



Recommendations to determine the GWP impact of lighting installations in buildings

Executive Summary

The purpose of this position paper is to provide a recommendation on the calculation of the total GWP of lighting installations in buildings. LightingEurope wishes to emphasize the importance of recognising EN15193-1 as the basis for the calculation of the operational GWP for lighting installations in buildings.

Background

The new Energy Performance of Buildings Directive (2024/1275/EU) mandates that the life-cycle Global Warming Potential (GWP) be included in the Energy Performance Certificate (EPC) of new buildings by specific deadlines.

By 2028, this requirement will apply to buildings with a useful floor area exceeding 1000m², and by 2030, it will extend to all new buildings (as per article 7). The life cycle GWP is a numeric indicator for each life-cycle stage expressed in kgCO₂eq per m² of useful floor area, calculated over a 50-year reference study period. These stages are defined in the standard EN15978:2011, which includes the Product Stage (A1, A2, A3), Construction Process Stage (A4, A5), Use Stage (B1 to B7), and End of Life Stage (C1 to C4), along with considerations for benefits and loads beyond the system boundary.

These life-cycle stages correspond with the life-cycle stages of an Environmental Product Declaration (EPD). Given that a building comprises various products with differing environmental impacts in different stages, aggregating the GWP values from the EPDs of these constituent products is a logical approach to determine the building's overall GWP. However, it is important to note that some building components, such as concrete and bricks, do not consume energy during their use phase, in contrast to technical building services, such as lighting luminaires and heating systems. The environmental impact of energy-consuming products is assessed through both embodied GWP (related to manufacturing and installation) and operational GWP (linked to use-phase energy consumption).

For instance, when examining a lighting installation comprising numerous identical luminaires in various rooms with varying usage patterns, the embodied GWP remains constant across all luminaires, as they are made from the same materials at the same location. In contrast, the operational GWP varies per luminaire, reflecting differences in energy consumption based on usage, since it is depending on luminaire on-time and operating settings (e.g. dimming level).

The guidance from standards

The IEC 63366: 2025¹ standard on product category rules for life cycle assessment of electrical and electronic products and systems, clause 4.5.2 provides guidance on integrating product impact on system level:

“Prerequisite for an aggregation of various products to a system or specific solution, for example “buildings” (see Annex D) or automation and drive systems, is that the potential environmental impacts are assessed with the same characterization models and therefore have the same units for the respective impact category, for instance kg CO₂-eq for the global warming potential. Further, the practitioners should verify that the underlying set of rules, such as PCR or PSR, is comparable.

Then:

- The environmental impacts of manufacturing stages of the systems’ components can be simply added up to reflect the production of the system;*
- Use stage should be assessed on system level, reflecting the corresponding specific parameters of the system’s usage, to evaluate the environmental impacts;*
- Upstream transportation and end-of-life stages should also be based on the environmental impacts declared on component level, but cross-checked and adapted to the systems’ specifics.”*

Based on those general rules, we provide in the next section the specific recommendation on calculating GWP of lighting products in a building context.

Recommendations

To determine the GWP of a lighting installation in a building, the following steps are recommended:

1. Calculate the embodied GWP of the lighting installation by summing the GWP values of the lighting products. The embodied GWP of a particular product can be determined based one of those three methods:
 - a) summing the GWP values from the manufacturing stages A1-A3 from a verified lighting product EPD;
 - b) summing the GWP values from the manufacturing stages A1-A3 from a verified lighting product carbon footprint according to ISO14067;
 - c) using reference values², if acceptable and as published by a Member State.
2. Determine the operational GWP at the building level using EN15193-1 to estimate the annual energy usage in kWh/m²/year and convert this to kgCO₂eq/m²/year using local conversion factors.
3. The Whole Life GWP of the lighting installation in the building is the sum of the embodied GWP and the operational GWP.
4. If the total GWP value for stages A1-A3 of the lighting installation falls under the cut-off criteria defined in EN 15804 for the entire building, these phases can be excluded from the calculation of the total GWP of the building, in accordance with Member State

¹ Publication expected imminently

² Some Member States mandate the use of a national database for GWP values for construction materials (incl. luminaires). If manufacturers do not submit their products to this database, a reference value for the product is given in this database. Typically, the reference values are less favourable.

regulation.

By following this procedure, stakeholders can assess and address the environmental impact of lighting installations within buildings in compliance with the directive.

Contact

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LightingEurope is the voice of the lighting industry, based in Brussels and representing 32 companies and national associations. Together these members account for over 1,000 European companies, a majority of which are small or medium-sized. They represent a total European workforce of over 80,000 people and an annual turnover exceeding 15 billion euro. LightingEurope is committed to promoting efficient lighting that benefits human comfort, safety and wellbeing, and the environment. LightingEurope advocates a positive business and regulatory environment to foster fair competition and growth for the European lighting industry. More information is available at www.lightingeurope.org.