TRILUX
SIMPLIFY YOUR LIGHT.

BREEAM BROCHURE

TRILUX & SUSTAINABLE BUILDINGS

Sustainability has been an integral part of TRILUX for many years. As a family-owned company we feel the need to take care of future generations.

Therefore, we are always looking for the most efficient composition of our luminaires and the best way to combine them with the right lighting management systems. This makes them suitable for any specific application and/or task. With this in mind, we produce innovative, energy-efficient and sustainable lighting solutions for office, industry, logistics, retail and health & care. Our solutions lift a building to a higher level in terms of energy efficiency, safety, comfort and wellbeing.

Our lighting solutions are therefore extremely energy-efficient during operation. But also in the development and production we take important measures to minimize the environmental impact. For example, the design of our luminaires is as modular as possible, which is in line with the life-cycle approach. We have also set up take-back and recycling programs in which we remain owner of our fixtures to keep them in our production loop for as long as possible.

With TRILUX lighting solutions you are choosing certainty. In addition, our products contribute significantly to the sustainability level of buildings and thus to the achievement of points for building certification, such as BREEAM.

Want to know more about BREEAM? Please contact us via phone/email or visit **trilux.com/breeam**

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WHAT IS BREEAM?

BREEAM

Building Research Establishment Environmental Assessment Method

BREEAM® is an assessment method for determining and comparing the sustainability performance of buildings. As a quality label, it stimulates the market to focus on the environmental impact of the products and services used throughout the entire construction process.

As the label assesses the overall building concept, it is assessed and evaluated on the basis of nine main categories and one innovation category. To determine the scoring of a building, the credits are weighted and awarded for each category; the levels range from pass to outstanding.

The products presented in this brochure have been evaluated and assessed by the independent engineering firm Encon, on the basis of the BREEAM-UK guidelines. The guideline used for this analysis is BREEAM-INT New Construction (NC) 2018.

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TRILUX & BREEAM

The scores per product:

A

SONNOS LED
Downlight
19 CREDITS
MORE INFORMATION

B

ARIMO FIT LED
Recessed luminaire
20 CREDITS
MORE INFORMATION

C

ARIMO FIT D LED
Surface-mounted luminaire
20 CREDITS
MORE INFORMATION

D

CREAVO LED
Recessed luminaire
20 CREDITS
MORE INFORMATION

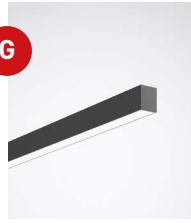
E

CREAVO D LED
Surface-mounted luminaire
20 CREDITS
MORE INFORMATION

F

CREAVO H LED
Pendant luminaire
20 CREDITS
MORE INFORMATION

G



FINEA LED
Light channel
20 CREDITS
MORE INFORMATION

H

OPENDO LED
Pendant luminaire
20 CREDITS
MORE INFORMATION

I

E-LINE NEXT LED
Continuous line luminaire
21 CREDITS
MORE INFORMATION

J

ARAGON FIT LED
Weatherproof luminaire
21 CREDITS
MORE INFORMATION

K

MIRONA FIT LED
Highbay luminaire
21 CREDITS
MORE INFORMATION

L

JOVIE LED
Post-top luminaire
21 CREDITS
MORE INFORMATION

VIEW CREDIT SCORES IN DETAIL >

TRILUX & BREEAM

The scores per product

CATEGORY	ISSUE	MAX. CREDITS	TRILUX PRODUCTS											
			A	B	C	D	E	F	G	H	I	J	K	L
Management (MAN)	MAN 02 - Life cycle costs and service life planning	4	3	3	3	3	3	3	3	3	3	3	3	3
	MAN 03 - Responsible construction practices	6	1	1	1	1	1	1	1	1	1	1	1	1
	MAN 04 - Commissioning and handover	4	3	3	3	3	3	3	3	3	3	3	3	3
	MAN 05 - Aftercare	3	2	2	2	2	2	2	2	2	2	2	2	2
Health & Wellbeing (HEA)	HEA 01 - Visual comfort	4	1	1	1	1	1	1	1	1	1	1	1	1
	HEA 02 - Indoor airquality	5	0	0	0	0	0	0	0	N/A	0	0	0	0
	HEA 06 - Accessibility	2	0	0	0	0	0	0	0	0	0	0	0	1
Energy (ENE)	ENE 01 - Reduction of energy use and carbon emissions	15	4	5	5	5	5	5	5	5	6	6	6	3
	ENE 02 - Energy monitoring	2	2	2	2	2	2	2	2	2	2	2	2	2
	ENE 03 - Outdoor lighting	1	0	0	0	0	0	0	0	0	0	0	0	1
Materials (MAT)	MAT 01 - Building life cycle assessment	6	1	1	1	1	1	1	1	1	1	1	1	1
	MAT 06 - Material efficiency	1	1	1	1	1	1	1	1	1	1	1	1	1
Waste (WST)	WST 01 - Construction waste management	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	WST 06 - Design for disassembly and adaptability	1	1	1	1	1	1	1	1	1	1	1	1	1
Pollution (POL)	POL 04 - Reduction of night-time lightpollution	1	0	0	0	0	0	0	0	0	0	0	0	1
	MAXIMUM CREDITS*		19	20	20	20	20	20	20	20	21	21	21	21

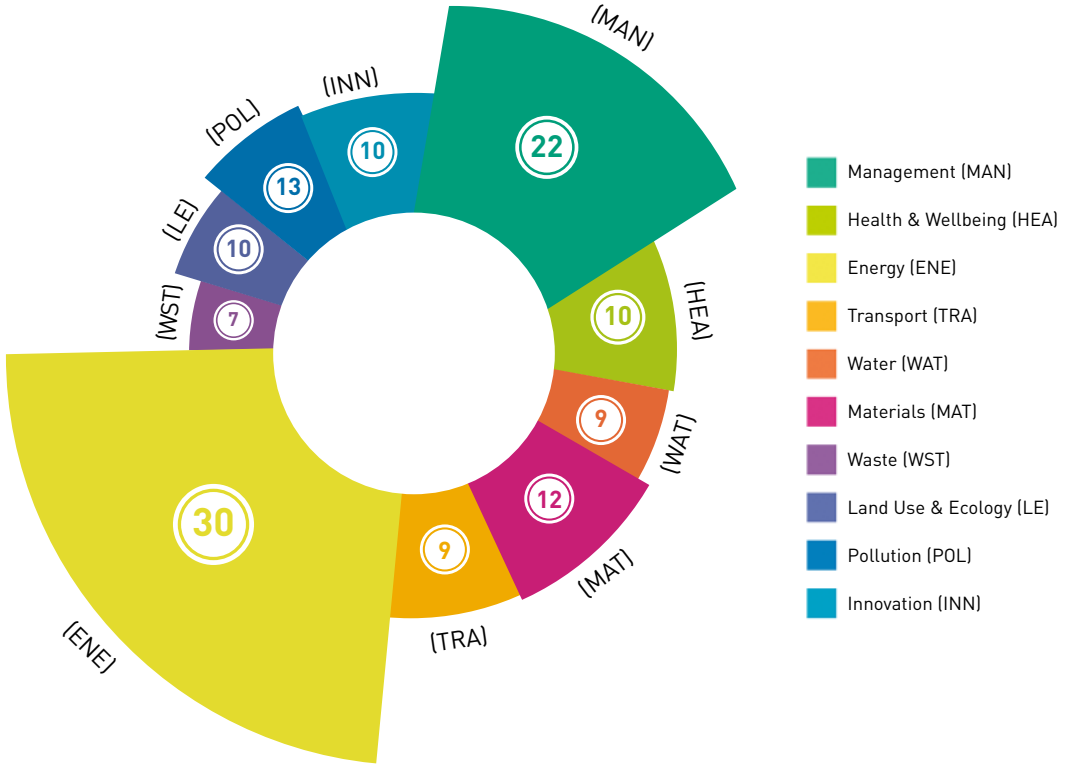
A Sonnos LED
B Arimo Fit LED
C Arimo Fit D LED
D Creavo LED
E Creavo D LED
F Creavo H LED
G Finea LED
H Opendo LED
I E-Line Next LED
J Aragon Fit LED
K Mirona Fit LED
L Jovie LED

