

## INFORMATION NOTE

### Light pollution and the regulation of outdoor lighting in selected places

#### 1. Background

1.1 The purpose of this information note is to provide the Panel on Environmental Affairs with general information on light pollution and the regulation of outdoor lighting in Japan, the United Kingdom (UK) and the State of California (California) of the United States (US). In particular, the note focuses on the regulation of outdoor lighting, in terms of its regulatory framework, scope and coverage of regulation, as well as enforcement practices in these places.

## 2. Light pollution

2.1 Light pollution is a relatively new issue. According to the International Dark-Sky Association (IDA),<sup>1</sup> light pollution is any adverse effect of artificial light, including sky glow, glare, light trespass,<sup>2</sup> light clutter, decreased visibility at night and energy waste. Different places may define "light pollution" in a slightly different way. For example, in Japan, the Ministry of the Environment (MOE) defines light pollution as any adverse effect and disturbance by light trespass as a result of the improper use of artificial light.<sup>3</sup> In the UK, the Department for Environment, Food and Rural Affairs (DEFRA) defines light pollution as any form of artificial light which shines outside the area it needs to illuminate, including light that is directed above the horizontal into the night sky creating sky glow, or which creates a danger by glare.<sup>4</sup> In the US, the federal government defines light pollution as "the illumination of the night sky caused by artificial light sources". It "is a side effect of industrial civilization; the amount of outdoor lighting increases as a result of increasing population. ... It comes from sources such as domestic lighting, advertising, commercial properties, offices, factories, streetlights, and lit sporting venues."<sup>5</sup>

2.2 Since light pollution is a relatively new area of public concern, the regulatory framework in many places, including those under study, is still under development. The earlier efforts in regulating light pollution were mainly to protect astronomy. In recent years, the problems of energy wastage and road safety brought by light pollution have aroused public concern. Excessive or improper lighting is generally considered as the major reason for light pollution.

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<sup>1</sup> IDA, founded in 1988 and based in the US, is an educational, environmental non-profit-making organization which aims to, inter alia, preserve and protect the night-time environment and promote good outdoor lighting practices.

<sup>2</sup> Light trespass is light falling outside the boundaries of the property upon which the lighting fixture is located.

<sup>3</sup> Ministry of the Environment (2006).

<sup>4</sup> Department for Environment, Food and Rural Affairs (2005).

<sup>5</sup> US Government's Official Web Portal (2008).

2.3 The selected places of this information note deal with light pollution from the source, i.e. principles of light pollution control should be observed when planning for outdoor lighting installation. Meanwhile, as light pollution implies energy wasted, energy consumption is also subject to outdoor lighting regulation. Other areas subject to regulation include types of lighting fixtures, duration of lighting and light intensity. In addition, some selected places may go further to control light trespass to ensure visual comfort of people.

### **3. Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States**

3.1 Most of the light pollution regulations in Japan have been initiated and enforced at the local level. Bisei of Okayama Prefecture enacted the first regulation in Japan to deal with light pollution for the protection of astronomy in November 1989. Subsequently, six other administrative districts in Japan launched similar regulations. At the national level, MOE has published voluntary light pollution control guidelines to help local authorities formulate light pollution control measures. This note will only cover guidelines at the national level since they are more comprehensive when compared with local control measures which are confined to the particular local situation.

3.2 In the UK, under the "plan-led" system,<sup>6</sup> the UK government has issued several Planning Policy Statements (PPS)<sup>7</sup> to explain statutory provisions relating to planning policies, which on some occasions have mentioned the control of light pollution.<sup>8</sup> Meanwhile, the Clean Neighbourhoods and Environment Act 2005 extends the statutory nuisance regime to include a new category of statutory nuisance – the statutory nuisance from artificial light.<sup>9</sup> Although the Act is not a dedicated law for light pollution, it works complementarily with the planning system in light pollution control and serves as a remedy for those people being aggrieved by light trespass.

3.3 In the US, there is no light pollution law or outdoor lighting regulation at the federal level. However, IDA estimates that as at August 2008, there were approximately 2 500 outdoor lighting codes at the state, county and municipal levels, with varying scope of regulation. In this information note, the State of California is selected, as its Energy Code provides a very comprehensive guide to outdoor lighting control.

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<sup>6</sup> In England and Wales, the planning system follows a plan-led system. It involves preparing plans that set out what can be built and where. The Department for Communities and Local Government sets out the overarching national planning policy, while the local planning authorities decide on individual development applications.

<sup>7</sup> PPS and their predecessors Planning Policy Guidance (PPG) are prepared by the UK government after public consultation to explain statutory provisions and provide guidance to local authorities and others on planning policies and the operation of the planning system. The regional planning bodies and the local planning authorities should take into account the policies stated in PPS and PPG when preparing their development plans and making decisions on individual planning permission applications.

<sup>8</sup> According to the UK government, a third Annex to PPS23 entitled "*Planning and Light Pollution*" will be prepared for public consultation in due course.

