency of external lighting include :
 - (a) Avoid over-illumination of signs, facades, shop fronts and facilities with lighting. Over-illumination will consume more lighting energy.
 - (b) Use more energy efficient lighting equipment, e.g. T5 fluorescent light, compact fluorescent lamp (CFL), ceramic metal halide (CMH) lamp, metal halide lamp, LED, and electronic ballast.
 - (c) Dim down lighting as applicable and switch off lighting when it is not needed (e.g. after business hours) by automatic or manual control.
 - (d) Incorporate sectional controls such that the sections of lighting not operationally required are switched off or dimmed down as appropriate.
 - (e) Clean up the external lighting (as part of regular maintenance) to reduce lumen depreciation due to dusts and wastes on the lighting. Adequate provision for easy access and/or appropriate facilities should be allowed to facilitate regular cleaning of external lighting.

Lighting project design planning

- 10. Good design planning for an external lighting project could help prevent occurrence of adverse impacts from the lighting installations. Design and planning measures include :
 - (a) Assess the impacts of external lighting as part of the lighting design development process before firming up the lighting design for installation. Some aspects to be considered may include critical or sensitive locations that the lighting may affect, ambient

Prevention of glare to road users

11. Glare from external lighting may affect road users resulting in safety concerns. Measures to reduce such glare impact include :
 - (a) Ensure the external lighting is appropriately positioned, aimed or shielded so that illumination of nearby roads will not be adversely affected.
 - (b) Ensure appropriate type of lighting is used (e.g. lighting with suitable light distribution pattern, or appropriate cut-off classification) to reduce glare impact on road users.

Advertising signs

12. Advertising signs should also comply with the advice and guidance on safety, health and related issues stipulated in the Practice Notes for Authorized Persons and Registered Structural Engineers APP-126 and the Guide on Erection & Maintenance of Advertising Signs issued by Buildings Department.

**Environment Bureau
Environmental Protection Department
Electrical and Mechanical Services Department
January 2012**

ANNEX 3

Task Force on External Lighting

MEMBERSHIP

Chairman: Dr Albert Chau Wai-lap

Members: Mr Charles Nicholas Brooke
Mr Cary Chan
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
Mr Ellis Wong Chuen
Mr Rex Wong Siu-han
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.

Footnotes

1. ILP is UK's largest and most influential professional lighting association. ILP has organised training seminars on tackling light nuisances for environmental health officers and planning officers in the UK. The ILP's Guidance Notes for Reduction of Obtrusive Light are often referenced to by practitioners in UK when dealing with external lighting issues.
2. This may correspond to zone E3 under the CIE/ILP system.
3. This may correspond to zone E4 under the CIE/ILP system.
4. Light trespass is the luminous flux per unit area at a point on a surface (unit: lux or lx).
5. In the absence of any local standards, CIE guidelines are used as the basis of comparison only for reason of convenience.
6. Building façade luminance and sign luminance are the visual stimulus creating the sensation of brightness (unit: candela or cd /m²).
7. Glare on residents is the luminous intensity emitted by luminaires in directions towards residents (unit: candela or cd).
8. 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.
9. For example, high pressure sodium lamps, metal halide lamps, neon or cold cathode lamps, fluorescent lamps, light emitting diodes, compact fluorescent lamps or electronic ballasts
10. Different limits on external lighting parameters may be prescribed for different types of environmental zones (e.g. commercial, residential, rural, etc.), and the classification of such zones may depend on human activities, land use properties and the prevailing brightness of the environment.
11. Preset times, or "curfew hours", generally refer to the time after which stricter requirements for the control of obtrusive light apply.
12. In the opinion survey study, "light sensitive receivers" refers to those persons who were more affected by external lighting, including people whose working or living locations are exposed to more external lighting in the surrounding.
13. International Commission on Illumination (CIE), an international professional body on light and lighting, suggests curfew at 11:00p.m., unless otherwise specified, after which stricter requirement for control of obtrusive light will apply.