PRODUCTS

* TRILUX lighting makes a strong contribution to the achievement of BREEAM credits, but does not influence every credit within an issue.
Lighting also does not offer the guarantee of credits, since all other criteria within an issue - on which light has no influence - must be met in order to score credits.

CATEGORIES

CATEGORY	MAX. CREDITS
Management (MAN)	22
Health & Wellbeing (HEA)	10
Energy (ENE)	30
Transport (TRA)	9
Water (WAT)	9
Materials (MAT)	12
Waste (WST)	7
Land Use & Ecology (LE)	10
Pollution (POL)	13
Innovation (INN)	10
Total	**132**



BREEAM-DE-QUALIFICATION

★	★★	★★★	★★★★	★★★★★
PASS ⩾ 30%	GOOD ⩾ 45%	VERY GOOD ⩾ 55%	EXCELLENT ⩾ 70%	OUTSTANDING* ⩾ 85%

* Additional requirements are mandatory for the 'outstanding' qualification.
The final score is converted into a BREEAM-INT qualification in accordance with the table above.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 4 ★★★★

LIFE CYCLE COSTS AND SERVICE-LIFE PLANNING

GOAL

To promote the business case for sustainable buildings and deliver long-term value by encouraging the reduction of life-cycle costs through the improvement of design, specification, maintenance and operation.

CRITERIA

CRITERIUM 1 (2 CREDITS) ★★

- **Elemental life-cycle costs (LCC)**

- An elemental LCC plan (future replacement, service life, maintenance, operation costs) has been carried out during the concept design phase.
- The elemental LCC plan has been used to minimize life-cycle costs and maximize critical value.

CRITERIUM 2 (1 CREDIT) ★

- **Component level LCC options appraisal**

- A component level LCC options appraisal (envelope, services, finishes, external spaces) has been developed in line with PD 156865: 2008.
- The component level LCC options appraisal has been used to minimize life-cycle costs and maximize critical value.

CRITERIUM 3 (1 CREDIT) ★

- **Capital costs reporting**

- Report the capital costs for the building via the BREEAM Assessment Scoring and Reporting tool.

TRILUX scores:

Product	BREEAM-INT MAN 02 Credits	Feasibility*
Sonnos LED	3	+++
Arimo Fit LED	3	+++
Arimo D LED	3	+++
Creavo LED	3	+++
Creavo D LED	3	+++
Creavo H LED	3	+++
Finea LED	3	+++
Opendo LED	3	+++
E-line Next LED	3	+++
Aragon Fit LED	3	+++
Mirona Fit LED	3	+++
Jovie LED	3	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

TRILUX products minimize life cycle costs. By focusing on high-quality LED lighting with a long service life, luminaires last longer and require less frequent replacement. Connect fixtures with the LiveLink lighting management system to further extend the service life thanks to daylight-presence detection. According to various studies (Repro-light), light management is a way to contribute to a longer life cycle.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 6 ★★★★★★

RESPONSIBLE CONSTRUCTION

GOAL

To recognize and encourage construction sites, which are managed in an environmentally and socially responsible manner.

PREREQUISITE

- Only use legally harvested and legally traded timber.
- The client and contractor need to agree on performance targets.
- All national health and safety laws and regulations for construction sites are considered and implemented.

CRITERIA

CRITERIUM 1 (1 CREDIT) ★

• Environmental management

- The main contractor operates an environmental management system (ISO 14001/EMAS).
- Implementation of best-practice pollution prevention policies and procedures on the construction site.

CRITERIUM 2 (1 CREDIT) ★

• Appoint a sustainability manager

- The sustainability manager monitors the project to ensure continuous compliance with the relevant sustainability performance and process criteria.

CRITERIUM 3 (2 CREDITS) ★★

• Responsible construction management

- The main contractor gathers six points in each of the four sections of Checklist A1.
- The main contractor fulfils all criteria in each of the four sections of the A1 checklist.

CRITERIUM 4 (2 CREDITS) ★★

• Monitoring of construction site impacts

- Monitor and record data on the utility consumption of the project site (energy and water).
- Monitor and record data on the transport of construction materials and waste.

TRILUX scores:

Product	BREEAM-INT MAN 03 Credits	Feasibility*
Sonnos LED	1	+++
Arimo Fit LED	1	+++
Arimo D LED	1	+++
Creavo LED	1	+++
Creavo D LED	1	+++
Creavo H LED	1	+++
Finea LED	1	+++
Opendo LED	1	+++
E-line Next LED	1	+++
Aragon Fit LED	1	+++
Mirona Fit LED	1	+++
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
- + medium feasibility
- ++ high feasibility
- +++ very high feasibility

TRILUX ADDED VALUE

TRILUX reports the CO2 emissions of the transport and distance to the project site. To reduce the impact, we encourage delivery to nearby projects and the use of bulk transport (if possible). For several product series, we have developed project packaging without (or with less) cardboard and plastic. For urban construction sites, we use electric transport for last-mile delivery, if necessary.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 4 ★★★★

COMMISSIONING AND HANDOVER

GOAL

To encourage properly planned handover and commissioning processes, which reflect the needs of the building's occupants.

CRITERIA

CRITERIUM 1 (1 CREDIT) ★

• Commissioning, testing schedule and responsibilities

- There is a commissioning schedule.
- Identification of the appropriate standards.
- Appointment of an appropriate project team member.

CRITERIUM 2 (1 CREDIT) ★

• Commissioning of the building services

- A specialized commissioning manager has been appointed for buildings with complex building services and systems.
- For simple building services, this role can be carried out by an appropriate project team member.

CRITERIUM 3 (1 CREDIT) ★

• Testing and inspecting building fabric

- Thermographic survey or an airtightness test.

