LIGHTING
ASSOCIATION
IRELAND

Lighting Key to Energy Savings, Carbon Reduction and Wellbeing

Lighting Association Ireland

Lighting Association Ireland (LAI) was established in 2016 to represent the collective views of all member companies involved in lighting in Ireland, and to promote best practice in the sector.

Membership of the Association is open to all *bona fide* lighting-related trading entities, provided they are fully tax-compliant and hold an in-date Tax Clearance Certificate (and Tax Clearance Access Number).

Correctly-designed and installed lighting contributes to the energy efficiency targets set by the Government and LAI acts as an "enabler" for these targets. It has strong relationships with the various statutory, regulatory and representative bodies responsible for the sector, including NSAI, SEAI, RECI, CIBSE Ireland, Enterprise Ireland, EIFI and LIA. Nominated LAI delegates meet regularly with their counterparts from these bodies, and also sit on various national standards and advisory committees.

In addition, LAI is an active member of LightingEurope and, apart from contributing to its activities in the broader EU context, brings the benefits of its experience and knowledge base to the Irish marketplace.

Key objectives in the LAI agenda are:

- Energy Efficiency
- Carbon Reduction
- Sustainability
- Health and Wellbeing
- Standards
- Regulation Compliance
- Product Quality
- Installation Excellence

Members

- ACEC Distributors
- AP Haslam
- Aurora Lighting
- Derrywood Agencies
- Domus Projects
- ECI Lighting
- EmCon Systems
- Fagerthult Lighting
- Fantasy Lights Group
- General Lighting
- Glamox Ireland
- Ledvance
- Lidacel
- Light Solutions
- Litho Circuits
- Lux Box Lighting Technology
- Lug Light Factory
- Profile Lighting & Power
- LED Group Robus
- Signify
- Switch Distribution
- TaskLED Lighting
- Watt Less

LIGHTING ASSOCIATION IRELAND

Realising Ireland's Climate Action Plan

Lighting critical to success of EU's Green Deal and Renovation Wave initiatives

The EU's Green Deal and Renovation Wave initiatives are excellent programmes and will undoubtedly inform and underpin the policies adopted by Ireland as we seek to reduce both our energy use and carbon emissions.

For the most part though they focus primarily on heating, cooling and hot water generation. These are indeed major areas of concern, and ones that offer significant potential for savings.

However, lighting offers as much, if not more potential for energy saving and carbon reduction. Lighting impacts every aspect of modern-day living, be it homes, commercial, retail, hospitality, leisure and public buildings, not to mention outdoor lighting. Also, the pace of development is phenomenal with massive gains being made on a regular basis.

Lighting has a major contribution to make in realising the energy saving and carbon reduction objectives of the Climate Action Plan. It can also help Ireland meet its obligations in respect of Article 7 of the Energy Efficiency Directive.

Moreover, with wellbeing now also high on the agenda, especially in the face of the Covid-19 pandemic and changed work practices, it offers additional benefits. The non-visual effects of proper lighting levels are critical to good health, promoting sleep and even recovery from illness, in addition to increasing concentration and performance levels

We are currently faced with two crises – the decline of the environment and Covid-19. Lighting is unique in that it offers huge benefits in tackling both at the same time. The following pages present evidence-based data supporting this.

Paul O'Connor
Chairman, Lighting Association Ireland

Why lighting has so much to offer

Lighting Association Ireland (LAI) – in conjunction with LightingEurope of which it is a member – is supporting the call to scale up renovation across Europe and says there are compelling reasons why lighting should be included as an integral part of the solution. Renovation is at the heart of the European Green Deal and has been identified as a key driver for the European social and economic recovery post-COVID-19. Here LAI spells out why there cannot, and should not, be any renovation of buildings that do not include the upgrading of the lighting.

Many perceive lighting mainly as a driver for energy efficiency and this indeed remains one of the core values for the lighting industry. The now mostly accomplished transition to LED technology has led to up to 90% savings for European consumers. The implementation of comprehensive light management systems will save 20 to 29 TWh per year as of 2030 (Lot 37 Ecodesign Lighting Systems <http:// ecodesignlightingsystems. eu/introduction>).

However, the benefits from lighting for the health, well-being, productivity and safety of people are rarely seen as added value. At best, they come for free as part of the energy savings. These benefits received more attention in 2017, when three biologists were awarded the Nobel Prize for helping to explain how the human circadian rhythm works, including how light affects our daily biological cycle.

With the EU Renovation Wave initiative, the discussion must move beyond energy savings to also address healthier buildings, peoples' quality of life and a lower level of inconvenience. We spend 90% of our time indoors and the quality of our indoor environment has a direct and indirect impact on our health, well-being, and productivity.

