

1 APPROVAL OF THE PROPOSAL FOR A REGIONAL REGULATION LAYING DOWN
2 TECHNICAL STANDARDS FOR THE APPLICATION OF REGIONAL LAW NO 31 OF
3 5 OCTOBER 2015 ON MEASURES TO IMPROVE THE ENERGY EFFICIENCY OF OUTDOOR
4 LIGHTING SYSTEMS TO SAVE ENERGY AND REDUCE LIGHT POLLUTION (REQUEST FOR
5 AN OPINION FROM THE COUNCIL COMMITTEE)
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8 HAVING REGARD TO Regional Law No 31 of 5 October 2015 on measures to improve
9 the energy efficiency of outdoor lighting systems to save energy and reduce light
10 pollution, as amended, hereinafter also referred to as 'the Law';
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12 HAVING REGARD TO Regional Law No. 20 of 6 December 2024, "Second Law on
13 Regulatory Reform 2024", which provides in Article 33 that, pending the entry into
14 force of the regional regulation referred to in Article 4(2) of the 'law', the definition of
15 a 'small-scale facility' referred to in Article 2(1)(f), pursuant to Article 3(1)(b) of the
16 same Act, shall continue to apply in the version in force prior to the date of entry into
17 force of 'the Law' itself;
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19 WHEREAS the implementation of Article 4(2) of the 'law' requires the definition of
20 technical criteria concerning the design, installation, management and control of
21 outdoor lighting systems, as well as the regulation of documentation provisions,
22 surveillance activities and the contents of the Outdoor Lighting Analysis Document
23 (Documento di Analisi dell'Illuminazione Esterna, DAIE);
24

25 NOTING that the competent Directorate-General for Local Authorities, Mountain Areas,
26 Energy Resources and Water Use, hereinafter referred to as the 'Directorate-General',
27 has drawn up a draft regulation aimed at fully implementing 'the Law', governing in
28 particular:
29

- 30 - identification of the technical criteria, characteristics, installation and design
31 methods for outdoor lighting luminaires and systems;
- 32 - the definition of the operating procedures for lighting luminaires and systems
33 dedicated to sports activities, monument illumination, signs, and other specific
34 areas;
- 35 - the preparation of the forms required to apply for regional recognition of an
36 area as a zone requiring special protection against light pollution, in accordance
37 with Article 9(1) of 'the Law', for astronomical observatories;
- 38 - the procedures for the exercise of the supervisory and control functions
39 incumbent upon local authorities as referred to in Article 6(3) of 'the Law', as
40 well as the forms relating to declarations of conformity for the design,
41 installation and luminaires;
- 42 - the specific provisions for drawing up the Outdoor Lighting Analysis Document
43 (DAIE), as referred to in Article 7 of 'the Law';
- 44 - the definition of the procedures to be followed to ensure the publicity of the
45 data referred to in Article 5 (4) of 'the Law';

46 NOTING that, during the preliminary investigation, the comments of the Technical-
47 Scientific and Legislative Committee were received and duly taken into account by the
48 Directorate-General in the final drafting of the draft regulation;
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50 RECALLING Directive (EU) 2015/1535 of the European Parliament and of the Council of
51 9 September 2015 laying down a procedure for the provision of information in the field
52 of technical regulations to prevent the creation of obstacles to the free movement of
53 goods and services in the internal market;

54
55 WHEREAS this measure involves the introduction of a technical regulation and, for this
56 reason, was notified by the Ministry of Enterprise and Made in Italy to the European
57 Commission, pursuant to Article 5 of Directive 2015/1535/EU, on XXXX, as indicated in
58 the note sent by the same Ministry to the Region XXXX, ref. 000 _____;

59
60 NOTING that:

- 61 • Following the aforementioned notification, the three months laid down in Article
62 6(1) of Directive (EU) 2015/1535 expired on XXXX - No. _____
63 2026/_____/IT, with no comments having been received;
- 64 • The measure has been published and is available for consultation on the
65 following website: [https://technical-regulation-information-](https://technical-regulation-information-system.ec.europa.eu/it/notification/____)
66 [system.ec.europa.eu/it/notification/_____](https://technical-regulation-information-system.ec.europa.eu/it/notification/____) and; on XXXX, the status of the
67 notification is shown as closed to further comments and observations;
- 68 • following the completion of the notification procedure, the attached document
69 may be approved, as it forms an integral and essential part of this act,
70 complying with the European provisions set out in Article 5 of Directive
71 2015/1535/EU;

72 CONSIDERING that the technical regulation introduced pursuant to Article 4 of
73 Regional Law No 31 of 5 October 2015 contributes to achieving the following
74 objectives of general interest:

- 75 • protection of the environment, both about light pollution and about the
76 reduction of air pollutants;
- 77 • protection of human health;
- 78 • protection of biodiversity and ecological balances;

79
80 HAVING REGARD TO the draft regional regulation 'REGULATION ESTABLISHING THE
81 TECHNICAL STANDARDS FOR THE IMPLEMENTATION OF REGIONAL LAW NO 31 OF
82 5 OCTOBER 2015 (MEASURES TO IMPROVE THE EFFICIENCY OF OUTDOOR LIGHTING
83 SYSTEMS WITH A VIEW TO ENERGY SAVINGS AND THE REDUCTION OF LIGHT
84 POLLUTION)', which forms an integral and substantial part of this measure (Annex 1);

85
86 NOTING that the above-mentioned proposed regulation is consistent with the
87 objectives of reducing energy consumption, protecting biodiversity and limiting light
88 pollution, particularly within specially protected zones, as pursued by 'the Law';

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90 IT IS FURTHER NOTED that the adoption of this regulation contributes to the
91 implementation of the Regional Sustainable Development Programme for the 12th
92 Legislative Term, approved by the Regional Council by Resolution No 42 of 20 June
93 2023, Pillar 5 'Lombardia Green' - Area 5.1 'Ecological Transition', Strategic
94 Objective 5.1.2 'Encouraging energy efficiency and promoting the diversification of
95 energy sources';

96
97 HAVING REGARD TO Article 42 of Statutory Regional Law No 1 of 30 August 2008,
98 pursuant to which regional regulations for the implementation and enforcement of
99 regional laws are approved by the Regional Government subject to a mandatory
100 opinion of the competent Council Committee;

101
102 CONSIDERING therefore to approve, with a view to subsequently obtaining the opinion
103 of the competent Council Committee, the proposal for a regional regulation
104 "REGULATION DEFINING THE TECHNICAL STANDARDS FOR THE APPLICATION OF
105 REGIONAL LAW NO 31 OF 5 OCTOBER 2015 (MEASURES TO IMPROVE THE ENERGY
106 EFFICIENCY OF OUTDOOR LIGHTING SYSTEMS WITH THE AIM OF SAVING ENERGY AND
107 REDUCING LIGHT POLLUTION)", set out in Annex 1, laying down provisions for the

108 implementation of Article 4 of Regional Law No 31 of 5 October 2015;

109

110 HAVING REGARD TO Regional Law No. 20 of 7 July 2008, "Consolidated Text of
111 Regional Laws on Organisation and Personnel", as subsequently amended and
112 supplemented, as well as the organisational measures of the 12th Legislature and, in
113 particular, the Sixth Organisational Measure of 2026, adopted by Regional Council
114 Decision No 5971 of 13 April 2026;

115 by unanimity of the votes cast in the forms laid down by law;

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HEREBY DECIDES

- 121 1. to approve, for the reasons set out in the preamble, the draft regional
122 regulation 'REGULATION ESTABLISHING THE TECHNICAL STANDARDS FOR THE
123 IMPLEMENTATION OF REGIONAL LAW NO 31 OF 5 OCTOBER 2015 (MEASURES
124 TO IMPROVE THE ENERGY EFFICIENCY OF OUTDOOR LIGHTING SYSTEMS to save
125 ENERGY AND reduce LIGHT POLLUTION)', set out in Annex 1, which forms an
126 integral and essential part of this measure;
- 127 2. to order, pursuant to Article 42 of Statutory Regional Law No 1 of 30 August
128 2008, that the draft regulation referred to in point 1 be sent to the competent
129 Council Committee for the purpose of obtaining the required opinion;
- 130 3. to order the publication of this measure in the Official Bulletin of the Region of
131 Lombardy.

**REGULATION LAYING DOWN TECHNICAL STANDARDS FOR THE
APPLICATION OF REGIONAL LAW NO 31 OF 5 OCTOBER 2015
(MEASURES TO IMPROVE THE ENERGY EFFICIENCY OF OUTDOOR
LIGHTING SYSTEMS TO SAVE ENERGY AND REDUCE LIGHT
POLLUTION)**

Art. 1
(Subject matter)

1. This Regulation, for the purposes set out in Article 1 of Regional Law No. 31 of 5 October 2015 (Measures to improve the efficiency of outdoor lighting systems with a view to saving energy and reducing light pollution), hereinafter referred to as 'the Law', regulates, in accordance with Article 4, paragraphs 2 and 3 of the same 'Law':

- a) the identification of the technical criteria, characteristics, installation methods and design provisions for outdoor lighting fixtures and systems, to ensure:
 - i. minimum energy performance;
 - ii. that luminous flux is not dispersed beyond the horizon;
 - iii. a level of luminance and illuminance that is not excessive in relation to the minimum levels required by current legislation;
 - iv. the reduction of light pollution to protect human health, biodiversity, and ecological balance;
- b) the definition of the operating procedures for lighting luminaires and systems dedicated to sports activities, monument illumination, signs, and other specific areas;
- c) the preparation of the forms required to apply for regional recognition of an area as a zone requiring special protection against light pollution, in accordance with Article 9(1) of 'the Law', for astronomical observatories;
- d) the procedures for the exercise of the supervisory and control functions incumbent upon local authorities as referred to in Article 6(3) of 'the Law', as well as the forms relating to declarations of conformity for the design, installation and lighting fixtures, as set out in Annexes 1 to 4;
- e) specific provisions for the preparation of the Outdoor Lighting Analysis Document (DAIE), as referred to in Article 7 of 'the Law', set out in Annex 5;
- f) the definition of the procedures to be followed to ensure the advertising of the data referred to in Article 5(4) of 'the Law'.

2. This Regulation is also accompanied by Information Appendices A, B and C.

Art. 2
(Definitions and terminology used)

3. In implementation of Article 2(1)(f) of 'the Law' and in accordance with Commission Regulation (EU) No 2019/2020 of 1 October 2019 laying down ecodesign provisions for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council, the following definition applies, in addition to those laid down in the same Article 2 of 'the Law':

- a) small-scale system: an outdoor lighting system connected to a single distribution board or a metered electricity supply, which meets all of the following conditions:
 - i. luminous flux emitted by a single light source, or by a group of light sources, in a single luminaire, not exceeding 1,200 lumens;
 - ii. total number of luminaires not exceeding ten units;
 - iii. total flux emitted upwards not exceeding 1,800 lumens.

172 **2.** Appendix A to this regulation sets out, in illustrative terms, the procedures for verifying compliance
173 with the conditions set out in paragraph 1(a).

174 **3.** To ensure uniformity in the application of this Regulation, the following terminology is also used in
175 accordance with the reference technical regulation:

176 a) Existing outdoor lighting system: a system referred to in Article 2(1)(e) of 'the Law' which, on
177 the date of entry into force of this Regulation, is:

178 i. already implemented;

179 ii. where technical documentation has already been submitted to the local authority for
180 authorisation pursuant to Article 4(1)(d) of Regional Law No 17 of 27 March 2000
181 (Urgent measures concerning energy saving in outdoor lighting and the fight against
182 light pollution), in the case of a private installation;

183 iii. by means of a tender procedure which has already been launched, in the case of a public
184 installation;

185 b) new outdoor lighting system: installation constructed after the date of entry into force of this
186 Regulation;

187 c) refurbishment of an existing outdoor lighting installation: a set of works involving the
188 replacement, in whole or in part, of more than 40% of the luminaires and at least one of the
189 following components associated with those replaced luminaires: electrical switchboards and
190 power supply lines;

191 d) replacement of a luminaire: the process of removing an existing luminaire and installing a new
192 one;

193 e) architectural lighting: the illumination of monuments or architectural structures, which may
194 highlight just a portion of a building, to emphasise its significant features or its location within the
195 urban environment;

196 f) adaptive lighting: lighting equipped with luminous flux control systems, capable of reducing
197 and controlling the luminous flux in relation to environmental conditions, such as traffic, weather
198 and luminance, as defined in standard UNI 11248 (Road lighting – Selection of technical lighting
199 categories);

200 g) intrusive light: light emitted by a lighting system that falls outside the boundaries of the
201 property or the area for which the lighting system was designed, as defined in standard UNI
202 10819 (Light and lighting – Outdoor lighting systems – Photometric quantities and calculation
203 procedures for the assessment of upward light spill);

204 h) obtrusive light: intrusive light that, due to quantitative, directional or spectral attributes in a
205 given context, produces annoyance, discomfort, distraction or reduction of the ability to see
206 essential information, as defined by the UNI 10819 standard;

207 i) lighting categories: as defined by the UNI 11248 standard.

