



Circular Economy How-to Guide:

Implementing Light as a Service in built assets

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Lead Partner:



Partners:



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Introduction

This guidance document contains a practical How-to Guide which is a follow up to the [UKGBC Circular economy guidance for construction clients: How to practically apply circular economy principles at the project brief stage](#).

This How-to Guide will explore the principle of **Products as a Service (PaaS)**, specifically Light as a Service (LaaS), and sets out actions for project teams to take forward during design and construction stages.

The following principles were identified in the UKGBC guidance for construction clients.



This guidance document addresses **How to apply Light as a Service (LaaS) to a built asset**. The aim of this guide is to stimulate growth in the PaaS market by encouraging and supporting construction project teams, including construction clients, project managers and design teams. The concept of LaaS encourages the demand for servicing over purchasing; ensuring efficiencies, longer lifetime and take back of products to enable refurbishment and reuse or, last resort, recycling.

This How-to Guide takes project teams, working on projects that are replacing lighting, through the process and project teams' roles and responsibilities for applying LaaS. This guide provides an understanding of what information is required, who to involve and at which point in the programme. It should be noted that this guidance has tried to best capture the learnings and processes applied on projects so far.

There will be further learnings and innovations in the lighting market and so this guidance will need to evolve in the area of lighting as well as for other products such as vertical systems and buildings services.

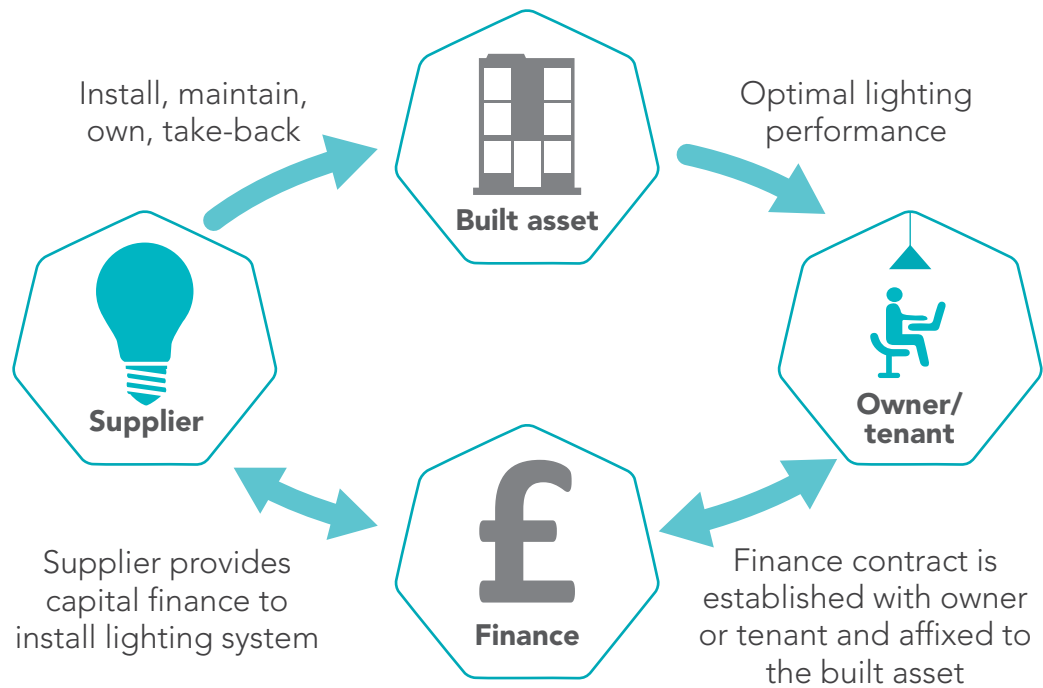


Figure 1. Relationship between product supplier and end customer.



This How-to Guide forms part of a PaaS Implementation Pack which has been developed through [UKGBC's Circular Economy Programme](#). The pack also includes:

- **Circular Economy Innovation Insights: Reuse and Products as a Service** – Highlights solutions (product and service related) for supporting reuse and PaaS
- **The why and what of Products as a Service slide deck** – A set of slides setting out why PaaS is important and explaining the How-to guidance available to support project teams in the process of implementing LaaS in developments.