To date, most people think of heating, cooling and ventilation when referring to indoor environmental quality. The importance of good indoor air quality, for instance, is well known. However, we must look beyond air quality and address all aspects of indoor environmental quality (IEQ). It must include ventilation, cooling, heating, daylight, electric lighting, air-conditioning, dehumidification, plumbing and building automation and controls.

The visual impact of lighting can be felt directly, i.e. we can see sufficiently to carry out our task and for orientation. The impact on our body and emotions from lighting is felt more indirectly but has meanwhile been proven in many studies <*https://www.valueoflighting.eu/*>. With good quality lighting employees perform better, students score higher, and it improves the sleep, mood and behaviour of patients suffering from Alzheimer disease.

Lighting Association Ireland, in tandem with LightingEurope, proposes that no renovation should take place without an upgrade of the lighting installation. It also recommends the following:

- Focus on non-residential buildings (public and commercial buildings), as already set out in the Energy Performance of Buildings Directive. It believes that public buildings should lead by example;
- Use LED lighting in combination with controls and sensors. By switching from incandescent lamps to energy efficient LED lamps, it is estimated that

Europeans have benefitted from up to 90% savings. Furthermore, these lighting systems, in addition to allowing for large energy savings, also offer significant benefits to the building users with regard to their visual comfort, wellbeing and productivity;

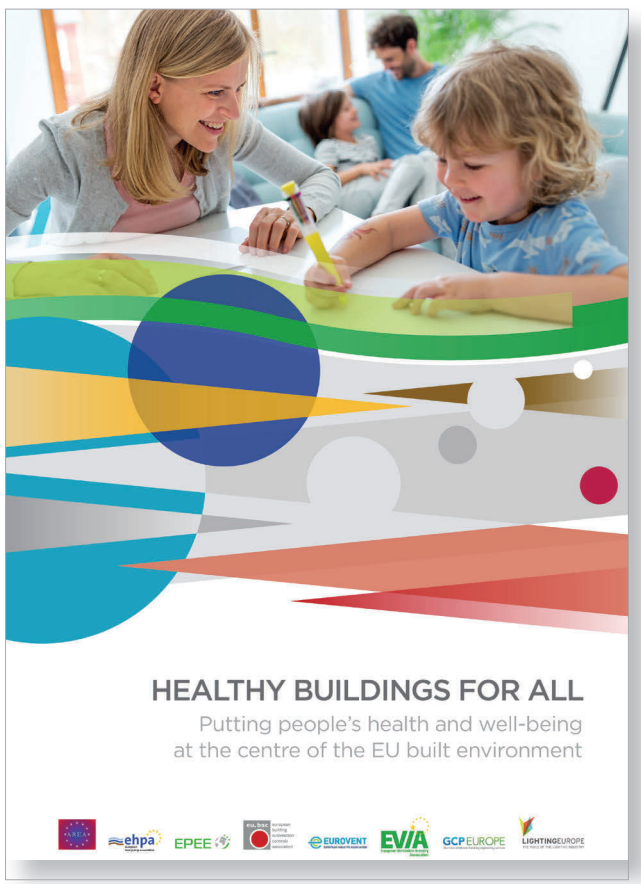
- Prioritise a full renovation of luminaires to include controls and sensors, with a minimum Smart Readiness Indicator (SRI) level. "Just re-lamping" – simple replacement of a lamp – should be avoided. Replacing luminaires or introducing a whole new lighting design should be encouraged as this will lead to greater benefits in terms of energy savings and IEQ;
- The Smart Readiness Indicator should be applied across the EU to maximise its energy savings potential and capture all the benefits it can bring to the wellbeing and performance of building occupants. Renovations should lead to a certain minimum SRI score;
- Introduce mandatory minimum requirements on IEQ. Criteria for lighting can be found in EN 12464-1 and should be referenced in the Renovation Wave Initiative;
- Access to public financing should be subject to the fulfilment of certain conditions. An obligation to include lighting renovation to obtain full subsidy should be introduced.