208 **4.** To assess any phenomena of light pollution or also of intrusive light, reference is made to the
209 technical standard UNI 10819.

210 **5.** The methodology and indicative values for any evaluations or even verifications about obtrusive
211 light are set out in Appendix B, annexed to this Regulation.

212 **6.** The UNI, CEI, CIE technical standards referred to in this Regulation shall be deemed to be tacitly
213 replaced by the most recent version, if no longer in force or updated.

214
215
216 **Art. 3**

217 **(Technical provisions for public outdoor lighting installations)**

218 **1.** To ensure compliance with the provisions of Article 3, paragraphs 3, 4 and 7 of 'the Law':

219 a) new installations must:

- 220 i. be equipped with luminaires which, in their installation position, have a maximum
221 luminous intensity distribution of $\gamma \geq 90^\circ$, between 0,00 and 0,49 candelas per 1000
222 lumens of total luminous flux emitted;
- 223 ii. be fitted with luminaires having a nominal Correlated Colour Temperature (CCT) of $\leq$
224 3000 K, an average colour temperature across the Gamma angles on the C planes or,
225 alternatively, emit a proportion of radiant flux in the blue portion of the spectrum
226 (wavelengths between 350 and 480 nm) of less than 18% of the total radiant flux; to this
227 end, certification of the data and the spectrometric tables for the luminaires must be
228 issued; these must be signed by the technical manager of the laboratory that issued
229 them, certifying their accuracy;
- 230 iii. ensure, in road applications, a Spacing-to-Height (S/H) ratio of not less than 3.7;
231 alternative solutions are allowed only insofar as they are functional to a better efficiency
232 of the system;
- 233 iv. be equipped with luminous flux regulating devices of class A0 or A1 (UNI 11431 Light and
234 lighting – Application in the road sector of luminous flux regulating devices) for lighting
235 categories M and C and, at least, of class A2 for lighting category P; a precise definition
236 of the lighting categories and of the setting times shall be detailed in the DAIE referred
237 to in Article 7 of 'the Law';
- 238 v. reduce the power consumption of the system by at least 30% compared with full-
239 capacity operation, pending the approval of the DAIE by each municipality, by taking
240 specific action on each luminaire or generally on the entire system, by midnight,
241 provided that safety conditions are maintained;
- 242 vi. the provisions of subparagraphs (iv) and (v) above do not apply if the installations are
243 equipped with adaptive lighting systems operating in accordance with the provisions of
244 the legislation in force and the relevant technical standards;
- 245 vii. be equipped with astronomical clocks or other equivalent instruments capable of
246 ensuring an on/off time in accordance with Article 9 (2) of Annex A to AEEG Decision
247 ARG/elt 29/08 of 12 March 2008, with a maximum delay upon switching on equal to 20
248 minutes and a maximum advance upon switching off equal to 20 minutes;
- 249 viii. ensure that lighting parameters, such as maintained average luminance and maintained
250 average illuminance, do not exceed the minimum levels and associated tolerances set
251 out in the relevant safety and technical standards; the above may be waived, on a case-
252 by-case basis only, for license plate recognition systems intended for tolling activities;
253 this decision must be documented and justified at the design stage; where outdoor
254 lighting systems are installed in areas for which there are no relevant technical

- standards, such systems must, in any case, maintain average illuminance value on the surface to be illuminated of less than or equal to 7.5 lux on the horizontal plane;
- ix. be designed and constructed taking into account any intrusive light phenomena and identifying solutions to maximise the utilisation factor;
 - x. not cause light pollution affecting residential or similar buildings, by assessing in accordance with the guidelines set out in CIE 150;
- b) existing installations undergoing refurbishment, limited to the parts concerned, must:
- i. comply with the provisions of point (a) except point (iii);
 - ii. comply also with the provisions set out in point (iii) of sub-paragraph (a) should the refurbishment involve a change to the layout of the installation.
2. Where luminaires are replaced, the provisions set out in point (a) of paragraph 1, sub-points (i), (ii), (viii), (ix) and (x), must be met and, where technically feasible, the provisions set out in sub-points (iv), (v) and (vi) of the same point (a) must also be met.
3. For the award of the public lighting service and the installation of plants to be implemented with concessions, project finance or also with performance guarantee contracts¹, a comparative cost-benefit assessment shall be carried out with respect to the profiles of the UNI 11431 standard, which takes into account the use of adaptive lighting systems of an extensive type in accordance with the UNI 11248 standard.
4. In the event of the adoption of adaptive lighting systems of an extensive type, for the systems referred to in paragraph 3, a risk analysis of the specific territory must be carried out, justifying the solutions adopted with regard to configurations, sensor locations and the number of sensors necessary for the maintenance of safety conditions.
5. Appendix C to this Regulation sets out a non-exhaustive list of possible requirements to be included at the tender process for the public lighting service.
6. Based on the findings from the assessments referred to in paragraph 3, the Region shall evaluate the possibility of making the technological solution referred to in paragraph 4 mandatory, starting from 2030.

Art. 4

(Technical provisions for private outdoor lighting installations)

1. With regard to private outdoor lighting installations, in the case of new installations, the refurbishment of existing installations (limited to the parts concerned), and the replacement of luminaires, to comply with the provisions set out in Article 3, paragraphs 3, 4 and 7 of 'the Law', the following must be done:

- a) comply with the provisions of Article 3 (1) (a) (i), (ix) and (x) of this Regulation;

¹ Energy Performance Contract (EPC): a contractual agreement between the beneficiary or the party exercising negotiating power on their behalf and the provider of an energy efficiency improvement measure, which is verified and monitored throughout the entire duration of the contract, whereby the investments (works, supplies or services) carried out are paid for based on the contractually agreed level of energy efficiency improvement or other agreed energy performance criteria, such as financial savings (as defined in Legislative Decree No 102 of 4 July 2014, as amended and supplemented).

- b) where relevant, comply with the provisions of Article 3(1)(a)(viii) of this Regulation;
- c) equip installations with luminaires or light sources that have a nominal Correlated Colour Temperature (CCT) ≤ 3000 K, defined as the average colour temperature value of the Gamma angles on the C-planes.

Art. 5

(Technical provisions for outdoor lighting installations in areas subject to special protection against light pollution)

1. For the areas of particular protection against light pollution referred to in Article 9 of 'the Law', without prejudice to the provisions of Article 3(7) of 'the Law', the following is laid down:

- a) to the definition of small-scale installation, referred to in Article 2(1)(a) of this Regulation, a 50% reduction shall apply to the maximum value of the total flow provided for in the same Article 2(1)(a)(iii);
- b) in the case of new installations, the refurbishment of existing ones (limited to the parts concerned), and the replacement of luminaires, the latter:
- i. shall be equipped with luminaires with a nominal Correlated Colour Temperature (CCT) of ≤ 2200 K, the average colour temperature of the Gamma angles on the C planes or, alternatively, with luminaires that emit a proportion of radiant flux in the blue spectral range (wavelengths between 350 and 480 nm) of less than 9% of the total radiant flux; to this end, certification of the data and the spectrometric tables for the luminaires must be issued and signed by the technical manager of the laboratory that produced them to attest to their accuracy;
 - ii. shall be equipped, for the areas referred to in Article 9(6) of 'the Law', with luminaires having a nominal Correlated Colour Temperature (CCT) of ≤ 2200 K – the average colour temperature of the Gamma angles on the C planes – or amber LEDs²;
 - iii. ensure that the values of the lighting parameters – in terms of maintained average luminance or maintained average illuminance – do not fall below the minimum levels and associated tolerances set out in the relevant technical standards; where outdoor lighting systems are installed in areas for which there are no relevant technical standards, such systems must, in any case, ensure that the maintained average illuminance on the surface to be illuminated is less than or equal to 3.5 lux on the horizontal plane;
 - iv. comply with the provisions of Article 3 (1) (a) (i), (ix) and (x) of this Regulation;
 - v. in the case of public lighting installations only, where relevant or also technically feasible, they meet the provisions of Article 3 (1) (a) (iii) to (vii) of this Regulation.

2. Applications for designation as an area requiring special protection against light pollution, pursuant to Article 9(1) of 'the Law', shall be made by the operators of astronomical observatories

² An Amber Light Emitting Diode (LED) light source is identified by a spectral power distribution whose peak wavelength λ_p and dominant wavelength λ_d values both fall within the nominal range set in $\lambda = 590 \pm 5$ nm.

by completing and signing the form set out in Annex 1 to these regulations and submitting it to the relevant regional offices.

Art. 6

(Technical provisions for outdoor lighting installations and appliances dedicated to additional specific areas)

1. For sports facilities, in the case of new construction, the refurbishment of existing facilities (limited to the parts affected by the works), or the replacement of luminaires, the following provisions apply:

- a) the installation of appropriate systems designed to reduce the power consumption of the lighting system in accordance with all possible uses of the pitch, such as maintenance, training sessions and matches;
- b) a guarantee that the values of the lighting parameters – in terms of maintained average luminance or maintained average illuminance – do not exceed the minimum levels and associated tolerances laid down in the relevant technical standards or the guidelines issued by the relevant sports federations, subject to any different provisions prescribed by the competent authorities during the type-approval or authorisation process for the sports facility;
- c) shut-down of the installation after completion of the activity and, in any case, by midnight;
- d) the design and construction, in accordance with Article 3(1)(a)(i) of these regulations, of sports facilities for which there are no specific approval requirements laid down by federations and associations recognised by CONI or by national sports leagues, in terms of minimum vertical illuminance, whilst also calculating the maximum vertical illuminance on the surfaces at the perimeter of the sports facility, as prescribed by the models set out in the UNI 10819 standard, which must not, in any case, exceed 15% of the average illuminance value of the main area; surfaces that do not contribute to glare, such as windowless walls, may be excluded from the assessment referred to in this subparagraph.

2. Sports facilities, for which specific provisions must be met in terms of minimum vertical illuminance – as determined by the federations, associations or leagues referred to in point (d) of paragraph 1 – in addition to the provisions set out in paragraph 1, points (a) to (c), and exclusively in the case of new construction or refurbishment, limited to the relevant parts of the facility, shall be designed and constructed in accordance with the following technical rules:

- a) luminous flux emitted beyond 90° is equal to or less than 9% of the total luminous flux;
- b) maximum vertical illumination on the floors located at the edge of the sports facility calculated in accordance with the provisions of the models in standard UNI 10819, demonstrating that, during the design phase, it has adopted the best solutions and technologies to minimise their values outside the sports facility.

3. The following technical regulations apply to the lighting of amusement parks, funfairs and similar venues³:

³ For a full definition of these types of structures, please refer to Article 4 of Law No 337 of 18 March 1968 and the Ministerial Decree of 23 May 2003 and their subsequent amendments and additions

- a) implementation of the functional lighting of streets, pedestrian paths or other areas outside attractions in accordance with Article 3 (1) (a) (i) and (ii) of this Regulation or, if located in the areas of particular protection against light pollution referred to in Article 9 of 'the Law', in accordance with Article 5 (1) (b) (i);
- b) installation of the remaining lighting, including decorative lighting and lighting inside the attractions, permitted by way of derogation from Article 3(1)(a), points (i) and (ii) of this Regulation and, where applicable, by way of derogation from Article 5(1)(b) of the same Regulation, without prejudice to the prohibition on the use of rotating light beams of any kind, as referred to in Article 3(6) of 'the Law';
- c) switching off the lighting referred to in point (b) after completion of the activity.