<sup>9</sup> According to DEFRA, artificial light nuisance is a source of light that interferes with someone's use of their property, and/or is prejudicial to someone's health.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States**

	<b>Japan</b>	<b>United Kingdom</b>	<b>California of the United States</b>
<b>Regulatory framework</b>			
Mode of regulation	Guidelines without binding force.	Legislation and planning guidelines with binding force.	Mandatory code and standards.
Major regulatory authority	Ministry of the Environment (MOE).	(a) Department for Environment, Food and Rural Affairs (DEFRA); and (b) Department for Communities and Local Government (DCLG).	(a) California Buildings Standards Commission (CBSC); and (b) California Energy Commission (CEC).
Responsibilities	MOE is responsible for setting standards and guidelines for light pollution control and prevention.	(a) DEFRA provides guidance to local authorities in enforcing nuisance legislation; and (b) DCLG sets out the national planning policy.	(a) CBSC is responsible for administering California's building codes and standards, including those on outdoor lighting; and (b) CEC formulates energy efficiency standards to reduce California's energy consumption.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	<b>Japan</b>	<b>United Kingdom</b>	<b>California of the United States</b>
<b>Regulatory framework (cont'd)</b>			
Relevant legislation or document	(a) Light Pollution Control Guidelines 1998 and 2006 (1998 Guidelines and 2006 Guidelines); (b) Manual for Local Planning of Lighting Environment 2000; and (c) Guidebook on Light Pollution Preventive Measures 2001.	(a) Clean Neighbourhoods and Environment Act 2005 (CNE Act); and (b) Planning Policy Guidance (PPG) and Planning Policy Statements (PPS).	(a) 2007 California Energy Code (California Code of Regulations, Title 24, Part 6); and (b) 2008 Building Energy Efficiency Standards for Residential and Non-residential Buildings (2008 Standards). <sup>(1)</sup>
Aims of the legislation and the relevant documents	(a) Providing guidelines and resources for local authorities to formulate light pollution control measures; and (b) educating people for efficient and proper use of lighting.	(a) The CNE Act provides local authorities with power and tools to tackle nuisance from artificial light; and (b) PPG and PPS aim to assist local authorities in preparing their development plans and making decisions on individual planning applications and appeals.	(a) The 2007 California Energy Code governs the construction of buildings to ensure compliance with energy conservation standards and lighting control; and (b) the 2008 Standards aim to achieve energy efficiency through imposing technical standards and concrete requirements for lighting control and energy consumption.

Note: (1) The 2008 Standards will be effective from 1 August 2009, replacing the 2005 Standards currently in use.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	Japan	United Kingdom	California of the United States
<b>Regulatory framework (cont'd)</b>			
Approval sought	Not applicable.	New buildings or major changes to existing buildings including changes to outdoor lighting fixtures require planning permission from the local planning authority.	For all newly constructed buildings or alterations to existing buildings including changes to outdoor lighting fixtures, building permit applications with building plans and energy compliance documentation should be submitted to the local Building Department for approval.
<b>Scope and coverage of legislation/guidelines</b>			
Control by zoning	The level of lighting control may vary with different "Lighting Environmental Zones". There are four "Lighting Environmental Zones", ranging from an area subject to the most stringent lighting control measures to the least lighting control measures. According to the 2006 Guidelines, Zone I is intrinsically dark landscape such as natural parks and residential communities, with the most stringent control of outdoor lighting; Zone II is rural and suburban residential area; Zone III is urban residential area; and Zone IV is urban core which allows high density of lighting fixtures in the area.	No.	The level of lighting control may vary with different "Lighting Zones". There are four "Lighting Zones", ranging from the low energy consumption area (Lighting Zone 1) to the high energy consumption area (Lighting Zones 2, 3 and 4). CEC defines the boundaries of "Lighting Zones" based on the boundaries of urban and rural areas as determined by the US Census Bureau as well as the legal boundaries of wilderness and park areas. Government designated parks, recreation areas and wildlife preserves are classified as Lighting Zone 1; rural areas are Lighting Zone 2; and urban areas Lighting Zone 3. Lighting Zone 4 is a special use district that may be defined by a local government.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	Japan	United Kingdom	California of the United States
<b>Scope and coverage of legislation/guidelines (cont'd)</b>			
Control of energy consumption	Reference with regard to the use of energy should be made to the technical guide of the Japan Industrial Standard (JIS).	PPS requires that the design of buildings including the lighting system should be energy efficient.	Detailed compliance requirements for achieving energy efficiency are listed in the 2008 Standards.
Control of lighting fixtures	(a) Lighting fixtures should be energy efficient and with proper distribution of luminous intensity. (b) For advertisement lighting, no searchlight or laser beam can be used.	In considering applications for floodlighting, local authorities should ensure that local amenities are protected from excessive glare.	Luminaires with lamps rated greater than 175 watts must be in "cutoff" design <sup>(2)</sup> so that the light is directed toward the ground.
Restriction on lighting hours	Lighting hours should correspond with the activities of people in the particular "Lighting Environmental Zone".	No.	Outdoor lighting should be automatically controlled so that it is turned off during daytime hours and during other times when it is not needed.
Control of light intensity	Light quantity should be minimized so as not to cause discomfort to people.	In considering how brightly advertisements should be illuminated, the local planning authority should have regard to the effect of advertisements on the appearance of buildings and on visual amenity in the immediate neighbourhoods.	Outdoor lighting power should not be greater than the allowed outdoor lighting power as stated in the 2007 California Energy Code and the 2008 Standards.