CRITERIUM 4 (1 CREDIT) ★

• Handover

- A user manual for the building or flat has been prepared.
- A training program for the users of the building has been created:
  - *The planned intention of the building.*
  - *The available after-care team.*
  - *Introduction to and demonstration of the installed systems.*
  - *Introduction to the building's user manual.*
  - *Maintenance requirements, including any maintenance contracts and arrangements.*

TRILUX scores:

Product	BREEAM-INT MAN 04 Credits	Feasibility*
Sonnos LED	3	+++
Arimo Fit LED	3	+++
Arimo D LED	3	+++
Creavo LED	3	+++
Creavo D LED	3	+++
Creavo H LED	3	+++
Finea LED	3	+++
Opendo LED	3	+++
E-line Next LED	3	+++
Aragon Fit LED	3	+++
Mirona Fit LED	3	+++
Jovie LED	3	+++

*) Suitability of the product

- low feasibility
- \+ medium feasibility
- ++ high feasibility
- +++ very high feasibility

TRILUX ADDED VALUE

TRILUX systems are tested in the appropriate phases. They perform as agreed and are accompanied by comprehensive manuals (if applicable) to help the users of the of the building in understanding and operating the building.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 3 ★★★

AFTERCARE

GOAL

To follow up on the condition of the building after the handover to the owner or occupant. This follow up takes place during the first year of use and ensures an appropriate operation and adaptation of the building.

CRITERIA

CRITERIUM 1 (1 CREDIT) ★

- **Aftercare support**

- Operational infrastructure and resources are in place to:
  - *Provide the users of the building with after-care support.*
  - *Collect and monitor energy and water consumption data for a minimum of 12 months once the building has been commissioned.*

CRITERIUM 2 (1 CREDIT) ★

- **Commissioning implementation**

- The seasonal commissioning activities will take place for a minimum of 12 months, starting from the date the building has been fully commissioned.

CRITERIUM 3 (1 CREDIT) ★

- **Post Occupancy Evaluation (POE)**

- A review of the design intent and construction process.
- Feedback regarding internal conditions (light, noise, temperature, air quality), maintenance, facilities, amenities, and access.
- Energy consumption, water consumption, materials, renewable energy, rainwater harvesting, etc.

TRILUX scores:

Product	BREEAM-INT MAN 05 Credits	Feasibility*
Sonnos LED	2	+++
Arimo Fit LED	2	+++
Arimo D LED	2	+++
Creavo LED	2	+++
Creavo D LED	2	+++
Creavo H LED	2	+++
Finea LED	2	+++
Opendo LED	2	+++
E-line Next LED	2	+++
Aragon Fit LED	2	+++
Mirona Fit LED	2	+++
Jovie LED	2	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

TRILUX offers an optional service to provide after-care support and seasonal commissioning (3/6/9/12 months) during the first year of operation of the building (LiveLink monitoring). Upon delivery of large projects, a handover protocol and a mini training about the lighting installation and the lighting management system is being provided. A service contract is optional.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 4 ★★★★

VISUAL COMFORT

GOAL

To ensure that daylight, artificial lighting and control systems are considered during the design phase in order to provide the best possible visual performance and comfort for the users of the building.

REQUIREMENT

- High frequency ballasts for all fluorescent lamps or LED lighting

CRITERIA

CRITERIUM 1 (1 CREDIT) ★

- **Daylight**
- Provision of daylight designed in compliance with national best practice.
- Daylight simulation study required.

CRITERIUM 2 (1 CREDIT) ★

- **Glare control**
- Potential of glare has been eliminated from all relevant areas in the building.
- The glare control system maximizes the amount of daylight.

CRITERIUM 3 (1 CREDIT) ★

- **View**
- Adequate view to the outside (window).

CRITERIUM 4 (1 CREDIT) ★

- **Internal and external lighting levels, zoning and control**
- Lighting parameters in accordance with national best practice: illuminance levels, UGR limits, uniformity ratios.
- Local standard EN 12464 (lux levels).
- Zoned lighting allows users to control the system.

TRILUX scores:

Product	BREEAM-INT HEA 01 Credits	Feasibility*
Sonnos LED	1	+++
Arimo Fit LED	1	+++
Arimo D LED	1	+++
Creavo LED	1	+++
Creavo D LED	1	+++
Creavo H LED	1	+++
Finea LED	1	+++
Opendo LED	1	+++
E-line Next LED	1	+++
Aragon Fit LED	1	+++
Mirona Fit LED	1	+++
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

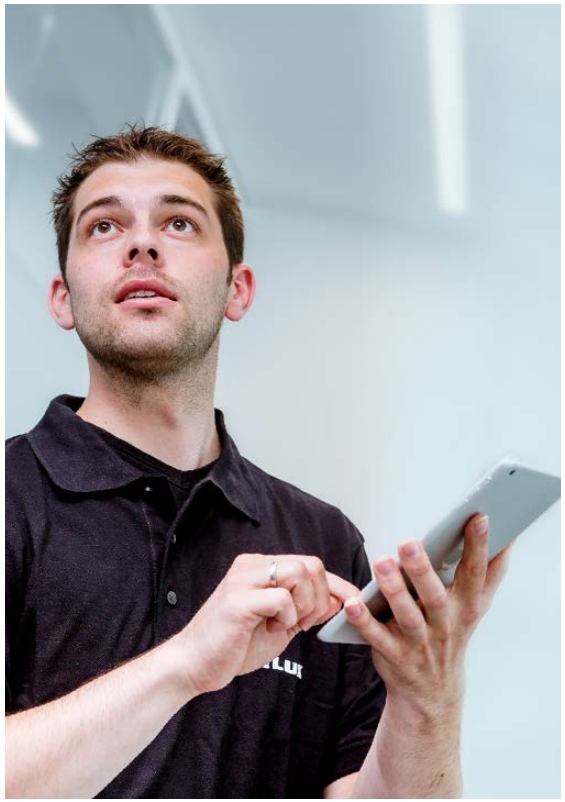
TRILUX products guarantee a high-quality solution and are in conformity with the standards for outdoor workplaces and public lighting (EN 12464, NPR 13201+A1:2018 EN). Zoned lighting can be achieved with DALI and LiveLink lighting management. Zones are determined by the type of the building (office - 1 zone = 4 workplaces or 40m²).

MAXIMUM NUMBER OF **BREEAM-CREDITS** 5 ★★★★★

INDOOR AIR QUALITY

GOAL

To identify and promote a healthy internal environment by specifying and installing appropriate ventilation systems, equipment and finishes.



CRITERIA

CRITERIUM 1 (1 CREDIT) ★

- **Indoor Air Quality (IAQ) plan**

CRITERIUM 2 (1 CREDIT) ★

- **Ventilation**

- National best practice standard for ventilation.
- Sufficient distance between air intake & exhaust.
- CO2- or air quality sensors.

CRITERIUM 3 (2 CREDITS ★★

- **Emissions from construction materials**

CRITERIUM 4 (1 CREDIT) ★★

- **Natural ventilation strategy**

CRITERIUM 5 (1 CREDIT) ★

- **Measurement of indoor air quality**

- Measurement by an external party in the building.