4. Without prejudice to the provisions of Legislative Decree No 285 of 30 April 1992 (New Highway Code) and the relevant implementing regulations referred to in Presidential Decree No 495 of 16 December 1992, in the case of new installations covered by these regulations, the following provisions shall apply to business signs in their entirety and to other illuminated advertising media in outdoor areas:

- a) if they are not equipped with their own lighting, they shall be illuminated in accordance with the provisions of Article 3(1)(a)(i) of this Regulation;
- b) if they are equipped with their own lighting, there must be no emission surfaces directly oriented upwards and the total luminous flux emitted by the emitting surface, calculated according to the diffusion capacity of the material used, must not exceed:
 - i. 4 500 lumens for the total size of the issuing surface alone, where this is less than 10 square metres;
 - ii. 300 lumens per additional square metre, if the emitting surface is between 11 and 20 square metres;
 - iii. 200 lumens for each additional square metre, if the emitting surface is between 21 and 30 square metres;
 - iv. 100 lumens for each additional square metre, if the emitting surface is between 31 and 50 square metres;
 - v. 50 lumens for each additional square metre, if the emitting surface area is greater than 50 square metres.

5. In the cases referred to in paragraph 4(b), to prevent glare and light spill into the surrounding environment, it is recommended to use dark backgrounds with light-coloured text and images, rather than light backgrounds with dark text, or backgrounds made of non-transilluminated material⁴, known as 'perforated' – and therefore non-illuminated – with only the text and logos illuminated.

6. In any event, all types of illuminated signs not intended for safety or public utility purposes – such as those for hospitals, pharmacies, police and carabinieri stations or fire stations – must be switched off by midnight, or upon closing time in the case of businesses operating beyond these hours.

⁴ Transilluminated: as defined by UNI EN 12899-1 'Permanent vertical road traffic signs – Part 1: Permanent signals'.

7. For installations consisting of individual screens, including television displays and monitors, or consisting of a series of LED modular panels or similar technologies capable of reproducing any multimedia content and used for advertising, including informative, video communication or digital signage, in any form and size, the following technical rules shall apply:
- a) have, by sunset, a nominal luminance measured on white (D65/6500 kelvin) not exceeding 100 cd/m² when situated in an urban area, and 60 cd/m² when situated in a non-urban area; these values may be achieved by using twilight sensors, combined with an astronomical clock, or other similar devices performing the same function; the nominal luminance value must be set during installation, based on the calculations set out in the technical report drawn up and signed by a qualified technician⁵ and verified instrumentally, including during routine maintenance or the replacement of one or more components;
 - b) have a nominal Correlated Colour Temperature (CCT) of the white point not exceeding 3000 K at least 30 minutes before sunset, achieved by gradual and progressive mixing, to be completed no later than sunset, and maintained until the system is switched off;
 - c) must be switched off by midnight for at least 8 consecutive hours.
8. The installations referred to in paragraph 7 are not permitted within the areas subject to special protection against light pollution referred to in Article 9(6) of 'the Law'.
9. The use of upward-facing beams of light for advertising or attention-grabbing purposes shall not be permitted.
10. Existing floodlights, headlamps and tower-mounted spotlights must be fitted with, at the very least, suitable shielding designed to comply with the provisions set out in Article 3(1)(a)(i) of this Regulation.
11. For the renovation of lighting systems referred to in subparagraph 10, Articles 3 to 5 of this Regulation shall apply, according to the cases provided for therein.
12. The provisions set out in Articles 3 to 5 of this Regulation shall apply to new lighting installations serving functional areas – other than roads or cycle and pedestrian paths – located within urban or peri-urban green spaces, in accordance with the circumstances set out therein. For installations serving the areas referred to in the first sentence, control systems must be installed to ensure that the installations are switched off by the time the green spaces close and, in any event, no later than 11.00 pm, for a period of at least 8 hours, subject to any safety considerations to be specified in the DAIE or by a decision of the relevant local authority.
13. No lighting installations may be installed to illuminate features of the natural landscape, such as mountains or hills or parts thereof, rock faces, small islands, as well as the monumental trees referred to in Law No 10 of 14 January 2013 (Provisions for the protection and conservation of monumental trees and monumental woodlands in Italy), nor may they be fitted to bodies of water.
14. In the case of new installations or the renovation of existing installations, in relation to the architectural lighting of buildings, structures and monuments:
- a) account must be taken of the provisions set out in Article 3(7) of 'the Law', including based on

⁵ The persons referred to in point 4.3.2.1 of the Annex to the Ministerial Decree of 27 September 2017 (Minimum Environmental Criteria for the procurement of light sources for public lighting, the procurement of public luminaires, and the award of contracts for the design of public lighting systems) are authorised to carry out lighting design work.

the contents of the DAIE, as well as the potential impacts on the species listed in Annexes II and IV to Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, and in Annex I to Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds;

b) the lighting shall be of the grazing type, directed from top to bottom, and shall comply with the provisions of Articles 3 to 5 of this Regulation;

c) In cases where the use of grazing illumination, directed from top to bottom, is demonstrably impracticable, and exclusively in respect of monuments and architectural structures classified as cultural heritage or for which a declaration of cultural interest⁶ has been made pursuant to Article 10(1) and Article 10(3)(a) and Article 13 of Legislative Decree No. 42 of 22 January 2004 (Code of Cultural Heritage and Landscape, pursuant to Article 10 of Law No. 137 of 6 July 2002), lighting from bottom to top or, in any event, with a different orientation, shall be permitted where one of the following alternative conditions is met:

i. it is planned to be switched off by midnight and until dawn;

ii. during the design phase, the operating hours – where these differ from those set out in point (i) of this letter – the operating procedures and the lighting control settings shall be submitted and assessed;

d) for installations consisting of historic luminaires that are classified as cultural heritage or for which a declaration of cultural interest has been issued pursuant to Article 10, paragraph 1 and paragraph 3(a), and Article 13 of Legislative Decree No 42 of 22 January 2004, in cases where the work concerns individual luminaires and is carried out to restore the system's functionality, with the aim of conservation and preserving the historical record (integration or replacement of damaged or non-functioning luminaires with equivalent alternatives), the adaptation and refurbishment of such luminaires is permitted, by way of derogation from Article 3(1)(a)(i) of these Regulations, whilst ensuring that the luminous flux emitted does not exceed the original value. Where the historic luminaires are completely replaced with new luminaires, the latter shall comply with the provisions laid down in Article 3(1)(a)(i) of this Regulation.

15. In the cases referred to in point (c) of paragraph 14 of this Article, the lighting must be designed using the calculation parameters set out in the UNI 10819 standard, and specifically:

a) the luminous flux must remain within the outline of the structure, and the proportion of the flux not intercepted by the outline shall not exceed 10% of the nominal flux emitted by the system as a whole ($R_{fd} \leq 10\%$);

b) the average maintained illumination of the surface to be illuminated shall not exceed that shown in the following table.

Classification area	Upper limit relating to the average illumination maintained on the surfaces to be illuminated (lx)
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⁶ A 'declaration of cultural interest' is the formal measure that recognises the archaeological significance of sites, monuments, collections and individual artefacts, whether publicly or privately owned. Article 39(2)(a), (b) and (c) of Prime Ministerial Decree No 171 of 2014 conferred on the Regional Committees on Cultural Heritage the power to decide on the adoption of measures to verify and declare cultural interest.

Areas subject to special protection against light pollution, as referred to in Article 9 of 'the Law'	5
Areas with a low contribution to light pollution	10
Rural areas or areas where human activities can be adapted to a low light level of the surrounding environment (areas not included in the other three zones defined in this column of the table)	15
Urbanised areas, such as those classified as Zones A, B and C in accordance with Interministerial Decree No 1444 of 2 April 1968, as amended and supplemented.	20

Table 1: - average illuminance maintained in the case of architectural lighting of buildings, structures and monuments

Article 7

(Procedures for the municipalities' exercise of their supervisory and control functions)

1. Local authorities shall carry out the supervisory and control functions referred to in Article 6(3) of 'the Law' by means of:

- a) the verification of the communication by the operators of external public lighting systems of the data relating to these systems, referred to in Article 8 of 'the Law';
- b) verification of the presence of the documentation referred to in Article 8 of this Regulation, for public outdoor lighting installations;
- c) verification of delivery of a copy of the declaration of conformity referred to in Article 9 of this Regulation, for private outdoor lighting systems;
- d) verification of the delivery of the documentation referred to in Article 10 of this Regulation for lighting installations and appliances dedicated to specific areas;
- e) random checks or, following a specific and substantiated report from third parties, checks on the documentation received pursuant to Articles 8, 9 and 10 of this Regulation, as well as on-site inspections.

2. Municipalities may request additional information to supplement the documentation received to verify that the installation complies with the terms and provisions of 'the Law' and this Regulation before taking the measures referred to in Article 6(3) and (4) of 'the Law'.

3. Where local authorities establish that a facility does not comply with the terms and provisions of 'the Law' and of this Regulation, and consequently exercise the powers set out in Article 6, paragraphs 3 and 4 of 'the Law', they shall report the non-compliance found:

- a) to the relevant local Chamber of Commerce, Industry, Crafts and Agriculture, in the case of installation or construction firms;

- b) to professional bodies, associations and organisations recognised under Law No 4 of 14 January 2013 (Provisions concerning unregulated professions) with regard to technicians authorised to draw up the technical documentation referred to in this Regulation.

Art. 8

(Documentation for the design, installation and operation of outdoor public lighting systems)

1. Subject to compliance with sector-specific regulations ⁷, the documentation referred to in the following subparagraphs for external public lighting installations must be prepared by the contracting public entity or the contracting authority (also through a person appointed by the latter). The same documentation is filed under the records of the municipality with territorial jurisdiction.
2. For new systems and the renovation of outdoor public lighting systems, an authorised technician⁵ must prepare an approved lighting design in accordance with the requirements set out in technical standard UNI 11630 'Light and lighting – Criteria for drafting the lighting design'. This project must contain at least the following documentation:
 - a) a general report describing in detail the lighting system to be built, including appropriate graphics and the criteria used for the design choices, including by means of appropriate technical documentation; this report shall clearly state compliance with the provisions of Articles 3 and 5 of this Regulation, in so far as they are relevant;
 - b) clear, adequate and repeatable lighting calculations showing compliance with the requirements of Article 3(1)(a)(viii) or Article 3(1)(b)(i) of this Regulation, depending on the type of intervention;
 - c) a maintenance plan, the purpose of which is to prepare, throughout the lifetime of the installation, for the maintenance over time of the functional characteristics of the structure;
 - d) installation instructions for luminaires, to comply with the provisions of Article 3(1)(a)(i) or Article 3(1)(b)(i) of this Regulation, depending on the type of intervention;
 - e) a cost analysis report for the life cycle of the installation⁸, taking into account a time period of not less than 20 years, with reference to the choices made in the maintenance plan accompanying the project; this report must indicate the consumption and energy savings that can be achieved;
 - f) the 'Declaration of design compliance with Regional Law No 31 of 5 October 2015', as set out in Annex 2 to this Regulation.

⁷ The following are cited in particular, though this list is not exhaustive: Ministerial Decree No 37 of 22 January 2008 'Regulations concerning the implementation of Article 11-quaterdecies, paragraph 13, letter a) of Law No 248 of 2 December 2005, reorganising the provisions governing the installation of systems within buildings' and subsequent amendments and additions, Legislative Decree No 36 of 31 March 2023 'Public Contracts Code implementing Article 1 of Law No 78 of 21 June 2022, delegating powers to the Government in the field of public contracts' and subsequent amendments and additions.

⁸ Life Cycle Cost Analysis (LCCA, also referred to as Total Cost of Ownership – TCO) is an economic tool that makes it possible to assess all the costs relating to a given component or system, from 'the cradle to the grave'. Account is taken of initial costs (purchase, installation, etc.), operating costs (energy costs, maintenance, financial charges, etc.), up to disposal and recovery costs. This tool makes it possible to optimise the costs of a component or an entire system and its use during the purchase phase, it is also suggested in UNI CEI EN 50001 Energy Management Systems and in the Minimum Environmental Criteria (CAM) for public lighting drawn up by the Ministry of the Environment and Protection of Land and Sea.