In the first instance, as part of the process of upgrading lighting, a cradle to cradle life cycle assessment should be carried out. This assessment should review the wider environmental impacts of removing existing lighting and replacing with more energy efficient lighting to ensure the best solution is reached from a wider environmental perspective. More information to support this can be found in [UKGBC's Circular economy guidance for construction clients](#).

The term 'Products as a Service' is probably most associated with the creation of the Product Life Institute in Geneva by Walter Stahl more than 25 years ago. Its objective was product-life extension, long-life goods, reconditioning activities, and waste prevention. It also focusses on the importance of selling services rather than products, an idea referred to as the 'functional service economy', now more widely subsumed into the notion of 'performance economy'. Here we refer to the concept as PaaS*.

* Ellen MacArthur Foundation <https://www.ellenmacarthurfoundation.org/circular-economy/concept/schools-of-thought> [Accessed 19/02/2020].

How to apply LaaS to a built asset



APPLYING LAAS TO EXISTING BUILT ASSETS

It makes most economic sense to use LaaS when the following conditions are met:

- There is an owner-occupier with a long-term interest in the building (with no plans to sell or lease out the building to a third party) – ideally at least 5 years
- There is limited capex (capital expenditure) budget available for lighting upgrades
- The building has a requirement for high-quality lighting
- The building is going through a significant refurbishment and currently has non-LED lighting. The payback period depends on operating hours, but it would typically be less than for a building which operates 24 hours / 7 days a week
- A sizeable refurbishment project with an estimated investment need for lighting requirements over £100,000
- The owner-occupier will benefit from the energy and maintenance savings of this refurbishment

There will be additional situations where LaaS works such as landlords exploring a service agreement with occupiers that could include a lighting service contract within that. However, there are restrictions relating to which costs can be passed onto the occupier through service charges.

For the solution to be fully circular, it is important that the LaaS offer is part of a circular business model; the product should be retained by the supplier and incorporate lifecycle maintenance and performance enhancement with no, or little, waste. This is in contrast to buying the product off the supplier over time or an energy performance contract. For new build projects the concept of LaaS should still be explored with the same challenges presented to the supplier for a circular lighting service which is modular, upgradable and reusable with a route back to the manufacturer.

ROLES, ACTIONS AND RESPONSIBILITIES

This section outlines a step-by-step process by which the project team can explore and apply LaaS with product suppliers. The client and project teams are mapped against their corresponding responsibilities and actions. See [Appendix 1](#) for the full list of roles and how they have been defined.

PROJECT STAGE: STRATEGIC DEFINITION (E.G. RIBA STAGE 0)

Role	Responsibilities and actions
Client Delivery Team	<ul style="list-style-type: none">• Set out strategic vision and functional requirements around LaaS, linking to embodied carbon savings and resource optimisation with long term totex (total expenditure includes capital and operational) cost savings. To ensure suppliers come up with the most circular options, try not to be prescriptive in terms of elements required.• See UKGBC's Circular economy guidance for construction clients for more information and support around PaaS at the project brief stage.• Assess where finance will be sourced, this will usually be acquired through a third-party financier, outside of the product supplier.• Review financial strategy to address totex cost savings to ensure best value and savings are made over lifetime of project rather than lowest cost upfront. Explore whether extra capital savings from lighting are best spent elsewhere on project. Ensure finance is associated with the building and not building owner, this will reduce risk associated with break clauses.• Share the LaaS information with the Quantity Surveyor (QS) and identify cost saving opportunities for the project, for instance taxation savings that can be realised for procuring a financial service versus a product*. Explore the financial targets that should be met for the project, for example, bonus or incentivisation schemes that are paid when targets are met. These should be factored into the overall cost analysis by the QS.

* Note: at the time of writing a new guideline IFRS 16 was released suggesting there is no longer a difference regarding operational lease and financial lease. The leased product will be on the financial balance of both lessor and lessee, assuming the product services the core business of the user.