Conditions to be fulfilled

- Lighting should comply with EN 12464-1;
- Use of controls and sensors, with minimum SRI level;
- For lighting Service 1a (occupancy control for indoor lighting), a minimum functionality of Level 2 (automatic detection) should be required, as Level 2 functionality is simple to implement and is based on established technologies that provide good additional levels of energy saving and user satisfaction as compared to Level 1;
- For lighting Service 2 (control artificial lighting power based on daylight levels), a minimum functionality of Level 3 (automatic dimming) should be required, as Level 3 functionality is simple to implement and is based on established technologies that provide good additional levels of energy saving and user satisfaction as compared to Level 2;

For more information seek out the LighingEurope Position Paper on Healthy Buildings at *www.lightingeurope.org*

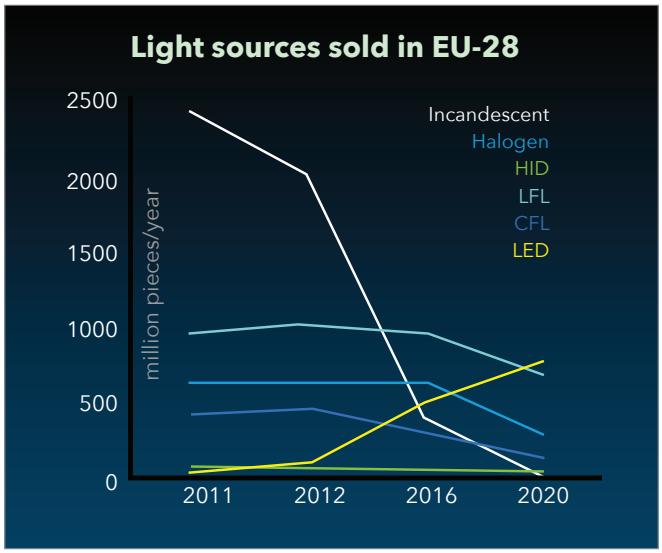
• *Healthy Buildings for All* was published by an informal Indoor Environmental Quality (IEQ) gathering of eight European industry associations, representing companies involved in technical building systems and their maintenance. The objective is to collectively promote healthy buildings with an adequate level of indoor environmental quality.



Energy saving, efficiency, wellbeing, sustainability

Value of light to society

- The Strategic Roadmap of LightingEurope demonstrates the increasing growth in the value of light to society. In this process, energy efficiency is supplemented with light for sustainability and with light for wellbeing. Together with European Regulators, the European lighting industry aims for more intelligent lighting systems, increased renovation rates, more Human Centric Lighting solutions, and circular economy thinking in relation to lighting. Apart fom products and controls, design, installation and commissioning must also be considered;
- While lighting is a key driver for energy efficiency, the attendant health and safety benefits are often overlooked. Indeed, they are sometimes taken for granted instead of being valued for their contribution to wellbeing;



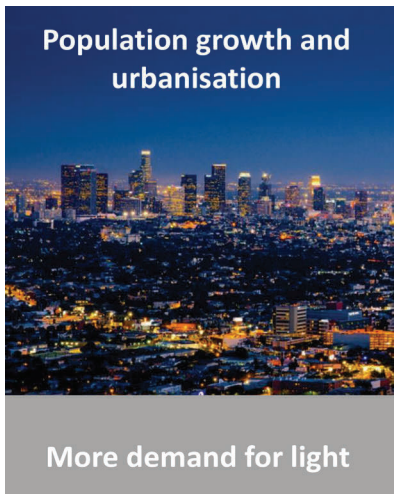
- Lighting Association Ireland's (LAI) goal is to create awareness of how lighting improves the wellbeing of people, both indoors and outdoors.

Consequences

- Poor circadian entrainment, problems with body clock similar to jet-lag;
- Problems with sleep and alertness;
- Disturbance of hormone system;
- Compromised mood, functioning, wellbeing and health.

Lighting challenge of a changing world

- 70% of the world's population will live in cities by 2030;
- People spend 90% of their life in buildings;
- People live and work longer. In 2020 those aged 50 and over account for 41% of the population, 212 million out of 514 million people;
- 70% of existing buildings in Europe will still be in use by 2050 (source: Buildings 2030);
- Today, only around 1% of existing buildings are new or renovated;
- Strengthening the role of lighting systems in the EPBD will result in improved energy savings and wellbeing in buildings;
- EPBD will create an opportunity to promote more investment in better-performing buildings;
- Each year, at least 3% of the existing buildings need to be renovated to achieve the European goals;
- In Europe, buildings use 40% of total energy and produce nearly 36% of CO2 emissions;
- Non-residential buildings comprise up to 20% of total energy consumption;
- 81% of light sources will be LED by 2030. Share in 2015 was 7% *(LightingEurope);*
- The benefit of saving one ton CO2 equivalent is €75€n the case of lighting systems;
- The maximum EU-28 total annual electricity savings for optimised lighting system designs with controls (depending on the reference light source scenario) are: 20-29 TWh/year in 2030; 48-56 TWh/year in 2050. *(Reference: EcoDesign [EC)245/2009 on tertiary sector lighting products saving potential is 38 TWh/year in 2020]source: ENER Lot 37)*



Energy saving, efficiency, wellbeing, sustainability

Energy savings through lighting

Depending upon the scenario, lighting accounts for around 20% of the total cost-effective energy savings potential in non-residential buildings towards 2030. Properly-designed and well-coordinated lighting systems are one of the most cost-efficient ways to reduce energy consumption and CO2 emissions.