535 3. In the event of the replacement of luminaires, a lighting design must be drawn up by a qualified technician⁵ in
536 accordance with the requirements set out in the UNI 11630 standard; this must include, at a minimum, the
537 documentation referred to in paragraph 2(a), (b), (c), (d) and (f).
538 4. When drawing up the documentation referred to in paragraphs 2 and 3 above, attention must also be paid to
539 any additional or even different requirements linked to the specific areas referred to in Articles 5 and 6 of this
540 Regulation.
541 5. In the case of new installations, refurbishment of existing installations and replacement of luminaires, at the
542 end of the works, the manufacturer or installer issues the 'Declaration of Installation Conformity to Regional
543 Law No 31 of 5 October 2015' in Annex 3 to this Regulation; the developer sends a copy of this document to
544 the territorially competent municipality. The declaration referred to in the first sentence shall be accompanied,
545 for each model of luminaire used, by the 'Declaration of conformity of the luminaires with Regional Law No
546 31/15, as amended, and of the veracity of the measurements and photometric data' referred to in Annex 4 to
547 this Regulation.

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Art. 9

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(Documentation for the design, installation and operation of private outdoor lighting systems)

551 1. Without prejudice to compliance with sectoral legislation⁹, in the case of new private outdoor
552 lighting installations, the refurbishment of existing installations or the replacement of lighting
553 equipment relating to such installations, at the end of the works, the manufacturer or installer shall
554 issue the client with a 'Declaration of Installation Conformity to Regional Law No 31 of
555 5 October 2015', set out in Annex 3 to this Regulation; the owner of the installation to the
556 municipality with territorial jurisdiction sends a copy of this document. The 'Declaration of
557 Conformity of Illuminating Devices with Regional Law No 31/15 and of Veracity of Measurements
558 and Photometric Data' in Annex 4 to this Regulation is attached to the declaration referred to in the
559 first sentence for each model of luminaire used.

560 2. Where the circumstances referred to in Article 4(1)(b) of this Regulation apply, a report must be
561 drawn up by a qualified technician⁵, containing appropriate lighting verification calculations, in
562 accordance with the provisions of section 5.4.4.1 of the UNI 11630 standard; this report shall be
563 attached to the 'Declaration of Conformity of Installation with Regional Law No 31 of
564 5 October 2015', referred to in Annex 3 to this Regulation, issued, at the end of the works, by the
565 construction or installation company. This declaration must be accompanied by a 'Declaration of
566 Conformity of Illuminating Devices with Regional Law No 31/15 and of Veracity of Measurements
567 and Photometric Data', as set out in Annex 4 to this Regulation, for each model of illuminating
568 device used.

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Art. 10

30 ⁹In particular, without limitation, reference is made to Ministerial Decree No 37 of 22 January 2008 laying down 'Regulations concerning
31 the implementation of Article 11-quaterdecies, paragraph 13(a) of Law No 248 of 2 December 2005, rearranging provisions concerning
32 the installation of systems in buildings', as amended and supplemented.
33

**(Documentation for the design, installation and operation of outdoor lighting systems and
luminaires intended for specific applications)**

1. For the systems referred to in Article 6, paragraphs 1 to 8, 11 and 12, subject to compliance with the relevant sectoral regulations⁷, upon completion of the works, the contractor or installer shall issue the 'Declaration of Conformity of Installation in accordance with Regional Law No 31 of 5 October 2015' in Annex 3 to this Regulation; a copy of that document shall be sent by the developer or owner of the system to the municipality with territorial jurisdiction.
2. The installations referred to in Article 6 (1) (d), if they are publicly owned, shall comply with the provisions of Article 8 to this Regulation; if they are privately owned, a report must be produced by a qualified technician⁵, together with appropriate lighting verification calculations, in accordance with point 5.4.4.1 of standard UNI 11630 demonstrating the provisions of Article 6 (1) (b) and (d) of this Regulation; this report shall be annexed to the 'Declaration of Installation Conformity to Regional Law No 31 of 5 October 2015' referred to in Annex 3 to this Regulation, issued at the end of the works by the construction or installation company.
3. For the installations referred to in Article 6(2), a lighting design must be drawn up by a qualified technician⁵, in accordance with the requirements set out in the UNI 11630 standard, to demonstrate compliance with the provisions of the same Article 6, insofar as they are relevant; the designer shall also provide the 'Declaration of Conformity of the Design with Regional Law No 31 of 5 October 2015', as set out in Annex 2 to this Regulation.
4. For the installations referred to in Article 6(4) to (6) of this Regulation, having a gross surface area of more than 5 square metres and constructed in negative relief¹⁰, a report containing appropriate lighting design verification calculations, in accordance with point 5.4.4.1 of standard UNI 11630, shall be prepared by a qualified technician⁵ to demonstrate compliance with the provisions laid down in Article 6(4)(b) of this Regulation; this report shall be annexed to the 'Declaration of Installation Conformity to Regional Law No 31 of 5 October 2015' referred to in Annex 3 to this Regulation, issued at the end of the works by the construction or installation company.
5. For the installations referred to in Article 6(7) of this Regulation, a report containing appropriate lighting design verification calculations, in accordance with point 5.4.4.1 of standard UNI 11630, shall be prepared by a qualified technician⁵ to demonstrate compliance with the provisions laid down in Article 6(7)(a) and (b) of this Regulation; this report shall be annexed to the 'Declaration of Installation Conformity to Regional Law No 31 of 5 October 2015' referred to in Annex 3 to this Regulation, issued at the end of the works by the construction or installation company.
6. The Installations referred to in Article 6(12) of this Regulation, if publicly owned, must comply with the provisions of Article 8 of this Regulation; if privately owned, a report must be produced by a qualified technician⁵, containing appropriate lighting verification calculations in accordance with point 5.4.4.1 of the UNI 11630 standard, designed to demonstrate compliance with the provisions of that article insofar as they are relevant. This report is attached to the 'Declaration of Installation Conformity' to Regional Law No. 31 of 5 October 2015' referred to in Annex 3 to this Regulation, issued at the end of the works by the construction or installation company.

¹⁰ Negative signs, meaning those with a dark background and lighter lettering and logos, or, alternatively, a perforated, non-backlit background as defined in Note 4.

611 7. For the systems referred to in Article 6(14) of this regulation, a lighting design must be prepared,
612 drawn up by an authorised technician⁵, in accordance with the requirements of standard UNI 11630,
613 to demonstrate the provisions of the same article insofar as they are relevant; the designer must also
614 produce a 'Declaration of Conformity of the Design with Regional Law No 31 of 5 October 2015', as
615 set out in Annex 2 to this Regulation.

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Article 11

(Specific provisions for the drafting of the Outdoor Lighting Analysis Document)

619 1. The detailed content required for the drafting of the Outdoor Lighting Analysis Document,
620 hereinafter 'DAIE', which must be approved, in accordance with current legislation, within the time
621 limits set out in Article 7(2) of 'the Law', is set out in Annex 5 to this Regulation.

622 2. The professional who draws up the DAIE declares, pursuant to Article 47 of Presidential Decree
623 No 445 of 28 December 2000 (Consolidated Act on Legislative and Regulatory Provisions
624 Concerning Administrative Documentation), the absence of any conflicts of interest that might
625 compromise their independence and impartiality of judgement. To this end, they must disclose
626 any professional, financial or contractual relationship – whether ongoing or having ceased within
627 the previous twelve months – with economic operators active in the lighting sector and relating to
628 the territory of the municipality concerned. The municipality shall assess, based on concrete and
629 documented circumstances, the possible existence of a conflict of interest and shall exclude the
630 professional only if the conflict cannot be effectively removed or managed.

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Article 12

(Publication of the data referred to in Article 5(4) of 'the Law')

635 1. Pursuant to Article 5(1) of 'the Law', the regional spatial information system, hereinafter referred
636 to as 'SIT', as referred to in Article 3 of Regional Law No 12 of 11 March 2005 (Provisions on spatial
637 planning), is to be supplemented with data relating to public outdoor lighting installations.

638 2. The information and data are provided in accordance with the provisions of the ministerial decree
639 referred to in paragraph 2 of Article 5 of 'the Law' and supplied by the local authorities in accordance
640 with the timetable set out in paragraph 3 of the same Article 5 of 'the Law'.

641 3. In accordance with Directive (EU) 1024 of the European Parliament and of the Council of
642 20 June 2019 on open data and the re-use of public sector information, data and technical
643 information relating to outdoor public lighting installations are made available to members of the
644 public, local authorities and economic operators interested in operating in this specific sector.

645 4. The information, except information which cannot be disclosed for reasons of confidentiality or
646 industrial secrecy, is published in the appropriate section of the website
647 <https://www.dati.lombardia.it>.

648 5. To make them accessible, and in accordance with Legislative Decree No 82 of 7 March 2005
649 (Digital Administration Code), the Region makes the data and information referred to in this article
650 available in an open format (IODL 2.0).

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Article 13
(Final provisions)

655 **1.** Any updates or amendments to Annexes 1 to 4 and the Appendices to this Regulation shall be
656 approved by executive decree of the Regional Directorate responsible for outdoor lighting.

657 **2.** Amendments to Annex 5 to this Regulation are approved by resolution of the Regional Executive.

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Article 14
(Entry into force)

662 **1.** This Regulation shall take effect 15 days after its publication in the Official Gazette of the Italian
663 Republic.

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Illustrative guidelines for the inspection of small-scale installations

The following discussion constitutes an illustrative guideline for verifying the requirements for classifying an outdoor lighting installation as 'small-scale', pursuant to Article 2(1)(a) of the Regulation referred to in Article 4(2) of Regional Law 31/2015.

The small-scale installation is excluded from the application of Regional Law No 31 of 5 October 2015 and its implementing regulation (hereinafter the 'Regulation'), as provided for in Article 3(1)(b) of Regional Law 31/2015.

Article 2(1)(a) of the Regulation defines:

a) small-scale system: *an outdoor lighting system connected to a single distribution board or a metered electricity supply, which meets all of the following conditions:*

- i. *luminous flux emitted by a single light source, or by a group of light sources, in a single luminaire, not exceeding 1,200 lumens;*
- ii. *total number of luminaires not exceeding ten units;*
- iii. *total flux emitted upwards not exceeding 1,800 lumens.*

Article 5(1)(a) of the Regulation for areas of particular protection against light pollution, referred to in Article 9 of Regional Law 31/2015 (recognised astronomical observatories, national parks, etc.) reduces the maximum total upward light output for small-scale installations as follows:

a) *to the definition of small installation, referred to in Article 2(1)(a) of this Regulation, a 50% reduction in the maximum value of the total flow provided for in point (iii) of paragraph 1(a) of the same Article 2 shall be applied.*

Based on the above definitions, it is possible to carry out the following checks already at the time of purchase of the light sources:

- **Correlated Colour Temperature (CCT):** the permissible colour temperature for lighting installations in external private areas is equal to or less than 3000 K. This temperature is generally indicated with the commercial notation 'Warm White' on sales packages;
- **luminous flux of the light source (lamp):** the luminous flux to be taken into account is that stated on the light source(s) and/or on the retail packaging. Since 2009, as a result of the EU Ecodesign Regulations, light sources sold separately from luminaires must indicate on their packaging (and since 2021 also on the source itself) the value of the useful luminous flux.

ASSESSMENT OF THE CRITERIA FOR CLASSIFYING AN OUTDOOR LIGHTING SYSTEM AS 'SMALL-SCALE'

To assess whether the conditions are met for classifying an outdoor lighting installation as 'small-scale' (Article 2(1)(a) of the Regulation), it is necessary to ascertain, as a preliminary matter, that the following condition is met:

- *luminous flux emitted by a single light source, or by a group of light sources, in a single luminaire, not exceeding 1,200 lumens;*

if the previous condition is NOT met, the installation subject to verification is NOT classified as of SMALL-SCALE and, therefore, is subject to compliance with the provisions of Regional Law 31/2015 and of the Regulation; if the above condition is met, a simplified methodology is set out below for the simultaneous fulfilment of both conditions relating to the maximum number of appliances and the total flow emitted upwards.

The methodology refers to technical standard UNI 10819¹¹ '*Light and lighting – External lighting installations – lighting quantities and calculation procedures for the assessment of the dispersion of light upwards*', which prescribes the simplified calculation and verification methods for the assessment of the dispersion of light upwards from artificial light sources of lighting systems in outdoor areas.