PROJECT STAGE: PREPARATION AND BRIEF (E.G. RIBA STAGE 1)

Role	Responsibilities and actions
Client Delivery Team – Procurement	<ul style="list-style-type: none">• Set out detailed brief including business model and finance options for procuring LaaS. This should also include delivery approach with attention given to the allocation of roles between project management, design team and lighting supplier. Consider having a circular economy ambassador to drive ambition.• Start the process of commissioning a professional lighting audit or validation of the site in accordance with the CIBSE LH2018 SLL Lighting Handbook. Ideally this should be completed by an organisation that offers LaaS and used as a baseline for the performance commitments in the project.• Ensure the lighting audit data and related baseline is available in the tender pack for the project team.• Ensure the employer requirements specify the best lighting solution over lifetime of asset.• Ensure the procurement scorecard for reviewing lighting supplier submissions takes into account those organisations who have the best track record for LaaS. This includes modular lighting, designed for disassembly (to enable them to be interchanged and replaced), designed for serviceability to extend the life-time of the installation by repair, remote servicing capabilities and onward reuse of lighting products where space use changes (or recycling if reuse is not available). See Appendix 2 for an example of a procurement scorecard.• Ensure any contract set up with the lighting supplier is linked to the building rather than the owner. If the property is sold, the contract should remain with the building and be passed on. You may be liable for penalties if the contract is with the owner and broken early.



Role	Responsibilities and actions
Client Delivery Team – Procurement	<ul style="list-style-type: none">• Discuss service level requirements, KPIs and delivery expectations with lighting suppliers. Some questions to ask include:<ul style="list-style-type: none">▪ Service level requirements – will the supplier provide the audit, finance, lighting design, installation, commissioning, measurement (data analytics) and verification, servicing and maintenance? What are associated costs and benefits? Once lighting costs have been paid back, what are the ongoing maintenance costs?▪ Key Performance Indicators (KPIs) of lighting –<ul style="list-style-type: none">– Energy commitment (installed power @ fixed user profile @ fixed energy cost (£/kWh))– Light level commitment (Lux levels over contract duration); (eg x lumen per m² or w/m²/100 lux rather than 60 fixtures of 40 watts)– Uptime commitment: response time and/or resolution time– All subject to a benefit sharing model for further improvement investments – 50% vendor / 50% customer▪ For examples of expected lighting performance for building types see the LETI Climate Emergency Design Guide*.▪ Identify measurement and verification rules – how will data be captured, who owns the data, access to lighting during operation for reporting of data.▪ Carry out a free cash flow analysis based on the financial proposals.▪ Discuss contingency plans should the lighting supplier go into liquidation.▪ Set out packing and waste reduction requirements associated with the lighting product.▪ Enquire whether the lighting product has circular economy certification such as Cradle to Cradle**.

* LETI Climate Emergency Design Guide. How new buildings can meet UK climate change targets. https://b80d7a04-1c28-45e2-b904-e0715cfac93.filesusr.com/ugd/252d09_3b0f2acf2bb24c019f5ed9173fc5d9f4.pdf (Accessed: 19/02/2020)

** <https://www.c2ccertified.org/get-certified/product-certification> (Accessed 12/03/20)

PROJECT STAGE: CONCEPT DESIGN (E.G. RIBA STAGE 2)

Role	Responsibilities and actions
Client Team	<ul style="list-style-type: none">Confirm lighting services contract with lighting supplier.
Design Team	<ul style="list-style-type: none">Review lighting audit and project brief including KPIs. Design teams should liaise with lighting manufacturer to design the optimal lighting solution (if this has not been allocated to lighting supplier). Note that where the responsibility is split between different parties, this may lead to confusion around accountability of the integral performance of the lighting system, this should be resolved and agreed upon early on.Factor in opportunities for ensuring that lighting is designed in such a way that allows for further disassembly in future, these should also feature in the performance specifications.
Lighting Supplier	<ul style="list-style-type: none">Support and/or instruct design team with design of lighting system (fixtures, controls, connectivity, software and services) taking into account the performance requirements over the lifetime of the installation, with a specific focus on daylight harvesting, presence detection and smart control capabilities.
Client Delivery Team – Procurement	<ul style="list-style-type: none">Get buy-in from Facilities Management (FM) team (if known) and review how the relationship would work between lighting supplier and FM team.