An estimation of the energy savings potential of lighting systems is shown below.*

	2030	2050
Annual energy savings (EU28)	20 – 29 TWh/y	48 – 56 TWh/y
Savings (%) of electricity use (BAU)	9 %	18 %
Cumulative energy savings	110 – 180 TWh	900 – 1,000 TWh
Cumulative GHG reduction	40 – 60 $MtCO_2eq$	270 – 300 $MtCO_2eq$
Energy expenditure reduction	€ 3 – 5 B/y	€ 21 – 25 B/y

• Energy savings for optimised lighting systems (both indoors and outdoors) with controls. *VITO et al.* (commissioned by the European Commission), Preparatory study on lighting systems 'ENER Lot 37' (Brussels, 15 December 2016), p. 331.

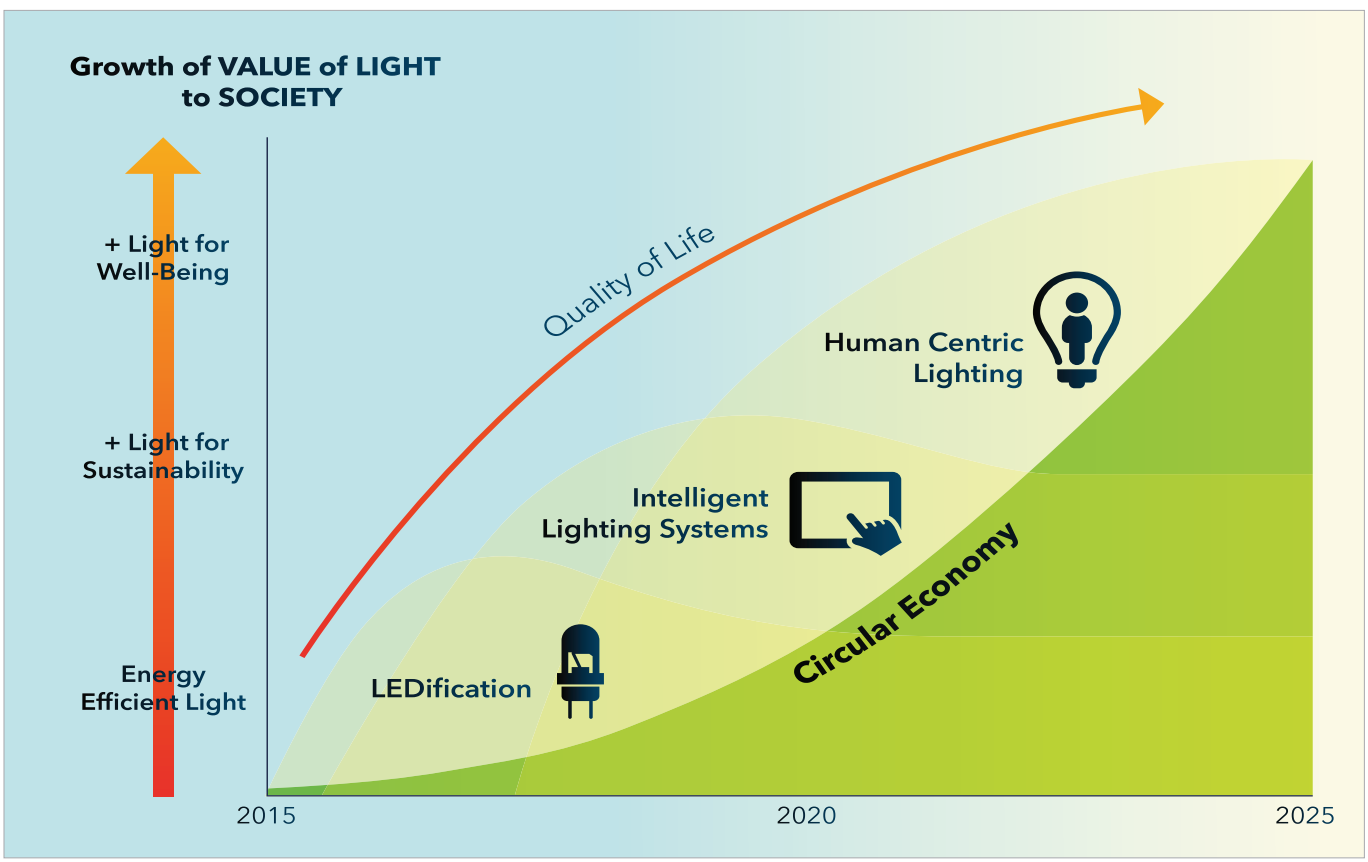
Value of good lighting to society

Light is life!