Defined R_n as the percentage emission of luminous flux of the lighting installation upwards in the installation conditions of all the lighting equipment concerned (see point 4.2 of the UNI 10819 standard), assuming that the light sources and their related appliances are the same and installed in the same way, the same R_n can take one of the following values:

- **Real**, if the photometric data of the luminaires are known and available;
- **simplified** (as per UNI 10819), equal to $R_n=0, 20, 50, 100\%$ as shown in the examples below and marked with letters (a) to (d).

PLEASE NOTE: an $R_n=0\%$ indicates complete upward shielding; in this case, the conditions relating to the luminous flux emitted by a single light source, or by a group of light sources, from a single luminaire, and to the maximum number of luminaires that may be installed, must still be met.

the maximum number of units 'n' permitted in a small-scale installation (rounded down to the nearest whole number), with a limit of ten units, across **the entire region (Article 2, paragraph 1, letter a) of the Regulation** is equal to:

$$n = 1800 / (\text{luminous flux of a single luminaire} \bullet R_n)$$

the maximum number of luminaires 'n' permitted in a small-scale installation (rounded down to the nearest whole number), subject to a limit of ten luminaires, in the **areas subject to special protection against light pollution, as referred to in Article 9 of the Regional Law 31/2015** is equal to:

$$n = 900 / (\text{luminous flux of a single luminaire} \bullet R_n)$$

The table below shows the results of calculating the maximum number of units for some common scenarios that can be installed in a small-scale system.

Example of calculation of the maximum number of luminaires admissible in a small-scale installation			
Luminous flux emitted by the light source(s) of the individual luminaire	Upward emission % [R_n]	The entire region (Article 2(1)(a))	Areas requiring special protection against light pollution (Article 5(1)(a))
>1200 lm		Nessuno	Nessuno

¹¹ The UNI, CEI and CIE technical standards referred to are deemed to be tacitly superseded by the most recent version, unless they are no longer in force or have been updated.

≤ 1200 lm	$R_n = 0\%$	10	10
1200 lm	$R_n = 50\%$	$1800 / (1200 \cdot 0,5) = 3$	$900 / (1200 \cdot 0,5) = 1,5 \rightarrow 1$
1200 lm	$R_n = 30\%$	$1800 / (1200 \cdot 0,3) = 5$	$900 / (1200 \cdot 0,3) = 2,5 \rightarrow 2$
1200 lm	$R_n = 20\%$	$1800 / (1200 \cdot 0,2) = 7,5 \rightarrow 7$	$900 / (1200 \cdot 0,2) = 3,75 \rightarrow 3$
1200 lm	$R_n = 10\%$	$1800 / (1200 \cdot 0,1) = 15 \rightarrow \text{max } 10$	$900 / (1200 \cdot 0,1) = 7,5 \rightarrow 7$
800 lm	$R_n = 50\%$	$1800 / (800 \cdot 0,5) = 4,5 \rightarrow 4$	$900 / (800 \cdot 0,5) = 2,25 \rightarrow 2$
800 lm	$R_n = 30\%$	$1800 / (800 \cdot 0,3) = 7,5 \rightarrow 7$	$900 / (800 \cdot 0,3) = 3,75 \rightarrow 3$
800 lm	$R_n = 20\%$	$1800 / (800 \cdot 0,2) = 11,25 \rightarrow \text{max } 10$	$900 / (800 \cdot 0,2) = 5,62 \rightarrow 5$
800 lm	$R_n = 10\%$	$1800 / (800 \cdot 0,1) = 22,5 \rightarrow \text{max } 10$	$900 / (800 \cdot 0,1) = 11,25 \rightarrow \text{max } 10$
400 lm	$R_n = 50\%$	$1800 / (400 \cdot 0,5) = 9$	$900 / (400 \cdot 0,5) = 4,5 \rightarrow 4$
400 lm	$R_n = 30\%$	$1800 / (400 \cdot 0,3) = 15 \rightarrow \text{max } 10$	$900 / (400 \cdot 0,3) = 7,5 \rightarrow 7$
400 lm	$R_n = 20\%$	$1800 / (400 \cdot 0,2) = 22,5 \rightarrow \text{max } 10$	$900 / (400 \cdot 0,2) = 11,25 \rightarrow \text{max } 10$
400 lm	$R_n = 10\%$	$1800 / (400 \cdot 0,1) = 45 \rightarrow \text{max } 10$	$900 / (400 \cdot 0,1) = 22,5 \rightarrow \text{max } 10$

At the end of this section, there is a flowchart to follow to determine whether the plant can be classified as being of 'SMALL-SCALE'.

ILLUSTRATIVE EXAMPLES OF COMMON LUMINAIRES' SHIELDING SYSTEMS

a. Fully shielded luminaires: light emitted exclusively downwards

The percentage of the total luminous flux emitted upwards by a single luminaire R_n is conventionally defined as **0%** of the luminous flux of the light source.

Ceiling lights (direct downward light)	Horizontal projectors (Parallel to the ground)	Posts or Bollard	Recessed spotlights (wall-mounted with the light source set back)
			
			

b. Unshielded upward-facing luminaires (e.g. recessed in the ground)

The percentage of the total luminous flux emitted upwards by a single luminaire R_n is conventionally defined as **100%** of the luminous flux of the light source.

Ceiling lights (facing upwards)	Projectors (upwards)	Posts - Bollard	Recessed ground luminaires
			

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766 **c. Luminaires with unobstructed light emission (without shields or elements to control the direction**
 767 **of light emission), such as bare globes, bare bulbs, recessed wall lights, vertical spotlights and other**
 768 **similar cases**

769 The percentage of the total luminous flux emitted upwards by a single luminaire R_n is
 770 conventionally defined as **50%** of the luminous flux of the light source.

Ceiling lights / Appliques (wall-mounted with free diffusion)	Vertical projectors or those tilted by more than 30°	Posts or Bollard (With free diffusion)	Recessed lights (free-diffusion wall)
			
			
			
			

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773 **d. Luminaires with light emitted downwards, or luminaires angled downwards and/or partially**
774 **shielded upwards; including shielded spherical and mushroom-shaped luminaires, luminaires with**
775 **curved glass and/or angled luminaires, and other similar cases**

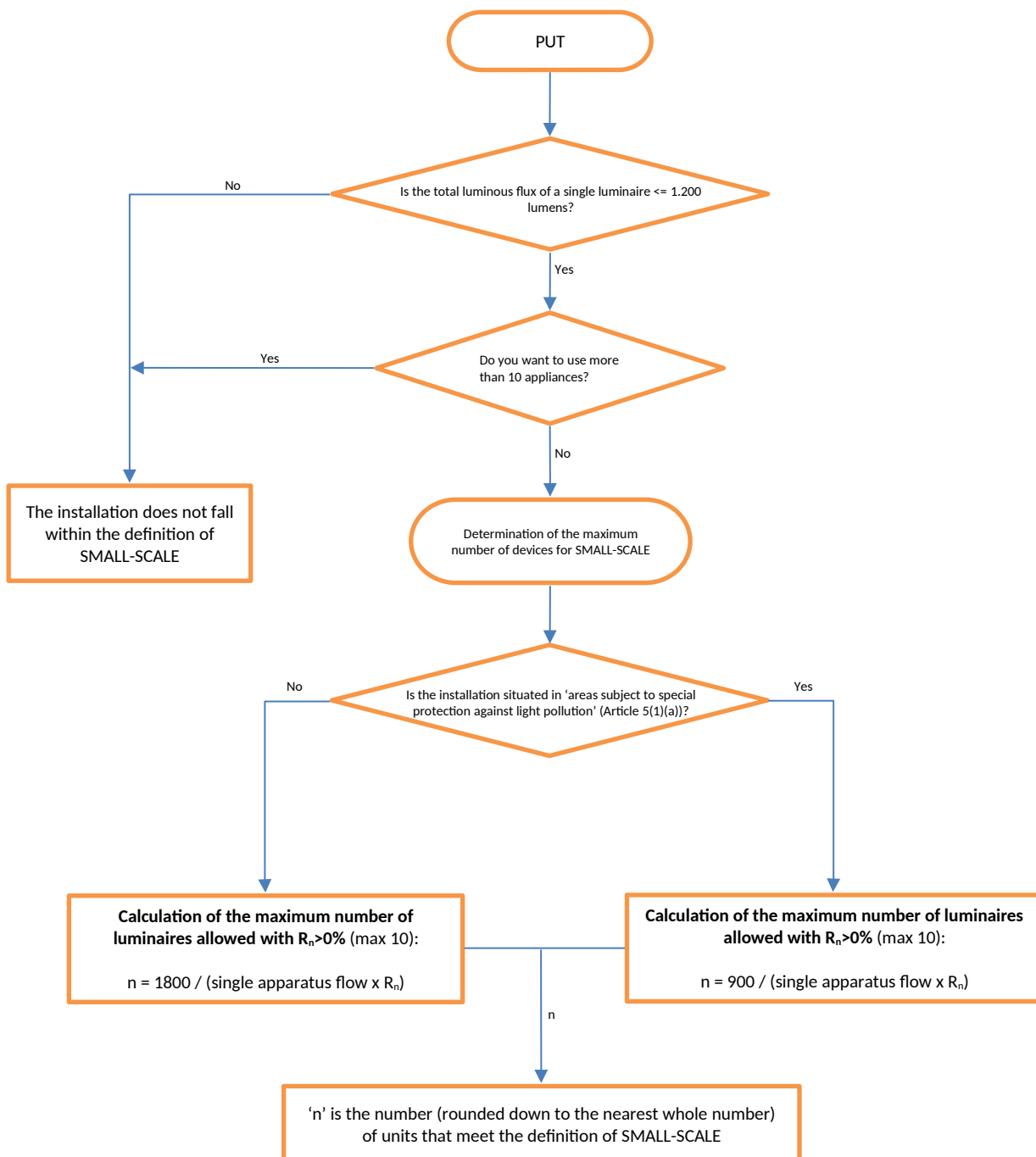
776 The percentage of the total luminous flux emitted upwards by a single luminaire R_n is
777 conventionally defined as **20%** of the luminous flux of the light source.

Ceiling lights (pointing downwards or partially shielded)	Spotlights angled less than 30°	Posts or bollards (partially shielded)	Recesses (partially screened walls)
			

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PROCESS FOR IDENTIFYING SMALL-SCALE INSTALLATIONS
(Article 2(1)(a) of the Regional Regulation on outdoor lighting)

- Select the desired **Correlated Colour Temperature**, which, for outdoor lighting installations in private settings, must be 3000 K or less. This temperature is generally indicated by the commercial designation 'Warm White' on the product packaging.
- Know the **luminous flux** of the source (lamp), which is declared on the light source(s) and/or on the commercial packaging(s).



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Simplified method of assessing obtrusive light on windows

A1.1 The procedures in this appendix are to be considered suitable for the assessment of specific cases relevant to lighting systems already designed in accordance with the criteria set out in Articles 3, 4, 5 and 6 of the Regulation referred to in Article 4(2) of Regional Law No 31/2015, in so far as relevant, in relation to the criterion of intrusive light.

A1.2 The design compliance of these lighting systems with reference to the criterion of intrusive light is already determined by the procedures prescribed in standard UNI 10819 'Light and lighting - Outdoor lighting systems - lighting technical quantities and calculation procedures for assessing the upward dispersion of the luminous flux', as specified in Article 2(4) of the Regulation referred to in Article 4(2) of Regional Law No 31/2015.

A1.3 All lighting installations falling within the scope of the Regulation, as referred to in Article 4(2) of Regional Law 31/2015, whether existing or newly constructed, and, in the event of a specific dispute raised by parties who consider themselves to be affected by intrusive light, may be assessed by the competent authority using the on-site measurement procedure set out in point A1.6, with a view to providing technical input that may be useful in resolving the dispute in question.

A1.4 The phenomenon of intrusive light entering through the window may arise from a combination of light contributions from multiple sources, including those external to the lighting system that is the subject of the complaint; it is therefore necessary to determine whether the contribution to the phenomenon in question is **predominantly** caused by the system in question, or whether the intrusive light as a whole is predominantly caused by factors external to the aforementioned lighting system under specific assessment.

A1.5 The predominant responsibility of the lighting installation under assessment shall be quantified if its contribution to the phenomenon under assessment is at least 70% or more of the total lux measured at the measuring points $P_{m,x}^{(x=1..n)}$ by means of the following simplified measurement procedure.