TRILUX scores:

Product	BREEAM-INT HEA 02 Credits	Feasibility*
Sonnos LED		
Arimo Fit LED		
Arimo D LED		
Creavo LED		
Creavo D LED		
Creavo H LED		
Finea LED		
Opendo LED	N/A	N/A
E-line Next LED		
Aragon Fit LED		
Mirona Fit LED		
Jovie LED		

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

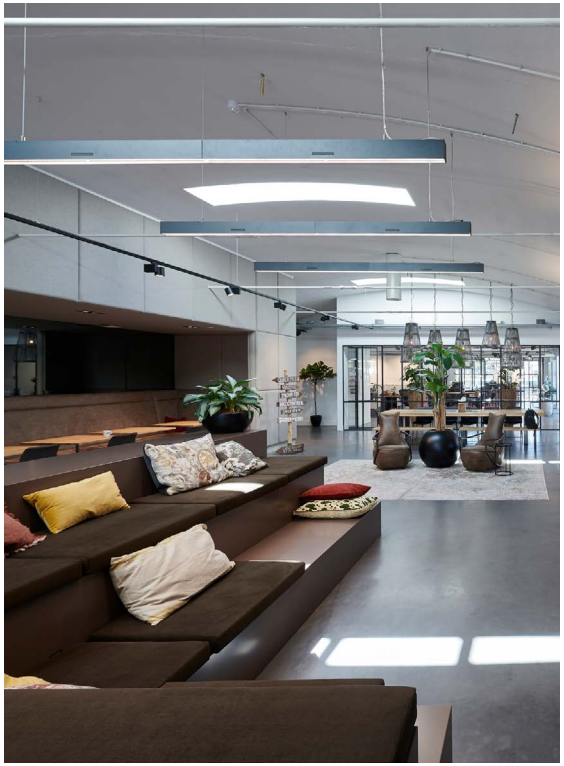
TRILUX products have a very low to no impact on the ventilation system. However, the Opendo LED system can be installed with an optional CO2 sensor, which indicates the air quality and the need for ventilation.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 2 ★★

SAFETY AND HEALTHY SURROUNDINGS

GOAL

To recognize and promote effective measures, which promote safe use of and access to and from the building.



CRITERIA

CRITERIUM 1 (1 CREDIT) ★

- **Safe access**

- The lighting of access roads, pedestrian walkways and cycle paths complies with national best practice (illuminance levels, UGR limits, uniformity ratio).

CRITERIUM 2 (1 CREDIT) ★

- **Inclusive and barrier-free design**

- The building is accessible to all potential users.
- An access strategy regulates the access to and throughout the facility for all users.

TRILUX scores:

Product	BREEAM-INT HEA 06 Credits	Feasibility*
Sonnos LED		
Arimo Fit LED		
Arimo D LED		
Creavo LED		
Creavo D LED		
Creavo H LED		
Finea LED		
Opendo LED		
E-line Next LED		
Aragon Fit LED		
Mirona Fit LED		
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

TRILUX products guarantee qualitative solutions and comply with the standards for outdoor workplaces and public lighting (NENEN 12464-2:2014 and NPR 13201+A1:2018 EN). TRILUX outdoor lighting ensures a pleasant, safe and well-lit arrival at a building.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 15 ★★★★★★★★★★★★★★★

REDUCTION OF ENERGY USE AND CARBON EMISSIONS

GOAL

To recognize and promote buildings with minimal energy consumption through intelligent design.

CRITERIA

2 Options

1. Use of approved software for the calculation of the building's energy consumption - max. 15 credits.
2. Use of the BREEAM-Checklist (A5) - max. 10 credits.

OPTION 1 (15 CREDITS) ★★★★★★★★★★★★★★★

- **Determination of the energy performance of a building with building energy calculation software.**

- Assessed building compared to fictitious equivalent.
- Notional building = local code or ASHRAE standard (if local code is less stringent).
- At least 6 points required for a pass rating.
- At least 10 points required for an excellent rating.

- **Energy modelling study and qualified engineer required**

- Modelling software = National Calculation Methodology or BRE approved (country specific).
- Approved software: Designbuilder, TRNSYS, EPB Software 3G.

OPTION 2 (10 CREDITS) ★★★★★★★★★★

- **Definition of the energy performance of a building with Checklist A5: Energy-efficient design features.**

- Covers topics such as U-values and lighting efficiency, renewable technologies.

Remarks

- Fewer points can be achieved for this ENE1 option.
- If possible, then option 1 must be used.

TRILUX scores:

Product	BREEAM-INT ENE 01 Credits	Feasibility*
Sonnos LED	4	+++
Arimo Fit LED	5	+++
Arimo D LED	5	+++
Creavo LED	5	+++
Creavo D LED	5	+++
Creavo H LED	5	+++
Finea LED	5	+++
Opendo LED	5	+++
E-line Next LED	6	+++
Aragon Fit LED	6	+++
Mirona Fit LED	6	+++
Jovie LED	3	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

Energy efficiency is based on the comparison between a real and a fictitious building. TRILUX uses LED lighting and, if applicable, optimization with LiveLink. Each project requires a specific analysis. (E-line Next has the best performance 190 lm/W)

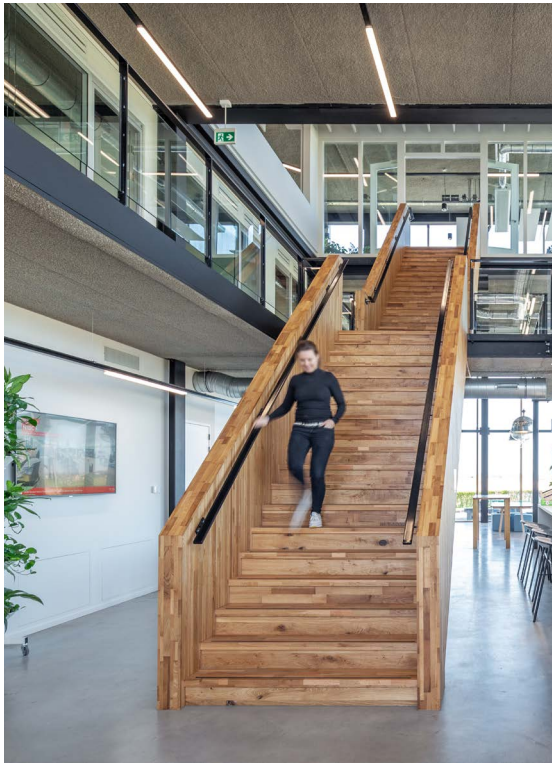
TRILUX products are very energy efficient. Each project requires a specific analysis to determine the ENE01-determination. If the project implements energy-efficient installations (in addition to TRILUX products), then scores up to 15 credits are possible.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 2 ★★

ENERGY MONITORING

GOAL

To encourage the installation of energy sub-metering to facilitate the monitoring of operational energy consumption.