- From the earliest stages of life on earth, life has been based on light. For over 100 years, electric light has made it possible to learn, work and live at almost any place and time on earth. Over recent decades, a lot of effort has gone into reducing the energy consumed to make this possible. In the coming decade, the development of new lighting systems will enable the properties of natural lighting to increase the quality of life in many daily situations. This will be the case in education, in leisure time, in healthcare, in elderly homes or in business.
- New system capabilities will adapt lighting conditions to suit the user, thus creating high value to society. Efficiency will go up, illness rates down, recovery will be faster and learning will be easier. Howevert, more importantly, wellbeing and perceived quality of life will improve.

Right lighting in right place and at right time

We know light enables vision, it helps us navigate our surroundings and makes us feel safe. But light can do so much more. It has the power to energise, relax, increase alertness or cognitive performance and mood, and to improve the sleep-wake cycle of people. Better lighting, whether in the home, at school, in workplaces or on the street, is about having the right light, at the right time, and in the right place. Better lighting is made possible with the right combination of daylight and electric

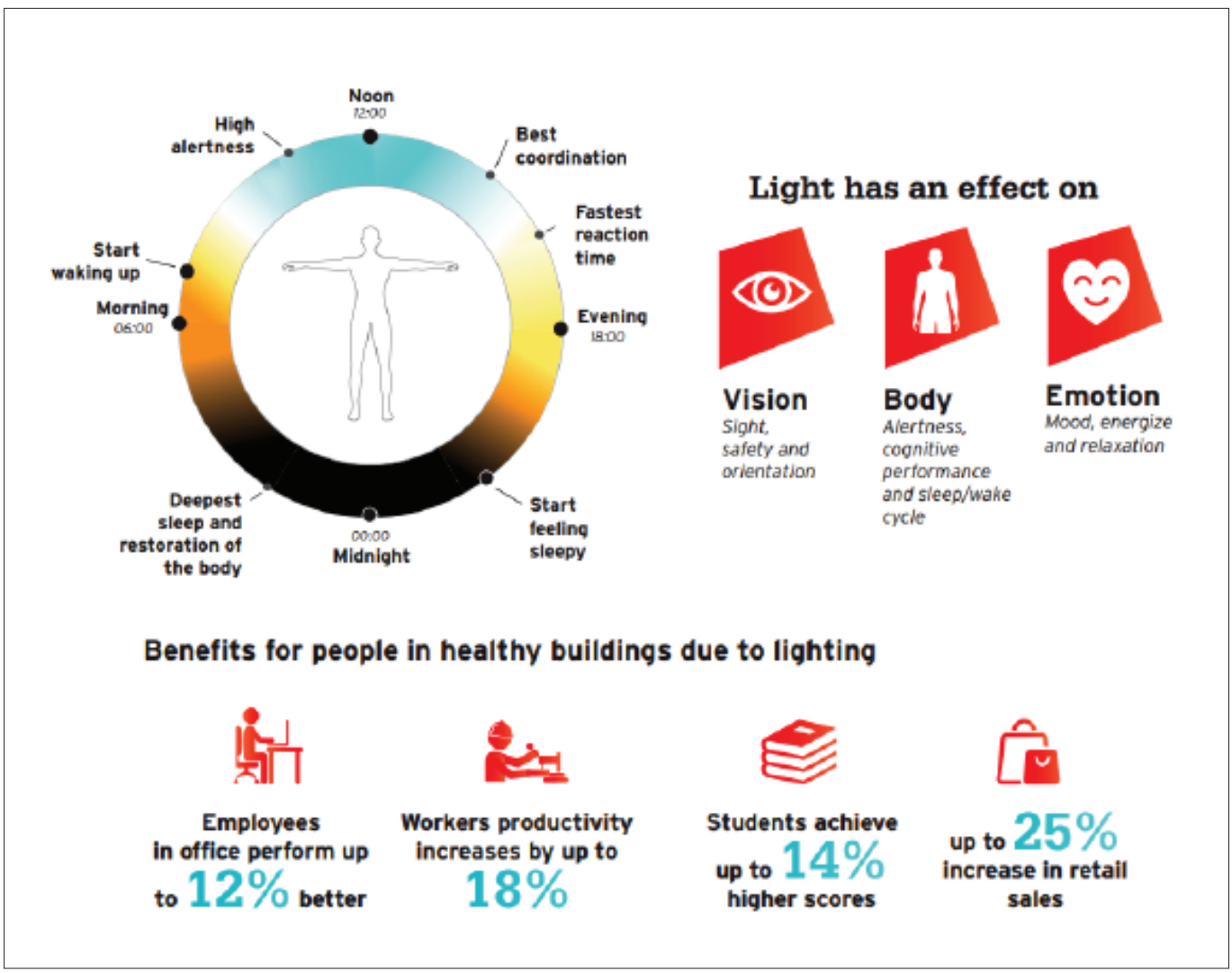


Value of good lighting to society

lighting in a building, and is enabled by lighting systems. Intelligent lighting systems have opened a new world of opportunities, allowing for instant lighting management capabilities and dynamic light.They provide the means to adjust the lit environment to suit our visual and biological needs, therefore enabling Human Centric Lighting while, at the same time, reducing energy consumption.

Why do we need light?

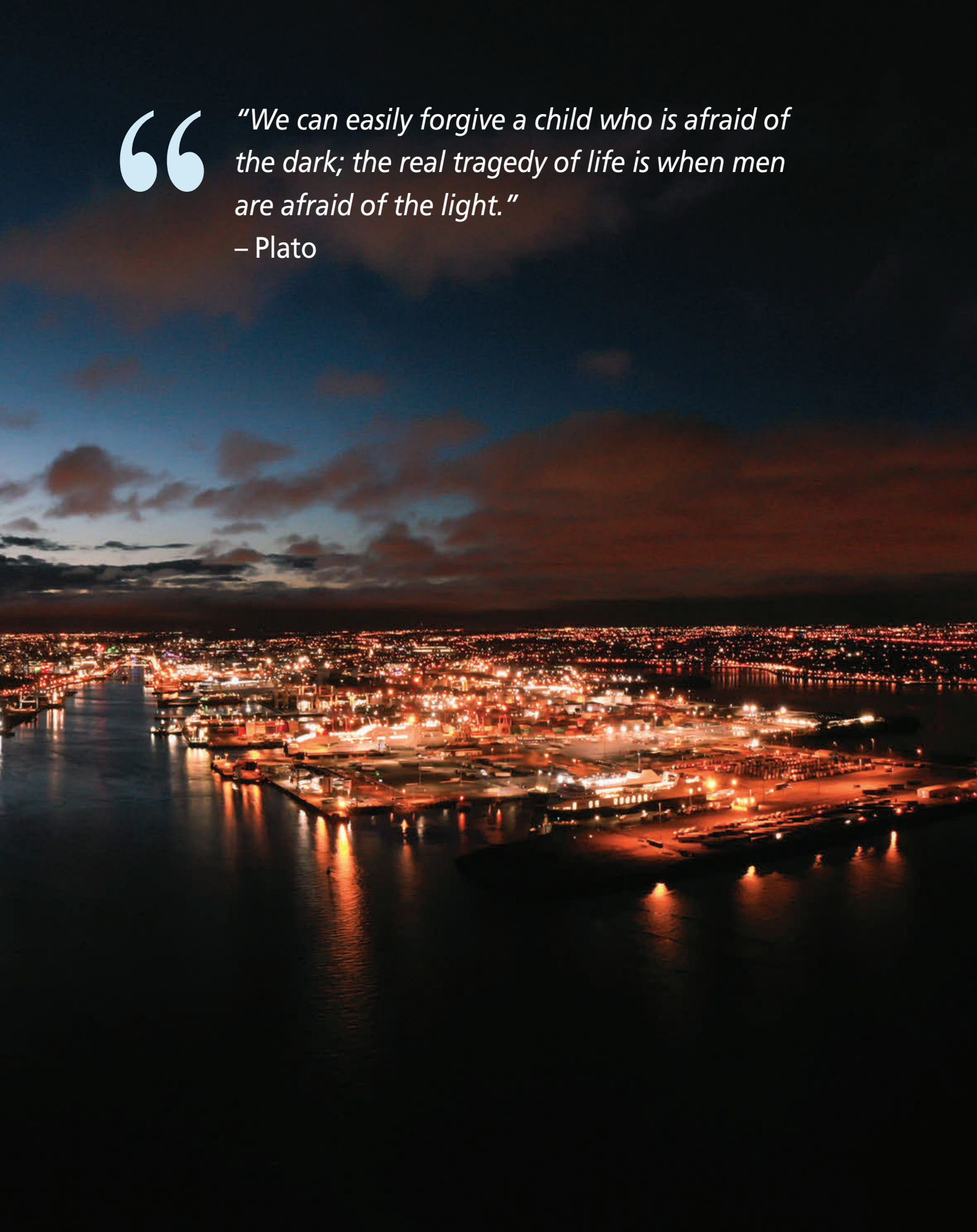
- The Nobel Prize in physiology or medicine 2017 was awarded jointly to Jeffrey C. Hall, Michael Rosbash and Michael W. Young "for their discoveries of molecular mechanisms controlling the circadian rhythm". The team's discoveries helped to explain the mechanism by which light can synchronise the 24-hour body clock.
- A circadian rhythm is any biological process that displays an endogenous oscillation of about 24 hours interacting with the environment (https://en.wikipedia.org/wiki/Circadian_rhythm). These 24-hour rhythms are driven by a circadian clock, and they have been widely observed in all living species. The rhythm is linked to the light–dark cycle. Environmental