A1.6 The total maximum tolerable value on window $E_{v,lim}$, which is determined by the sum of the light contributions generated by several sources, is given in Table A.1.

Land use type	Light on the windows $E_{v,lim}$ lux (maximum value)
Areas subject to special protection against light pollution pursuant to Article 9 of the Law	2
Areas with a low contribution to light pollution Rural areas or, in any case, areas where human activities can adapt to low ambient light levels (areas not included in the other three zones defined here)	5
Areas with a moderate degree of urbanisation, such as those classified as Zone C under Interministerial Decree No 1444 of 2 April 1968, as amended and supplemented.	10
Densely urbanised areas, such as those included in Zones	25

A and B as set out in Interministerial Decree No 1444 of 2 April 1968, as amended and supplemented.	
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Table A.1 Indicative values for obtrusive light assessments

A1.7 Procedure for measuring vertical illumination on windows:

1. in the case of window(s) and/or French window(s), the width and height of each section of the window through which light passes shall be taken into account, excluding the areas occupied by the window frames and any shutters (including louvres and roller shutters), with a single measurement point being determined P_m at the midpoint of each transparent vertical surface of the windows being assessed;

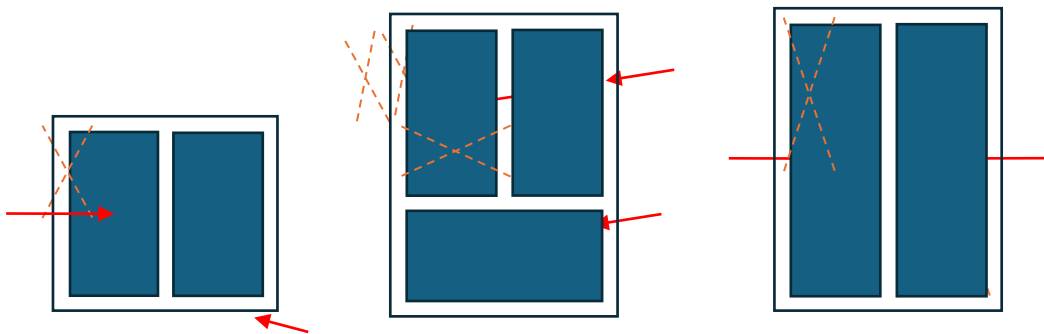


Figure A.1

2. the lux meter shall be placed on the vertical plane of the window, inside and with a closed window, at the smallest possible distance from the transparent surface (usually from the glass);
3. in the room relevant to the window under verification, each light source shall be switched off;
4. the following measurements shall be taken:
 - a) the reading of the total intrusive light ($E_{v,tot}$) is carried out sequentially for each of the points P_m ; therefore, the lux meter measures the contributions that come simultaneously from all the light sources that can determine the value of the reading and that are facing the window in question;
 - b) once the measurements referred to in point (a) have been carried out, the light sources relevant to the lighting system under investigation shall be switched off and a second sequence of measurements of the residual intrusive light ($E_{v,res}$) shall be carried out at the points P_m ;
5. the maximum measured $E_{v,tot}$ value is defined as $E_{v,max}$ and shall be used for the continuation of the evaluation;
6. given the values of $E_{v,max}$ and the corresponding $E_{v,res}$ measured at the same point, their difference is calculated as follows:
 - a) if $E_{v,max}$ is $> E_{v,lim}$ (relevant limit given in Table A.1) and $E_{v,max} - E_{v,res} \geq 70\%$ of $E_{v,max}$ then this difference is considered as a **substantial contribution** to the exceedance of the tolerable value of intrusive light on windows $E_{v,lim}$ and therefore the person responsible for the installation being verified will be held responsible for the phenomenon of intrusive light;

- 903 b) if $E_{v,max}$ is $> E_{v,lim}$ (relevant limit given in Table A.1) but $E_{v,max} - E_{v,res} < 70\%$ of $E_{v,max}$ then
904 this difference does not appear to be a substantial contribution to the exceedance
905 of the tolerable value of intrusive light on the windows $E_{v,lim}$, thus the system being
906 verified will be considered partially responsible for the phenomenon of intrusive
907 light for the relevant portion, and action to mitigate its contribution may be
908 required on this value if this is higher than the limit in lux of the immediately lower
909 category referred to in Table A.1;
- 910 c) if $E_{v,max}$ is $>$ the relevant limit set out in Table A.1 and if the share calculated for the
911 lighting system during the verification is $< 70\%$ of $E_{v,max}$ is less than the limit in lux of
912 the immediately lower category referred to in Table A.1, then the analysis of the
913 system subject to verification shall be discontinued and the same procedure may
914 be repeated for the other systems;
- 915 d) if $E_{v,max}$ is $<$ than the relevant limit set out in Table A.1, the lighting system shall in
916 any case be deemed to comply with the principles of the regulation referred to in
917 Article 4(2) of the Regional Law 31/2015.
- 918

Guidelines for tender specifications for adaptive lighting

All public lighting refurbishment projects involving the introduction of adaptive lighting technologies in accordance with the UNI 11248 standard 'Street lighting – Selection of lighting categories' and UNI EN 13201 standard 'Street lighting' should include the following provisions in their tender specifications to ensure the long-term proper functioning of such systems:

1. The required remote control systems must offer guarantees of accessibility and reliability of the systems and infrastructure over time, through:
 - a) the availability of the proposed technologies or compatible technologies that do not require significant modifications to the remotely controlled system originally supplied;
 - b) supply of remote management modules for switchboards and lighting points, fitted with a remote digital georeferencing system to facilitate configuration and management;
 - c) the supply of remote management modules that guarantee failure rates at least equivalent to those specified for LED lighting fixtures as set out in point 4.2.3.10 of the Annex to the Ministerial Decree of 27 September 2017 (Minimum Environmental Criteria for the procurement of light sources for public lighting, the procurement of public luminaires, and the award of contracts for the design of public lighting systems) and subsequent amendments and additions;
2. management shall be required to ensure the correct functioning of the remote management system by:
 - a) daily archiving of an image of the entire remote control system and its data as a copy (backup) allowing recovery in case of malfunction and in the shortest possible time;
 - b) preparation of an annual operational report for the owner of the installations, setting out the energy and environmental results achieved;
 - c) a suitable technical support structure available throughout the term of the contract;
 - d) the performance of constant monitoring of the operation, through periodic testing and timely application of the preventive maintenance plan;
 - e) the establishment of a dedicated stock of small quantities of spare parts, so that operations can be restored within a reasonably short period of time, to maintain the required safety levels;
 - f) taking out specific insurance to cover malfunctions or accidental events;
3. as regards testing activities, the contracting authority shall, without prejudice to the provisions of Legislative Decree No 36/2023 'Public Procurement Code', as amended and implemented, select professionals capable of verifying the following:
 - a) traffic and luminance sensors (if any);
 - b) extensive adjustment of the related light points, for each sensor and its area of influence;
 - c) correct operation under all operating conditions: standard, low-traffic, reduced visibility and/or adverse weather conditions;
 - d) monitoring of trends in calculated luminance values, based on measurements of illuminance and power, with deviations not exceeding 10% from the design value, and their variation in relation to traffic and visibility;
 - e) a remote monitoring platform that must be capable of displaying all the required parameters and recording actual consumption figures both under unregulated operating conditions and under static control conditions (excluding adaptive control).

**REQUEST FOR RECOGNITION AS AN AREA OF PARTICULAR PROTECTION AGAINST LIGHT POLLUTION
PURSUANT TO ARTICLE 9(1) OF REGIONAL LAW NO 31 OF 5 OCTOBER 2015**

I, the undersigned (surname)..... (first name).....
.....

born in (place) (prov.) on.....

residing at (place) (prov.)

in (address) n.....

IN THE CAPACITY OF

☐ Manager

☐ Legal representative of the Observatory Management

Association (identification name)

located in the municipality of
(prov.....)

in (address) n.....

owned by

REQUESTS

that, pursuant to Article 9(1) of Regional Law No 31 of 5 October 2015, an area of special protection against light pollution be designated in the vicinity of the aforementioned Observatory, covering an area of:

☐ Km of radius around the Observatory (up to 25 km).

To this end, we enclose the following documentation to support the assignment of the requested information:

1. a statement on the type of Observatory (professional, non-professional, of national, regional or provincial significance);
2. scientific research and/or dissemination programme of the Observatory;
3. justifications for the required safeguards, also in the light of points 1 and 2;
4. a map, drawn to an appropriate scale, showing the location of the Observatory and the area for which special protection is requested;
5. a list of the local authorities affected by the proposed special protection area.

In addition, the following documentation is attached:

.....
.....

Any correspondence should be sent to the following address (you may also provide a certified email address registered in the name of the applicant Observatory):

.....

Place date

Signature

.....

DECLARATION ON THE PROCESSING OF PERSONAL DATA

Region of Lombardy is the data controller and undertakes to comply with the provisions of the currently applicable legislation on the protection of personal data (Regulation (EU) 2016/679, Legislative Decree 196/2003 as amended by Legislative Decree 101/2018), as

1004 well as the provisions issued by the Italian Data Protection Authority. Personal data are processed, in compliance with the principle of
1005 minimisation and proportionality, exclusively for the purposes related to the execution of the activities referred to in Article 9(1) of
1006 Regional Law 31/2015, as amended. Personal data processed in the course of the activities referred to above will be retained for the
1007 'data retention' period specified by the Data Controller.

DECLARATION OF CONFORMITY OF THE PROJECT

TO REGIONAL LAW No 31 of 5 October 2015 and subsequent amendments

The undersigned
 Registered with the following professional body/association:
 registration number
 Lighting system designer (brief description):

DECLARES

on their own personal responsibility, that the installation has been designed in accordance with Lombardy Regional Law No 31 of 5 October 2015, 'Measures to improve the efficiency of outdoor lighting systems with a view to saving energy and consequently reducing light pollution', as amended and supplemented, and with the regulations referred to in Article 4(2) of Regional Law 31/2015, having in particular (please tick only the relevant boxes):

- ☐ the maximum permissible values for the distribution of the maximum luminous intensity for $\gamma \geq 90^\circ$ have been complied with;
- ☐ complied with the maximum permissible values for Correlated Colour Temperature or, alternatively, the maximum permissible proportion of radiant flux in the blue spectrum portion (wavelength between 350 and 480 nm);
- ☐ the system must be fitted with Class A0 or A1 luminous flux control devices (UNI 11431 'Light and lighting - Application of luminous flux control devices in road lighting') for lighting categories M and C, and at least Class A2 for lighting category P;
- ☐ the system must be fitted with astronomical clocks or equivalent equipment capable of ensuring that the system is switched on and off in accordance with current regulations;
- ☐ the maximum deviation of the lighting parameters (average luminance maintained - average illuminance maintained) from the minimum levels required is respected;
- ☐ having taken into account any instances of stray light, and identified solutions to maximise the utilisation factor;
- ☐ when assessed in accordance with the CIE 150 recommendations, there is a possibility of obtrusive light affecting residential or similar buildings;
- ☐ met the provisions of technical standard UNI 11630 'Light and lighting - Criteria for drawing up the lighting design' for the implementation of the lighting design;
- ☐ detailed in the executive lighting design all the elements for correct installation and in accordance with Regional Law 31/2015;
- ☐ complied with the specific provisions for lighting installations and appliances dedicated to specific areas as required by Article 6 of the Regulation, as set out in Article 4(2) of Regional Law 31/2015 and subsequent amendments and additions;
- ☐ The lighting design has been drawn up in accordance with the documentation listed below:
 - report proving compliance with the legal provisions of Regional Law 31/2015 and subsequent amendments and additions;
 - lighting design calculations and lighting design results (including any isoluminance and isoflux curves).

Annexes:

- ☐ certifications, technical documentation to support what is stated above.

DECLINES

1053 any liability should the installation company, after having been notified of the issue, nevertheless proceed to
1054 install the system in a manner that deviates from the design specifications, thereby rendering the system non-
1055 compliant with the Regional Law No 31 of 5 October 2015 and subsequent amendments and additions.