PROJECT STAGE: DEVELOPED & TECHNICAL DESIGN AND CONSTRUCTION (E.G. RIBA STAGE 3, 4 & 5)

Role	Responsibilities and actions
Design Team	<ul style="list-style-type: none">Incorporate lighting options into design proposals ensuring modular design and design for disassembly are included.
Client Delivery	<ul style="list-style-type: none">When reviewing contractor responses to tender requirements (if lighting supplier is not responsible for installation), ensure they fully understand the requirements for installation and are available to commission final installation and correct any snagging.
Lighting Supplier	<ul style="list-style-type: none">Build the lighting solution in line with the design, including the integration activities and commissioning as applicable.

PROJECT STAGE: HANDOVER AND CLOSE OUT (E.G. RIBA STAGE 6)

Role	Responsibilities and actions
Lighting Supplier	<ul style="list-style-type: none">Perform a hand-over test to prove the performance of the new installation versus the agreed commitments.Provide lighting design and layout to FM team.Depending on service level provision; commissioning of lighting scheme will need to take place, implementation of monitoring and control systems and connections for remote access by the supplier.If generated, Building Information Modelling (BIM) product data should be shared.

PROJECT STAGE: IN USE (E.G. RIBA STAGE 7)

Role	Responsibilities and actions
Lighting Supplier	<ul style="list-style-type: none">Operate the system to obtain and maintain the most optimal performance in line with the KPIs and Service Level Agreement.Maintain the system to guarantee the uptime & performance of the new lighting system.Ensure regular monitoring reports are submitted and targets are being met.Provide data analytics on occupancy and energy with quarterly reporting.Regularly review controls strategy with wireless feedback where use of space/ occupancy patterns change and highlight opportunities for energy savings.
Client Delivery Team	<ul style="list-style-type: none">Meet with lighting supplier regularly to review performance and understand any new innovations on the market.

Appendices

APPENDIX 1: CONSTRUCTION TEAMS DEFINED

Construction Team	Definition
Client Delivery Team	The internal team of the occupier/developer/landlord/asset owner (i.e. the client) of the development.
Client Delivery Team – Procurement	Includes the team responsible for procuring goods and services for the client.
Client Project Team / Manager	The project management team employed by the client to oversee the development.
Contractors (refurbishment or main)	The contractor employed to oversee and carry out construction works, whether refurbishment or new build.
Design Team	The architects and engineers employed to develop the design.
Facilities Estate Manager	The team that operates and maintains the building while occupied.
Lighting Supplier	The supplier of the lighting service.

APPENDIX 2: PROCUREMENT APPROACH

In order to stimulate a value procurement approach, the following award criteria are suggested:

Description	Suggested weighting
Price <ul style="list-style-type: none">Lowest cost of ownership on proposed user profile over 10 years (Products & Maintenance) (30%).	30%
Solution Design <ul style="list-style-type: none">Detailed light plan according to light level requirements (5%).System design with cloud-based capabilities (remote monitoring & data collection capabilities) (10%).Detailed information on the system performance, maintenance factors applied and related service plan (5%).	20%
Service Levels <ul style="list-style-type: none">Service management system with service ticketing and KPI reporting documented in e-Portal (5%).Remote monitoring capabilities (5%).Data analytics proposal & capabilities (5%).Yearly preventive maintenance plan (on-site and remote activities) (5%).Corrective maintenance (acknowledgement time and response time) (5%).Measurement and verification plan (5%).	30%
Approach of the project in relation to a sustainable LaaS model <ul style="list-style-type: none">Serviceable products with traceability (with a minimum level of serviceability: driver, front cover, clips, ...) (5%).Service parts management process & guaranteed availability for contract period (5%).Reverse logistics infrastructure in place (5%).Continuous improvement approach (5%).	20%



APPENDIX 3: FURTHER READING

- [Circular economy brings value for real estate businesses](#), by Arup and Ellen MacArthur Foundation
- [Lighting as a service poised to deliver the circular economy](#), by LEDs Magazine
- [Lighting National Union of Students](#), by Signify
- [Philips provides Light as a Service to Schiphol Airport](#), by Ellen MacArthur Foundation
- [Products Service Systems, Ecological and Economic Basis](#) by Goedkoop M., Halen C., Riele H. et. al.
- [Selling Light as a Service](#), by Ellen MacArthur Foundation

Contributors

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