Value of good lighting to society

cues that reset the rhythms each day are called zeitgebers (from the German, "time-givers").

- Light is the most important timer for our internal clock. Even a single biological cell experiences a biological clock.
- There is a period of the day when we are active and a period when we are sleeping. We need light to wake up in the morning and darkness to help us sleep at night.
- The true value of light lies in the combination of exvisual, biological and emotional benefits. Light affects sight, feeling of safety, orientation, alertness, cognitive performance, sleep/wake cycle, mood, energy and relaxation. As mammals, our eye lenses deteriorate with age and thus aging people need more and better light to see and to influence their circadian system.
- A 70-year-old person needs twice the amount of light compared to a 30-year-old person.
- In the EU in 2020, 41% of population is said to be above 50 years old.



"We can easily forgive a child who is afraid of the dark; the real tragedy of life is when men are afraid of the light."

– Plato

Value of good lighting to society

90% of time spent indoors

- Buildings are built to protect us from outdoor weather conditions (rain, cold/warmth), allowing us to live and work in comfort.
- Good lighting is a basic requirement for people in a healthy building, along with air quality, thermal comfort and acoustics.

What is good lighting?

- Minimum light quality requirements are described in European Standards (EN 12464-1).
- Light quality requirements for visual effects of light are:
  – Colour rendering
  – Horizontal and vertical Illuminance
  – Illuminance uniformity
  – Glare
  – Colour temperature
- For non-visual effects of light:
  – Timing
  – Intensity
  – Colour spectrum
  – Duration
  – Photic history
- We need the right light for our activities at the right place at the right time. This requires intelligent and digital lighting.
  – Dynamic lighting allows dimming and boosting of light intensity.
  – Tuneable lighting allows variation of light spectrum.
  – Dynamic and tunable lighting enable Human Centric Lighting.
- HCL supports health, wellbeing and performance of humans by combining visual, biological and emotional benefits.
- Good lighting minimises the impact on the environment.
- Good efficient lighting in a building is a combination of daylight and electric light.

Energy saving a given with good lighting

- The maximum EU-28 total annual electricity savings for optimised lighting system designs with controls (depending on reference light source scenario) are: 20-29 TWh/year in 2030 / 48-56 TWh/year in 2050.
- Good lighting using lighting systems controls reacts instantly to user needs, thereby reducing energy consumption.

Value of good lighting to society

Ledification

- Continue to strive for, and influence, energy efficiency policies;
- Simplify energy efficiency product regulation via the One Lighting Regulation (1LR);
- Develop a determined strategy against poor-quality, non-compliant products via market surveillance;
- Educate stakeholders to guide them from product efficiency to system efficiency.

Intelligent Lighting Systems

- Build the relevant partner network, collaboration with allied industries;
- Enable alliances to cooperate with big construction companies;
- Lobby for measures for accelerated renovation of lighting installations as part of a wider building stock renovation policy;
- Publish white papers on what lighting systems can deliver;
- Drive for appropriate interfaces between domains to keep pace with market and technology.

Intelligent lighting systems

Holistic lighting systems

A lighting system is a holistic one with lighting components, sensors and controls that also includes the design and installation of the system. The lighting industry recommends that a lighting system design process specifies the steps for correct lighting system design to secure quality of light requirements prior to the energy calculations, installation, commissioning, operation and maintenance of the lighting system over the years.