1056 Date..... : The designer

**DECLARATION OF CONFORMITY OF THE INSTALLATION
TO REGIONAL LAW No 31 of 5 October 2015 and subsequent amendments**

- I, the undersigned, , legal representative of the company

 with its registered office at No. ,
 postcode
 Municipality , Province ,
 tel.
 fax VAT number

☐ registered in the C.I.A.A. Register of Companies for the Province of under
 No
☐ registered in the Provincial Register of Artisan Businesses of under
 No
 system operator (schematic description):

 realizzato presso:
 Municipality:
 understood ☐ new installation ☐ refurbishment of existing installation
 as: ☐ replacement of luminaires
- DECLARES**
- on their own personal responsibility, that the installation has been carried out in accordance with Lombardy
 Regional Law No 31 of 5 October 2015, 'Measures to improve the efficiency of outdoor lighting systems with a
 view to saving energy and consequently reducing light pollution', as amended and supplemented, and with the
 regulations referred to in Article 4(2) of Regional Law 31/2015, having in particular (please tick only the
 relevant boxes):
- ☐ complied with the detailed design drawn up in accordance with Regional Law No 31 of 5 October 2015 and
 subsequent amendments and additions, issued by a qualified professional – Ref. Declaration of conformity
 of the project with Regional Law No 31 of 5 October 2015 dated and signed by the
 designer.....;
- ☐ the maximum permissible values for the distribution of the maximum luminous intensity for $\gamma \geq 90^\circ$ have
 been complied with;
- ☐ complied with the maximum permissible values for Correlated Colour Temperature or, alternatively, the
 maximum permissible proportion of radiant flux in the blue spectrum portion (wavelength between 350
 and 480 nm).
- Annexes:
- ☐ a declaration of conformity of the luminaires with Regional Law No 31/15, as amended and supplemented,
 and a declaration of the accuracy of the measurements and photometric data for each model of luminaire
 installed;
- ☐ relationship with appropriate lighting verification calculations, in accordance with point 5.4.4.1 of standard
 UNI 11630 'Light and lighting – Criteria for drawing up the lighting design'.

1099

1100

DECLINES

1101 any liability arising from tampering with the installation by third parties which may render the installation non-
1102 compliant with Regional Law No 31 of 5 October 2015 and subsequent amendments and additions.

1103

Date	The Declarant
------------	------------------------

LOGO AND HEADER

**DECLARATION OF CONFORMITY OF LUMINAIRES WITH REGIONAL LAW NO 31/15 AS AMENDED AND OF THE
VERACITY OF MEASUREMENTS AND PHOTOMETRIC DATA**

Place, Date

Technical manager of the photometric laboratory dat the company:

.....

Certificate number

I declare that the product:

Series or model:	
Optical:	
Colour temperatures (average colour temperature of the Gamma corners on the C-planes) expressed in Kelvin	
Percentage radiant flux in the blue spectrum portion (wavelength between 350 and 480 nm) only if the colour temperature referred to in the previous box is > 3 000 K or, for the areas referred to in Article 9 of Regional Law 31/2015, > 2 200 K	

It has been tested:

In the Laboratory of:	
------------------------------	--

in accordance with the instructions set out below:

Measuring system		Position of the device during the measurement:	
Measurement parameters		Measurement uncertainty	
Reference system		Applied symmetry	
Power Supply Voltage		Frequency	
Ambient temperature		Photometric centre	
Photocell distance		Flow uncertainty	
Maximum luminous intensity per gamma angle greater than or equal to 90° (in the measurement position):			Less than 0.49 cd/km
Reference Standards:	UNI EN 13032 Light and lighting – Measurement and presentation of photometric data of lamps and lighting equipment Part 1: Measurement and file format Part 2: Data presentation for indoor and outdoor workplaces Part 4: LED lamps, LED modules and luminaires		
Position of installation to meet the provisions of the Law:			
The appliance must be installed horizontally and strictly in accordance with the instructions in the user manual.			

The product therefore complies with the following laws relating to the containment of light pollution:

- Regional Law of Lombardy No 31/2015 and subsequent amendments and additions

Further declares

that the photometric data of the products listed above:

- ☐ are attached to this declaration in paper or digital format;
- ☐ are freely distributed in electronic format in accordance with the UNI 11733 standard 'Light and lighting – Specifications for a data interchange format for photometric and spectrometric data on luminaires and lamps', or Eulumdat, or an equivalent standard, and are managed under a quality control system on the

website:

1118 • that the photometric data for the products listed above have been collected within the laboratory itself, without
 1119 tampering or alterations other than those provided for in standard UNI/TS 11901 'Light and lighting – Symmetrisation of
 1120 photometric data' and are managed under controlled quality management and in accordance with sector standards;

1121 • that the spectrometric data set out in the tables for the products listed above were measured within the
 1122 laboratory itself, without any tampering or alteration, and are managed under a quality control regime and in accordance
 1123 with industry standards (only where the value of the percentage radiant flux in the blue portion of the spectrum
 1124 (wavelengths between 350 and 480 nm), has been reported):

☐ are attached to this declaration in paper or digital format;

☐ they are freely distributed in electronic form on the following
 website:

1125

1126

1127

1128 STAMP AND SIGNATURE OF THE OFFICIAL OF THE ISSUING LABORATORY

1129

1130

1131

Contents for the Outdoor Lighting Analysis Document – DAIE

Introduction and purpose of the document

Regional Law No 31 of 5 October 2015 on: ‘Measures to improve the efficiency of outdoor lighting systems with a view to saving energy and consequently reducing light pollution’, hereinafter referred to as ‘the Law’, defines, in Article 2(1)(c), the **outdoor lighting analysis document** (hereinafter referred to as ‘**DAIE**’) as a ‘municipal document for the census of outdoor lighting systems, identifying critical issues, opportunities and ways of requalification with a view to saving energy and reducing light pollution.’ This document is a tool which, by carrying out an ‘assessment’ of outdoor public lighting systems, enables various refurbishment and/or development solutions to be compared against one another from a holistic perspective, thereby facilitating a more rational management of outdoor public lighting networks.

The DAIE also identifies the future needs of public lighting installations, including through specific tools for their implementation.

Below, therefore, is a detailed outline of the main sections into which the DAIE should be organised, as well as a brief description of their minimum contents.

Outdoor lighting analysis document – DAIE

1. Foreword

A brief overview of the regulatory framework governing light pollution, a description of the purpose, objectives and scope of application of the DAIE, and an explanation of the stages of the study and the structure of the DAIE.

2. General characteristics of the territory

A description of the characteristics and distinctive features of the municipal area from a social, urban planning and topographical perspective, with a view to identifying the provisions and key factors for public lighting. Identification of potential areas in which similar types of installations could be implemented, and of any services that could be integrated with the outdoor public lighting system. Checking whether any areas within the municipal boundaries are subject to special protection against light pollution.

2.1. Territorial framework

The following shall be assessed:

- geographical position;
- boundaries and built-up areas;
- main morphological, environmental, climatic and natural characteristics;
- projections of population growth/decrease and any other statistical data relevant to the objectives of the document;
- infrastructure and road system;
- allocation of production, commercial activities, etc., and identification of possible services that can be provided in an integrated manner with external public lighting.

2.2. Ecological-environmental framework

The following shall be assessed:

- Ecological infrastructure: the Municipal Ecological Network or, in its absence, the Provincial Ecological Network or that of the Metropolitan City of Milan, highlighting all protected areas, ecological corridors and passageways;
- natural features of the landscape and any specific local characteristics (e.g. mining sites, caves, monumental trees as defined by Law No 10 of 14 January 2013, as subsequently amended and supplemented, etc.);
- the presence of architectural structures such as castles, historic palaces, towers, religious buildings, fortifications, strongholds, bridges, ancient aqueducts and underground archaeological sites, for the purpose of carrying out a preliminary assessment of the possible presence of protected species that are particularly sensitive to light pollution (e.g. bats, owls);
- wildlife, flora and vegetation, with particular reference to the habitats in Annex I and the species in Annexes II and IV to Directive 92/43/EEC or in Annex I to Directive 2009/147/EC for the purpose of assessing the sensitivity of these components to light pollution and highlighting the potential impacts, in compliance with Article 3 (7) of the Law.

If specificities linked to the aspects referred to in the previous paragraph are found, further analyses must be carried out to identify specific protection needs linked to the presence of particular animal and/or plant species.

Attached to these guidelines is a methodology for the preliminary assessment of the potential for buildings, structures and other works to be sites where protected species under Directive 92/43/EEC or 2009/147/EC may be present.

2.3. Historical evolution of lighting on the municipal territory

A brief historical overview of the regional development of lighting, drawing on period images and documents, thereby identifying any historical characteristics – whether existing or in need of promotion – of the area under study.

2.4. Historical, cultural and artistic evidence.

Identification and mapping of all significant monuments and architectural structures that have been granted a ‘declaration of interest’¹² specifying their significance.

2.4.1. Homogeneous areas

Identification of homogeneous areas into which the municipal territory can be divided, based on possible similar types of installations and any services that may be provided in conjunction with the outdoor public lighting system.

When identifying homogeneous areas, factors relating to specific morphological and environmental characteristics, the enhancement of architectural features, and urban safety may also be taken into account where these may influence public lighting systems and require particular performance levels and/or technical specifications.

2.5. Areas requiring special protection against light pollution

Verification of the official maps in the regional regulatory acts to identify:

- the presence of astronomical observatories that have applied for recognition as an area requiring special protection against light pollution in accordance with Article 9(1) of the Law;

¹² A declaration of cultural interest is the formal measure that recognises the archaeological significance of sites, monuments, collections and individual artefacts, whether publicly or privately owned. Article 39(2)(a), (b) and (c) of Prime Ministerial Decree No 171 of 2014 conferred on the Regional Committees on Cultural Heritage the power to decide on the adoption of measures to verify and declare cultural interest.

- the existence of areas designated as zones requiring special protection against light pollution pursuant to Article 9(6) of the Law (national parks, Natura 2000 sites, and regional protected areas referred to in Article 1 of Regional Law No 86 of 30 November 1983).

The identification of these areas of particular protection is functional for the application of the provisions of Article 9(7) of the Law and for the verification of compliance with the provisions of Article 5 of the Regulation referred to in Article 4 of Regional Law 31/2015.

The findings of the analysis must be set out on a dedicated map drawn to an appropriate scale, highlighting homogeneous areas, any zones requiring special protection against light pollution, ecological infrastructure within the study area, and the presence of significant monuments and architectural structures that hold a 'declaration of interest' clarifying their significance.

3. Illumino-technical classification of the territory

The lighting classification of roads¹³ within the municipal territory is defined as the initial lighting category for the risk analysis, which is necessary to determine the photometric characteristics of a lighting installation serving such roads. All this to identify the lighting performance of lighting systems¹⁴ designed to contribute, as far as relevant, to the safety of users.

The procedure for the identification of lighting categories, as defined in paragraph 5 of the UNI 11248 standard, provides for:

- definition of the entrance lighting categories;
- carrying out the risk analysis and defining the design lighting categories;
- definition of the operating lighting categories.

Guidance must also be provided on classifying new roads or areas within the territory, with a view to optimising the lighting design of the systems in accordance with the DAIE guidelines.

3.1. Initial technical category for risk analysis

For the definition of the initial lighting category for risk analysis, the following shall be required:

- divide the road into one or more study zones with homogeneous conditions of the influencing parameters;
- for each study area, identify the type of road. This information must be provided by the local council (or the owner/operator of the road). In the absence of appropriate urban planning instruments, such as the (Urban Traffic Plan)¹⁵, the author of the DAIE may propose – always in accordance with the guidelines provided by the local authority (or the road owner/operator) – a provisional classification, based on existing regulatory and legislative

¹³ The term 'road' is generic and refers to more specifically named areas such as square, intersection, roundabout, cycle path, pedestrian area, etc.

¹⁴ UNI EN 13201 series – Parts 2, 3 and 4.

¹⁵ The Urban Traffic Plan (Piano Urbano del Traffico, PUT), governed by Article 36 of the Highway Code is a mandatory short-term planning tool for provincial capitals and municipalities. Its main purpose is to improve the mobility of pedestrians, public transport and private vehicles, while at the same time reducing pollution and accidents.

references¹⁶. However, it is always the responsibility of the local authority (as the owner/operator of the road) to bear the burden of deciding on the type of road;
 – based on the type of road, identify the initial lighting category using the relevant technical standards¹⁷. The category thus identified requires a basic level of proficiency in the following areas¹⁸.