Note: (2) The design would limit the amount of light emitted from the lighting fixture at the horizontal level.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	Japan	United Kingdom	California of the United States
<b>Scope and coverage of legislation/guidelines (cont'd)</b>			
Regulation of light trespass	<p>(a) Glare should be limited according to the standards formulated by JIS and the Illuminating Engineering Institute of Japan.</p> <p>(b) For illumination of advertising boards, no light should be emitted upward from the fixtures, and no light should be emitted outside the surface of the advertising boards.</p>	<p>There is no objective and set level of artificial light above which a statutory nuisance is caused. Statutory nuisance is assessed on a case-by-case basis. When assessing a case, the Environmental Health Practitioner<sup>(3)</sup> should take account of a range of factors like duration, frequency, impact (material interference with use of property or personal well-being; actually or likely to be adverse to health), local environment, motive (unreasonable behaviour or normal user), and sensitivity of the plaintiff. Technical parameters on obtrusive lighting formulated by the Commission Internationale de l'Eclairage (International Commission on Illumination or CIE) and Institution of Lighting Engineers may help inform consideration of the level of sensitivity to light that might be considered that of the "average person".</p>	<p>(a) All outdoor luminaires that use lamps rated greater than 175 watts in hardscape areas including parking lots, building entrances, sales and non-sales canopies, and all outdoor sales areas shall be "cutoff" for light distribution.</p> <p>(b) The illuminated area may not extend beyond the property line.</p>

Note: (3) Environmental Health Practitioners are responsible for enforcing the CNE Act.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	<b>Japan</b>	<b>United Kingdom</b>	<b>California of the United States</b>
<b>Enforcement and penalty</b>			
Enforcement authority	Not applicable.	(a) Local Environmental Health Department; and (b) Local District or Borough Council.	Local Building Department.
Enforcement procedure	Voluntary compliance.	(a) Upon receiving a complaint, the Environmental Health Practitioner of the Environmental Health Department will assess the case. If the Environmental Health Practitioner considers that there exists a statutory nuisance, an abatement notice will be issued requiring that the nuisance cease or be abated within a set timescale. Alternatively, the complainant may take a private action through the local magistrates' court under section 82 of the Environmental Protection Act 1990; and (b) the Local District or Borough Council should decide planning applications in line with the development plan and the relevant PPG and PPS.	The Building Department inspects new constructions to determine whether they are consistent with the approved plans and specifications, and in compliance with the 2007 California Energy Code.

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	<b>Japan</b>	<b>United Kingdom</b>	<b>California of the United States</b>
<b>Enforcement and penalty (cont'd)</b>			
Appeal mechanism	Not applicable.	<p>(a) Appeal against an abatement notice can be made to the local magistrate's court within 21 days from the notice being issued; and</p> <p>(b) appeal against the decision on planning permission can be made to the Planning Inspectorate within six months from the date of the application decision letter.</p>	<p>If a dispute concerning a provision of the 2007 California Energy Code arises between an applicant for a building permit and the Building Department, appeal can be sent to the local Board of Permit Appeals or other higher local review body. Notice of appeal shall be sent to CEC 15 days before the appeal is heard, and the result of the appeal shall be sent to CEC within 15 days after the decision is made. If either party to the dispute is dissatisfied with the result of the appeal, one may apply for a determination from CEC. CEC may then make a written determination, which is binding on both parties.</p>

**Table – Regulation of outdoor lighting in Japan, the United Kingdom and California of the United States (cont'd)**

	<b>Japan</b>	<b>United Kingdom</b>	<b>California of the United States</b>
<b>Enforcement and penalty (cont'd)</b>			
Penalty for violation	Not applicable.	<p>(a) Offender of a statutory nuisance is subject to imprisonment for a term not exceeding 12 months; or a fine not exceeding £50,000 (HK\$588,450); and</p> <p>(b) a planning breach in itself is not illegal and the Local District or Borough Council may permit a retrospective application. However, if the breach involves a previously rejected development or the retrospective application fails, the Local District or Borough Council may issue an enforcement notice. It is illegal to disobey an enforcement notice. If the Local District or Borough Council decides to take the offender to court, the offender may have to pay a fine.</p>	<p>The Building Department has options including stopping work orders for contractors or builders that are not in compliance with the building codes. If a contractor continues to be in non-compliance, the violation can be taken to the Contractors State License Board, and the contractor's licence can be in jeopardy through fines, fees or restrictions.</p>

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