CRITERIA

CRITERIUM 1 (1 CREDIT) ★

- **Sub-metering of end-use categories**
- Track annual energy consumption.
- Energy monitoring & management system or pulsed energy sub-meters.

CRITERIUM 2 (1 CREDIT) ★

- **Sub-metering of a high energy load and tenancy areas**
- Sub-metering per floor.
- Energy monitoring & management system or pulsed energy sub-meters.

TRILUX scores:

Product	BREEAM-INT ENE 02 Credits	Feasibility*
Sonnos LED	2	+++
Arimo Fit LED	2	+++
Arimo D LED	2	+++
Creavo LED	2	+++
Creavo D LED	2	+++
Creavo H LED	2	+++
Finea LED	2	+++
Opendo LED	2	+++
E-line Next LED	2	+++
Aragon Fit LED	2	+++
Mirona Fit LED	2	+++
Jovie LED	2	+++

*) Suitability of the product

- low feasibility
- + medium feasibility
- ++ high feasibility
- +++ very high feasibility

TRILUX ADDED VALUE

Energy monitoring is possible by using DALI and LiveLink to monitor luminaires in a building. The collected luminaire data can be linked back into the freely accessible LiveLink Cloud, or it can be delivered as raw data for an open API integration with third-party software and platforms.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 1 ★

EXTERNAL LIGHTING

GOAL

To reduce energy consumption through the specification of energy-efficient light fittings for the external areas of the building.

CRITERIUM 1 (1 CREDIT) ★

- **The building has been designed to operate without the need for external lighting**

ODER

- **Average initial luminous efficacy of the external light fittings (> 60 lumens per circuit Watt) and automatically-controlled external light fittings**

TRILUX scores:

Product	BREEAM-INT ENE 03 Credits	Feasibility*
Sonnos LED		
Arimo Fit LED		
Arimo D LED		
Creavo LED		
Creavo D LED		
Creavo H LED		
Finea LED		
Opendo LED		
E-line Next LED		
Aragon Fit LED		
Mirona Fit LED		
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
++ high feasibility
+ medium feasibility
+++ very high feasibility

TRILUX ADDED VALUE

The high energy efficiency (lm/W) of TRILUX products in conjunction with automatic LiveLink lighting control (daylight sensor or time switch) make it possible to provide very energy-efficient lighting. An analysis per project and product is required. The Jovie LED scores very well with 125 lm/W.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 6 ★★★★★★

BUILDING LIFE CYCLE ASSESSMENT

GOAL

To reduce the burden on the environment by recognizing and encouraging measures to optimize the selection of construction materials with a low environmental impact and ensuring a maximum consumption efficiency throughout the entire life cycle of the building.

CRITERIA

CRITERIUM 1 (5 CREDITS) ★★★★★

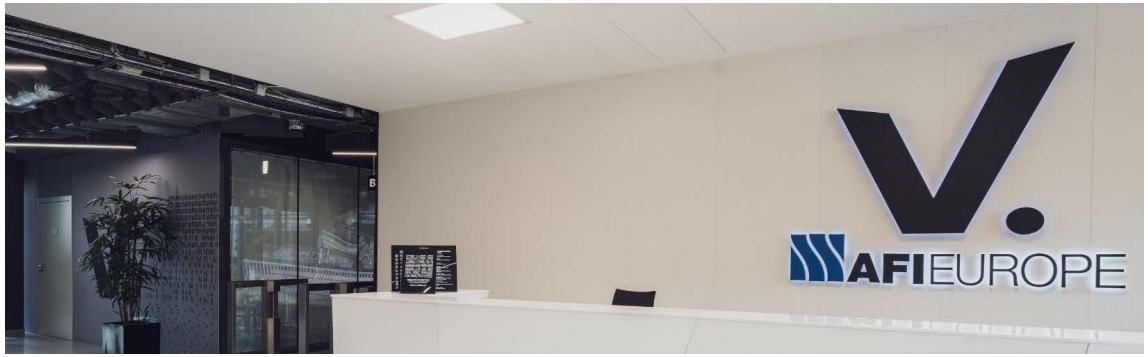
- **Measuring the environmental impact of building elements during the entire life cycle**

- Frame, upper floors, roof, external and internal walls, windows and external doors, stairs and ramps.
- Substructure and hard landscaping.

CRITERIUM 2 (1 CREDIT) ★

- **Material Reisepass**

- EPD Environmental Product Declarations.



TRILUX scores:

Product	BREEAM-INT MAT 01 Credits	Feasibility*
Sonnos LED	1	N/A
Arimo Fit LED	1	N/A
Arimo D LED	1	N/A
Creavo LED	1	N/A
Creavo D LED	1	N/A
Creavo H LED	1	N/A
Finea LED	1	N/A
Opendo LED	1	N/A
E-line Next LED	1	N/A
Aragon Fit LED	1	N/A
Mirona Fit LED	1	N/A
Jovie LED	1	N/A

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

TRILUX products are part of the 'electrical installations' in the BREEAM Mat 01 calculator and contribute 1-2% within the material rating.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 1 ★

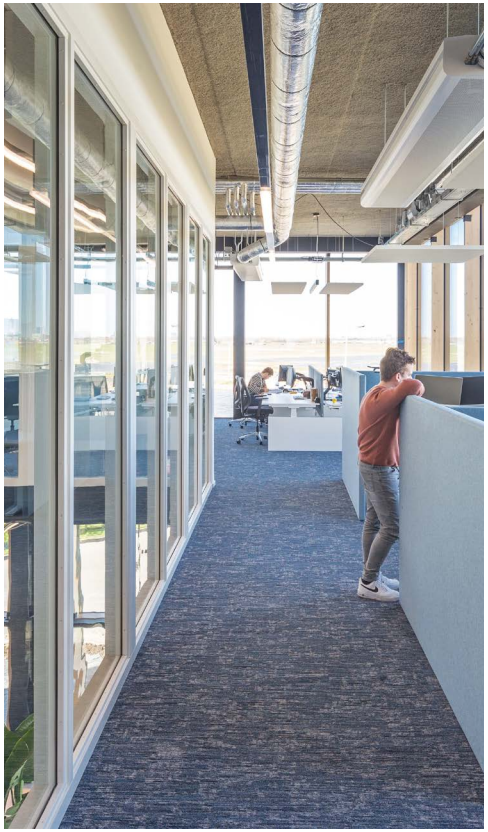
MATERIAL EFFICIENCY

GOAL

To recognize and promote measures to optimize material efficiency to minimize the environmental impact of material consumption and waste without compromising the structural stability, durability or lifespan of the building.