3.2. Risk analysis

Once the initial lighting category has been identified, an initial risk analysis is carried out, involving an assessment of the relevant parameters, with a view to identifying the lighting category or categories that ensure the lighting systems contribute most effectively to the safety of road users at night, whilst minimising energy consumption, installation and running costs, and environmental impact. This analysis may serve as a reference for the subsequent design work. In this case too, please refer to standard UNI 11248 for more precise indications.

4. Public lighting installations in the territory

A survey of the current state of outdoor public lighting installations within the municipal area, with a view to identifying ownership details, management arrangements and compliance with current regulatory provisions, with particular reference to safety aspects, highlighting any particularly critical situations.

4.1. Survey of lighting installations

The census must include identification, for each installation, of at least the following information:

- description of the layout development of the installation;
- details of the owner and operator;
- type of luminaires installed (street lights, globes or similar, lanterns or similar, indirect lighting, street furniture, wall lights or ceiling lights, floodlights, lighting towers, recessed lights, etc.);
- types of supports used (whip-type, pole-top, suspension, cantilever, catenary, wall-mounted, etc.);
- type of light sources installed (high-pressure sodium, ceramic burner metal halide, metal halide, fluorescent, mercury, halogen, LED, etc.), divided by power;
- type of power supply lines (underground, overhead, wall-mounted), with information on distributed power, and whether they are exclusive or not;
- location and identification of electrical switchboards and correspondence with energy delivery points (PODs);
- types of electrical switchboards;
- the presence of and models of astronomical clocks or other equivalent instruments, which control the switching on and off of the system;
- presence and models of flow reducers.

¹⁶ By way of example only, the following are cited: Law No 285 of 30 April 1992, 'New Highway Code', as amended, Ministerial Decree of the Ministry of Infrastructure and Transport No 6792 of 5 November 2001, 'Functional and Geometric Standards for Road Construction', as amended and supplemented.

¹⁷ UNI 11248 standard: 'Street lighting – selection of lighting categories'.

¹⁸ Traffic flow, complexity of the field of view, conflict zones, traffic-calming measures, aggression risk index, average gradient, ambient light level index, pedestrians. Standard UNI 11248 'Road lighting – Selection of lighting categories'.

Finally, it would be useful to include cartographic materials at an appropriate scale showing the *distribution of different types of light sources* and the *distribution of luminaires*.

4.2. Regulatory compliance and critical issues

Based on the results set out in section 4.1, a check is carried out on the individual components (light sources, luminaires, mounting brackets, electrical switchboards, power supply lines, etc.) of each system surveyed, covering:

- regulatory compliance with particular attention to the issues of static safety, electrical safety, energy saving and light pollution;
- based on the lighting classification referred to in Chapter 3, the conformity of lighting performance with a view to avoiding phenomena of discomfort glare or under-illumination in the territory¹⁹;
- problems related to a high level of wear or obsolescence;
- critical issues related to insufficient maintenance.

To complete the chapter, appropriate detailed notes must be inserted regarding the need for regulatory adaptation, modification of lighting performance, replacement, or implementation of a new maintenance programme.

Where the need for a new maintenance programme is identified, at least the relevant maintenance methods and intervals shall be specified as follows:

- the cleaning of luminaires (optical unit and protective shields);
- periodic monitoring of the conservation status of the installation;
- the replacement of light sources;
- the replacement of deteriorated electrical and mechanical components;
- the painting of ferrous and perishable parts.

5. Proposed interventions

Based on the findings of the analyses and surveys carried out, referred to in Chapters 2, 3 and 4:

- the age, condition, manner of use and maintenance of the equipment and facilities;
- the technology of the installed equipment compared with the best available technologies (BAT);
- the expected and planned operating conditions;
- the presence of areas of particular protection against light pollution and other sensitive environmental areas;

the drafter of the DAIE must identify and describe proposals for actions aimed at:

- to ensure compliance with the provisions set out in Articles 3, 4 and 5 of the regulation referred to in Article 4 of Regional Law 31/2015;
- opportunities for the improvement of the energy performance of the installations;
- acquisition of ownership of existing installations, taking into account existing contracts;
- opportunities for the installation of dedicated power supply lines for the plants;
- opportunities for planned works to implement the systems using complementary materials and technologies, with a view to enabling the provision of integrated services.

¹⁹ Such assessments can be carried out by using technical data on the installed luminaires as input for lighting simulation software, or by using the results of on-site lighting surveys carried out on the installations. The surveys must be carried out in accordance with the UNI EN 13201-2-3-4 Series of Standards and attached to the DAIE.

5.1. Presentation of the solutions

To make it easier to choose between the solutions under consideration, they are first presented individually (as separate measures) and then as a whole (as a combination of individual measures).

5.1.1. Individual interventions

For each individual intervention, a summary must be drawn up that includes:

- its classification within one of the categories mentioned above: improvement of energy performance, acquisition of property, installation of dedicated power supply lines, and measures to provide integrated services;
- a detailed description, including the timeframe for completion;
- the possible savings (energy and/or economic) or improvements achievable and, if necessary, how to verify the effectiveness of the proposed interventions;
- the typical life cycle;
- impact on management and maintenance. In that case, a draft maintenance plan or manual for the proposed work must be drawn up, as this is necessary to ensure that the identified improvements are carried out;
- implementation constraints and possible solutions;
- Compatibility, potential impacts and any interdependence with other actions;
- possible forms of financial support: assistance, financing, tax incentives, etc.

5.1.2. Combined interventions

Provision should be made for the study of combined interventions if:

- several individual interventions are compatible with each other;
- several individual interventions interfere with each other, especially when some negatively impact others.

5.2. Economic assessment

For each proposed measure (whether individual or combined), an economic assessment must also be carried out with a view to identifying the most cost-effective options for achieving more energy-efficient lighting with a low environmental impact. To do this, a life cycle cost analysis of the proposed interventions will have to be carried out⁽²⁰⁾.

The following must be clearly stated in the evaluation:

- simulation assumptions used;
- financial factors affecting the cost of capital invested or the investment cost (in this case, the valuation method used must be mentioned);
- financial exposure and its implications for local authority accounts;
- secondary costs due to this type of intervention;
- effects on operating and maintenance costs, including energy supply contracts (supply, capacity);

²⁰ Life Cycle Cost Analysis (LCCA, also referred to as Total Cost of Ownership – TCO) is an economic tool that makes it possible to assess all the costs relating to a given component or system, from ‘the cradle to the grave’. Account is taken of initial costs (purchase, installation, etc.), operating costs (energy costs, maintenance, financial charges, etc.), up to disposal and recovery costs. This tool makes it possible to optimise the costs of a component or an entire system and its use during the purchase phase, it is also suggested in UNI CEI EN 50001 Energy Management Systems and in the Minimum Environmental Criteria (CAM) for public lighting drawn up by the Ministry of the Environment and Protection of Land and Sea.

- assumptions used in relation to the quantification of achievable savings/improvements (energy costs, timeframes, operational periods, etc.).

6. Other information

The person compiling the DAIE must complete the document with details regarding:

- possible associated management of the external public lighting service;
- DAIE update schedules;
- the possibility of applying the provisions of Article 6 of the Regulation referred to in Article 4 of Regional Law No 31/2015 also to existing installations.

6.1. Joint management

Based on available data, market research, and reference literature, a possible method for the associated management of the outdoor public lighting service should be evaluated and described, taking into account the possible interventions referred to in Chapter 5.

6.2. Update by DAIE

To take account of significant changes in the scope of outdoor lighting installations and the emergence of new technologies that may affect their design, maintenance and management, and in light of the findings set out in the previous chapters of the DAIE, a timetable for updating the document must be proposed, in accordance with the provisions of Article 7(3) of the Law.

Preliminary assessment of the potential for buildings, structures or other features to host protected species under Directive 92/43/EEC or 2009/147/EC – to be carried out before the design of the lighting system

Castles, historic buildings, towers, ecclesiastical buildings, fortifications, fortresses, bridges, ancient aqueducts and underground archaeological sites have a high potential to be used as refuge or nesting sites by protected species that are particularly sensitive to light pollution (e.g. bats). These species are strictly protected under European Directives, and the destruction or disturbance of their habitats or nesting sites – even outside Natura 2000 sites – constitutes an offence punishable under EU Directive 2024/1203 on environmental crime.

Before proceeding with the design of a lighting system or the refurbishment of an existing one, it is therefore necessary to carefully assess the potential impact on the building, structure or site due to the presence of species protected under Directive 92/43/EEC or 2009/147/EC, which may be adversely affected by light pollution.

For the purposes of this assessment, the following outline is recommended.

Preliminary analysis

Within a radius of at least 500 m around the site, assess:

- the current or historical presence of species in Annex II and IV to Directive 92/43/EEC or Annex I to Directive 2009/147/EC by consulting wildlife *databases*, such as those of the Regional Biodiversity Observatory, Ornitho, iNaturalist (note that the absence of data for the area does not mean the absence of the species), with particular reference to species that are particularly sensitive to light pollution (e.g. bats, Strigiformes);
- the presence of other species of conservation interest important for the area in question, including by consulting local authorities (e.g. Natural History Museums) and local experts (ornithologists, chiropterologists, etc.).

The territorial context in which the building/manufacture/structure is located shall also be assessed in relation to the Municipal or Provincial Ecological Network, taking into account ecological corridors and other landscape features of importance to the target species (e.g. hedgerows and tree rows, watercourses, veteran trees, urban parks, etc.), as well as land use where relevant (e.g. in natural or semi-natural areas).

It should be borne **in mind that individuals may occupy the site only at certain times of the year** – e.g. during breeding or hibernation season – therefore the characteristics of the building/manufacture/structure should be carefully analysed and considered, together with the needs of the target species, repeating assessments at different times of the year if necessary.

Analysis of the building/manufacture/structure

Evaluate the following aspects:

- ☐ the presence of attics (including those in bell towers or other towers) and/or underground rooms (cellars, icehouses, etc.);
- ☐ the presence of compartments/rooms/spaces accessible from the outside (N.B. gaps wider than 2 cm can be used by various species to gain access to the compartment/room) and/or niches usable by wildlife (e.g. woodpecker holes);
- ☐ traces of the presence of target species (e.g. nests, guano, carcasses);

- 1434 ☐ known, current or historical presence, through a collection of information from local staff
 1435 (e.g. contact persons or facility custodians).

1436 If at least one of the above points is positive, the building/manufacture/structure has the potential
 1437 to host target species, and **it is necessary to carefully assess the following aspects**, as indicated in
 1438 the sector guidelines,²¹ by setting an appropriate timetable for the works and operation of the
 1439 plant:

- 1441 • installation and refurbishment work on the system should preferably be carried out **during**
 1442 **periods when the target species are absent**; should this not be possible, the work must be
 1443 carried out in such a way as to minimise disturbance to the species (*taking particular care*
 1444 *not to block the target species' access points, shelters or nesting sites, for example with*
 1445 *stored materials or scaffolding*);
- 1446 • when planning the operation of the lighting installation, the on/off settings must be
 1447 configured taking into account the periods when the species are present, whilst
 1448 considering the following aspects:
 - 1451 - provide seasonal lighting/shutdown periods (including partial periods for parts of
 1452 the facility with potential or established shelters/nesting sites for target species);
 - 1453 - The access points and roosting sites used by bats, and their flight corridors, must be
 1454 kept dark during the periods when they are present²². If such periods are not
 1455 known, the access points and roosting sites must always be kept dark;
 - 1456 - The nesting sites of the target bird species must be kept dark during the breeding
 1457 season. This period varies between species and must be evaluated based on the
 1458 species actually present. If detailed information is not available, consider the period
 1459 between March and the first half of August;
- 1460 • the current degree of illumination of the building/manufacture and the context must be
 1461 considered, assessing the variations envisaged by the lighting design, especially if this leads
 1462 to illumination of currently dark areas.

63 ²¹ Voigt et al., 2018: Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No 8. UNEP/EUROBATS
 64 Secretariat, Bonn, Germany, 62 pp. – Schmid, H., W. Doppler, D. Heynen & M. Rössler, 2013. Building with glass and light whilst
 65 respecting birds. Swiss Ornithological Station.

66 ²² See Annex III to the Action plan for bats from Lombardy for periods of presence.