CRITERIUM 1 (1 CREDIT) ★

- **The design team identifies opportunities and acts to optimize the use of materials in design, procurement, construction, maintenance and end-of-life.**



TRILUX scores:

Product	BREEAM-INT MAT 06 Credits	Feasibility*
Sonnos LED	1	++
Arimo Fit LED	1	++
Arimo D LED	1	++
Creavo LED	1	++
Creavo D LED	1	++
Creavo H LED	1	++
Finea LED	1	++
Opendo LED	1	++
E-line Next LED	1	++
Aragon Fit LED	1	++
Mirona Fit LED	1	++
Jovie LED	1	++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

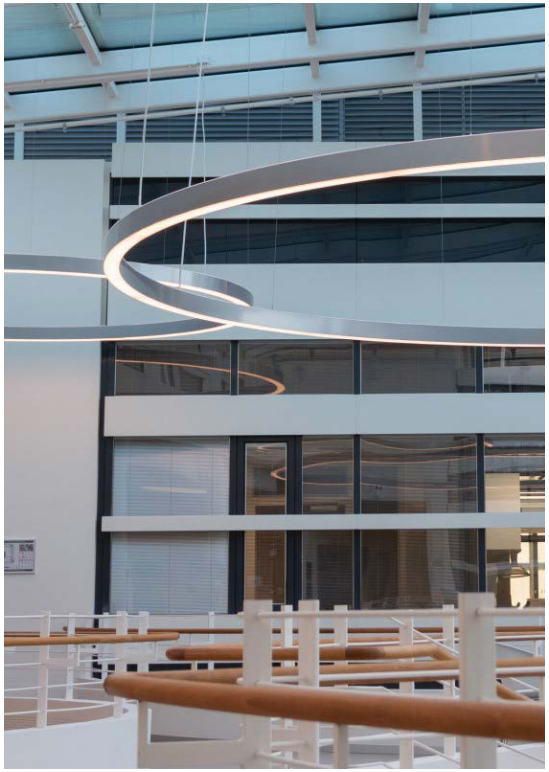
TRILUX encourages the most efficient use of materials throughout the lifecycle of the building and its components. This includes the reduction of used materials, reuse of existing products or materials, stripping materials from depreciated products, and purchasing materials with a higher content of recycled materials (Circular systems and modular products).

MAXIMUM NUMBER OF **BREEAM-CREDITS** 3 ★★★

CONSTRUCTION WASTE MANAGEMENT

GOAL

To promote resource efficiency through effective and appropriate management of construction waste.



CRITERIA

CRITERIUM 1 (2 CREDITS) ★★

- **Reduction of construction waste**

- Appropriate goals and procedures to minimize hazardous and non-hazardous waste on site.
- Construction waste on site is monitored and the goals are regularly checked.
- Procedures are in place to sort, reuse and recycle construction waste into at least five defined waste groups.

CRITERIUM 2 (1 CREDIT) ★

- **Diversion of resources from landfill**

- A significant amount of non-hazardous construction and demolition waste generated by the project has been kept out of the landfill.

TRILUX scores:

Product	BREEAM-INT WST 01 Credits	Feasibility*
Sonnos LED	N/A	N/A
Arimo Fit LED	N/A	N/A
Arimo D LED	N/A	N/A
Creavo LED	N/A	N/A
Creavo D LED	N/A	N/A
Creavo H LED	N/A	N/A
Finea LED	N/A	N/A
Opendo LED	N/A	N/A
E-line Next LED	N/A	N/A
Aragon Fit LED	N/A	N/A
Mirona Fit LED	N/A	N/A
Jovie LED	N/A	N/A

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

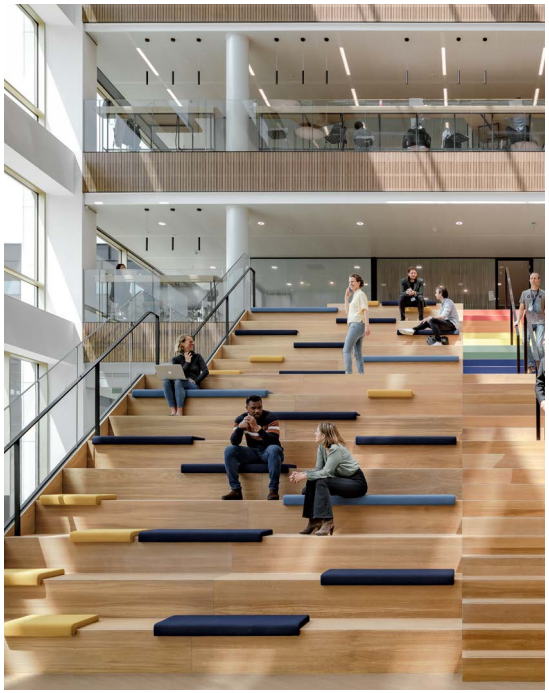
Points are project-dependent and thus difficult to determine, but bulk transport of TRILUX products or a joint bulk transport of TRILUX products with, for example, a ceiling supplier, avoid a large amount of packaging waste. TRILUX products contribute to this credit.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 1 ★

DESIGN FOR DISASSEMBLY AND ADAPTABILITY

GOAL

To recognize and promote measures, which can accommodate future changes in the use of the building during its lifetime.



CRITERIUM 1 (1 CREDIT) ★

- **Functional adaptability**

- A building-specific functional adaptability strategy study.
- Functional adaptation measures have been implemented in the design.

TRILUX scores:

Product	BREEAM-INT WST 06 Credits	Feasibility*
Sonnos LED	1	+++
Arimo Fit LED	1	+++
Arimo D LED	1	+++
Creavo LED	1	+++
Creavo D LED	1	+++
Creavo H LED	1	+++
Finea LED	1	+++
Opendo LED	1	+++
E-line Next LED	1	+++
Aragon Fit LED	1	+++
Mirona Fit LED	1	+++
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
++ high feasibility
+ medium feasibility
+++ very high feasibility

TRILUX ADDED VALUE

TRILUX enables easy disassembly of its products. The extent to which this is possible depends on the accessibility, method of fixing, and the size of the system. Many of the latest TRILUX product series are modularly developed and produced, so that components can be easily exchanged.

MAXIMUM NUMBER OF **BREEAM-CREDITS** 1 ★

NIGHTTIME LIGHT POLLUTION

GOAL

To ensure that outdoor lighting is concentrated in appropriate areas, upward illumination is minimized, and that unnecessary, intrusive light pollution, energy consumption and nuisance to neighbors are avoided.

CRITERIUM 1 (1 CREDIT) ★

- **The external lighting strategy has been designed in compliance with the Institution of Lighting Professionals (ILP) Guidance notes for the reduction of obtrusive light**
- All external lighting can be automatically switched off between 11:00 PM and 07:00 AM.
- Safety and security lighting complies with the lower levels of lighting in the CIE 150 2003 and CIE 126 1997 standards.

TRILUX scores:

Product	BREEAM-INT POL 04 Credits	Feasibility*
Sonnos LED		
Arimo Fit LED		
Arimo D LED		
Creavo LED		
Creavo D LED		
Creavo H LED		
Finea LED		
Opendo LED		
E-line Next LED		
Aragon Fit LED		
Mirona Fit LED		
Jovie LED	1	+++

*) Suitability of the product

- low feasibility
+ medium feasibility
++ high feasibility
+++ very high feasibility

TRILUX ADDED VALUE

Option to switch off outdoor lighting with a daylight sensor or time switch. Controlling and monitoring are possible with DALI and LiveLink Outdoor.

TRILUX delivers a fully controlled lighting solution for education.

TOP MARKS FOR **EFFICIENCY**

Putteridge High School is a coeducational secondary school in Luton (UK). The new school was built under the Department of Education's School Priority Building Program. The funding is part of a comprehensive national program to invest £2 billion in new and refurbished school buildings between 2015 and 2021.

The £23m project is now home to 1,200 secondary school students and offers state-of-the-art facilities including modern classrooms, a gymnasium and three all-weather outdoor hard courts.

The former artificial lighting installation accounted for a significant portion of the buildings' energy use and carbon emissions, contributing more than 87,700 kWh per year.

Kier Construction and mechanical and electrical consultant Hoare Lea were asked to find efficient luminaires, which could help to reduce the all-over energy consumption. Hoare Lea selected TRILUX lighting for all areas of the building to ensure high lighting efficiency.

The following approach was applied in order to minimize the energy consumption of the lighting systems:

- Reducing energy consumption of the lighting by using LED lighting throughout the entire building.
- Reducing the time and intensity at which this energy is consumed through daylight-dependent control and manual dimming systems.
- Good illuminance in the working area according to EN12464.

The school's architectural design contrasts with the norms of a typical school building. The stylistic choices reflect the forward-thinking approach to teach and inspire students. The exposed, high concrete ceilings play an important role in the design, and the designers needed a lighting solution that would fit into the ceiling between the acoustic panels.

The suspended modular Solvan Flow system provides high-quality, energy-efficient light up to 143 lm/cw, which is optimal for classrooms. A wide range of light distributions, including symmetrical,

asymmetrical and diffuse light distributions, are available for all educational lighting tasks.

In the foyer, the decorative Limba pendant lights create a striking entrance. The ball-proof Mirona Fit Sport luminaire ensures high light output in the sports hall and is reinforced against high impacts for safe operation.

The TRILUX LiveLink light management system controls the lighting in all rooms, except the shops. The intelligent system combines LED lighting with different types of sensors to increase energy efficiency. LiveLink forms the basis for the future and can be expanded beyond lighting at a later stage. The system can independently report maintenance needs and interact with users, opening up a wide range of options for controlling and monitoring lighting solutions, which make planning and installation very easy.

The following lighting control strategy was programmed for the school:

- Absence detection in all rooms up to 35 m².
- Absence detection with daylight dimming in all rooms larger than 35 m².
- Daylight is dimmed in the daylight-lit corridors.
- PIR control with manual override switches is used in all hallways, stairways and foyers without natural light.

In the classrooms, each row of lights is controlled independently via manual inputs and via the automatic system. In addition, emergency lighting versions of the standard lights were chosen to ensure the required minimum illuminance in the event of a power failure.

The energy-efficient combination of lighting and control systems has helped to achieve a BREEAM rating of 'very good' for this building.

Want to know more about BREEAM? Please contact us via phone/email or visit **trilux.com/breeam**

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Building one of the highest BREEAM-ranked offices in the world

V.OFFICES: WORKSPACES OF THE FUTURE.

Efficiency in office buildings has a new name: V.Offices. Located in Kraków (Poland), the newly constructed office building offers 24,700 m² of leasable space. It is built according to the highest standards in terms of ecology as well as ergonomics and wellbeing. With a BREEAM score of 98.87%, V.Offices is the most efficient office building in Poland and one of the most sustainable offices in the world. With regards to the BREEAM International building classification, it is ranked second in the top three of the highest ranked office buildings in the world. This outstanding score was partly achieved by making use of the latest technology in light management as well as using state-of-the-art luminaires by TRILUX.

V.Offices is located in a former industrial area of Kraków where it offers 24,700 m² of gross leasable space. While the ground floor provides commercial premises and a restaurant, the five upper floors are exclusively offices. In addition, a hall and a public patio with a green space serve as public spaces, which are accessible to all workers at V.Offices. While the modern V-shaped architecture provides an elegant and comfortable work environment for its users, the real game-changing nature of the iconic building lies in its cutting-edge emphasis on sustainability. As a single source provider, TRILUX contributed to the building's green performance by providing 1,540 luminaires in total, providing most luminaires for both indoor lighting and outdoor lighting.

The goal of the investor was to build an exceptionally efficient and sustainable building. As BREEAM not only takes the energy efficiency of a building into account, but also includes aspects like light pollution and visual comfort, choosing the right luminaires and appropriate lighting solutions is crucial for achieving a top score. BREEAM International Assessor Dominik Włodarczyk summarizes: "A lighting system must be considered in terms of its impact on people and on the environment. It is important that these two aspects are not overlooked in the search for the best solutions." Therefore, the planning team's choice for TRILUX was made very quickly. In addition to the large portfolio allowing to equip the entire building with luminaires from one single source, the luminaires' design, quality, and high efficiency were the main reasons to trust TRILUX. Installer Jerzy Trześniowski points out that "TRILUX luminaires have a very good light spectrum. They give the impression of 'soft light'. This is how you can differentiate a good luminaire from a bad one." The reliable availability of the solutions, a five-year warranty, and the fact that the products are made in Europe, contributed to the decision for TRILUX.

For a BREEAM score as high as 98.87%, all aspects of the building must be optimized to a maximum. In terms of lighting, this means using the most energy-efficient luminaires, as well as making sure that they are only turned on when necessary. Therefore, lighting control in the common areas is based on DALI modules, linked to movement detectors. The outdoor lighting relies on dusk sensors reducing light pollution to a minimum. Architect Andrzej Gacek illustrates how deep the integration of the lighting systems into the building's outstanding efficiency is. "Lighting has been integrated with solenoid valves in the toilets. If there is no lighting, the water supply is cut off."

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Lighting calculations, light measurements, installation and project management: TRILUX took care of everything.

INTELLIGENT LIGHTING FOR ONE OF EUROPE'S **MOST SUSTAINABLE DISTRIBUTION CENTERS**

One of the most sustainable and - in our opinion - one of the most beautiful distribution centers ever built: the iconic DC Rhenus A58 has such an exceptional architecture that it cannot be missed along the A58 near Tilburg (The Netherlands). This building, developed by Dokvast and used by Rhenus Logistics, achieved a BREEAM score of no less than 99.48%, making it the most sustainable DC in Europe. TRILUX provided the lighting and lighting control for this modern DC.

SUCCESS FORMULA

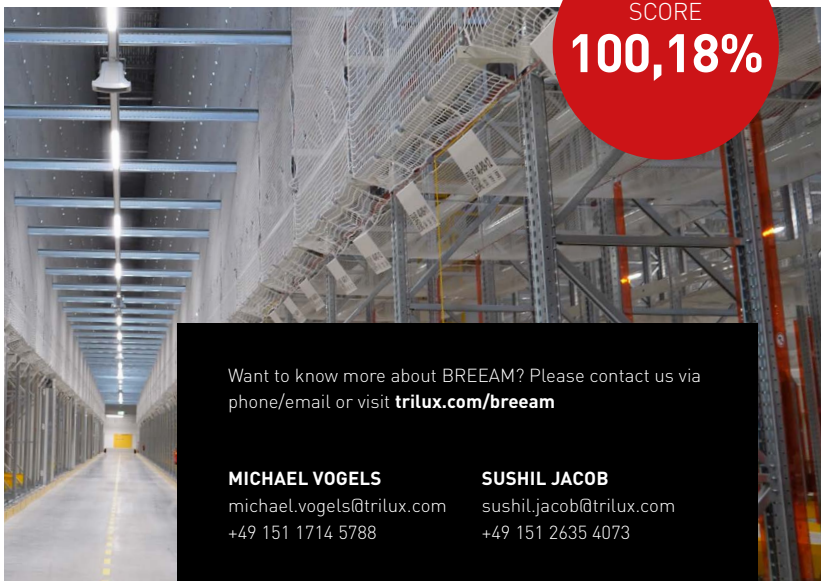
This is the third distribution center in a row from Dokvast, which is equipped with intelligent lighting solutions by TRILUX. "That shows the confidence in our company, as well as the trust that we are able to develop beautiful things together," says Willem Dammers, Managing Director of TRILUX Benelux. "In addition to our high-quality LED lighting, the LiveLink Premium light management system was also used for this project. We do not only provide luminaires, but also provide functionality of intelligent light. The light only switches on when it is really needed, i.e. when there is insufficient daylight and when people are present." Dammers continues: "But the system only becomes truly intelligent by collecting data. Our luminaires collect live data about the burning hours, dimming levels, energy consumption, and temperature. Next to that, they can send notifications in the event of malfunctions. We provide this data to Dokvast, who uses it as input for its own building dashboard and directs its use and maintenance accordingly."

FULL-SERVICE

In addition to the technical realization, TRILUX took care of the project-related support. "We always apply a full-service approach in such projects," says Dammers. "That means that we have conversations with the building owner to identify his requirements and wishes. We then provide a comprehensive BREEAM lighting planning and project management. At the construction site, we have frequent consultations with the other construction partners in order to work as efficiently as possible."

"In order to work more efficiently, an assembly team installed our light lines," Dammers continues. "This saves the electrical installer a lot of time. The assembly service is a service, which we can offer in all our continuous-row lighting projects. After assembly, the light lines are connected to the power supply and the LiveLink Premium system by an installer. Then our specialists put the light management system LiveLink Premium into operation. After delivery, we look at the light measurements and provide the evidence for the BREEAM assessment. This is how our lighting solutions and services really make a difference."

Thanks to TRILUX, all the lighting in this building has an incredibly high light level, which provides exceptional comfort for everyone who is present in the building. And the lighting in combination with the light management system makes a strong contribution to the high BREEAM rating.



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Lighting with efficiency from the latest LED luminaires

TRILUX LIGHT THE ESSENTIALS FOR **LONDON'S LATEST BREEAM OUTSTANDING BUILDING**

100 Liverpool Street is London's new kid on the block. Already in the top 1% of the UK's sustainable office buildings, it bears no resemblance to its former self. Hopkins Architects and Sir Robert McAlpine recently completed a refurbishment and extension for British Land, which has reinvigorated the existing outdated building, stripping it back to its structural frame and providing it with a dynamic new identity thanks to a new curving façade and revamped public realm.

The building now provides 520,000 sq. ft of light, airy offices, and three new floors at the top of the building. The ninth floor includes one of the largest open-air restaurant spaces in the City of London.

Central to the buildings' design ethos was efficiency. It features an array of sustainable features to meet the ambitious net-zero carbon aims established at the project's outset.

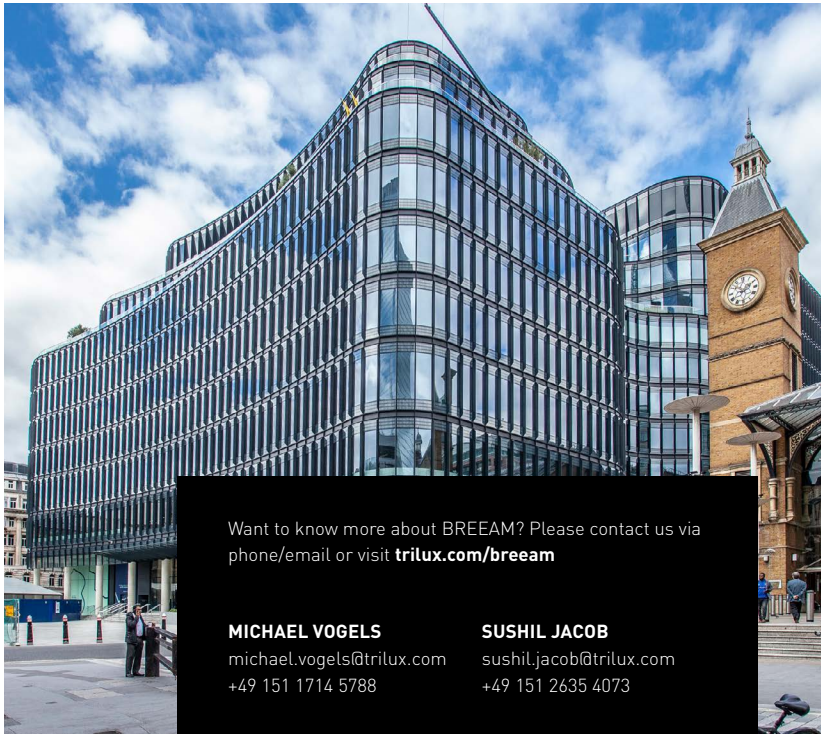
High efficiency building systems, including the lighting, the re-engineering of the existing structural frame, photovoltaic panels, and outdoor planted areas on the upper terraces, all contribute.

Throughout the ten floors, the lighting objective was to take advantage of high efficacy from the latest LED luminaires. TRILUX Oleveon Fit LED's outstanding, low glare, and energy-efficient light supported the energy targets of the project and was selected to light the essential back-of-house areas.

Vick Nanthan, Head of Sustainability and Key Account Manager at TRILUX, describes, "I am incredibly proud of this project. The team was very hands-on and did a remarkable job of delivering on time despite the setbacks of the pandemic. Efficiency and high-quality runs through the core of this landmark redevelopment, and the washrooms were no exception.

The impressive washroom fit-out package included various styles of lighting. Our trimless LC60 light channel, in different shapes and configurations, integrates effortlessly in the changing rooms to provide an exceptional light quality. SNC point downlights with a warm light lens and special sunken optic installation appear hidden within the ceiling, creating atmosphere and accents. But my personal favourite is the bespoke antique brass wall washing luminaires which perfectly add to the oak and brass interior scheme. They use a soft warm colour temperature LED to create a wonderfully comfortable, complementary environment."

Since completion, 100 Liverpool Street has received a BREEAM Outstanding rating and is on target to achieve WELL Gold certification.



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