The lighting system is a key competence of the lighting industry. It will have standard interfaces to adjacent industries in infrastructure, building management or IT, and will allow freedom of business models. The uptake of intelligent lighting systems will be increased by simpler legislation that enables differentiation and which is easy to enforce.

An energy efficient luminaire operating within an empty room is not energy efficient!

Dynamic lighting

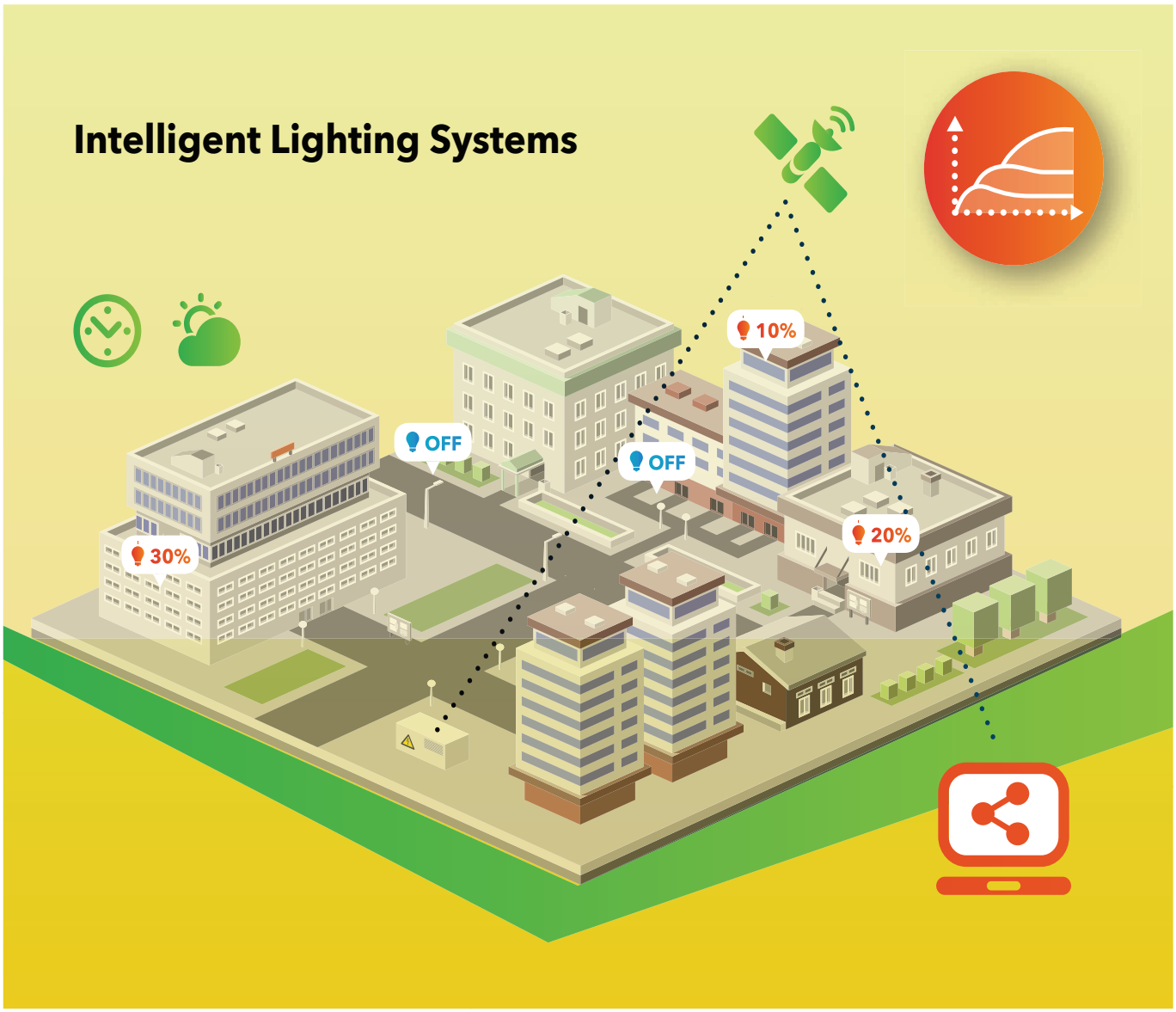
Lighting systems provide dynamic and tunable light (dimming and boosting light intensity and tuning spectrum) enabling Human Centric Lighting. Lighting systems are measured in actual energy consumed and not in maximum installed power.

Lighting system design process

- Define the lighting design according to user needs and investor interest;
- Achieve transparency, documentation and planning certainty;
- Ensure energy performance and lighting quality according to design.

Lighting systems design process:

(Source: CEN/TS 17165)



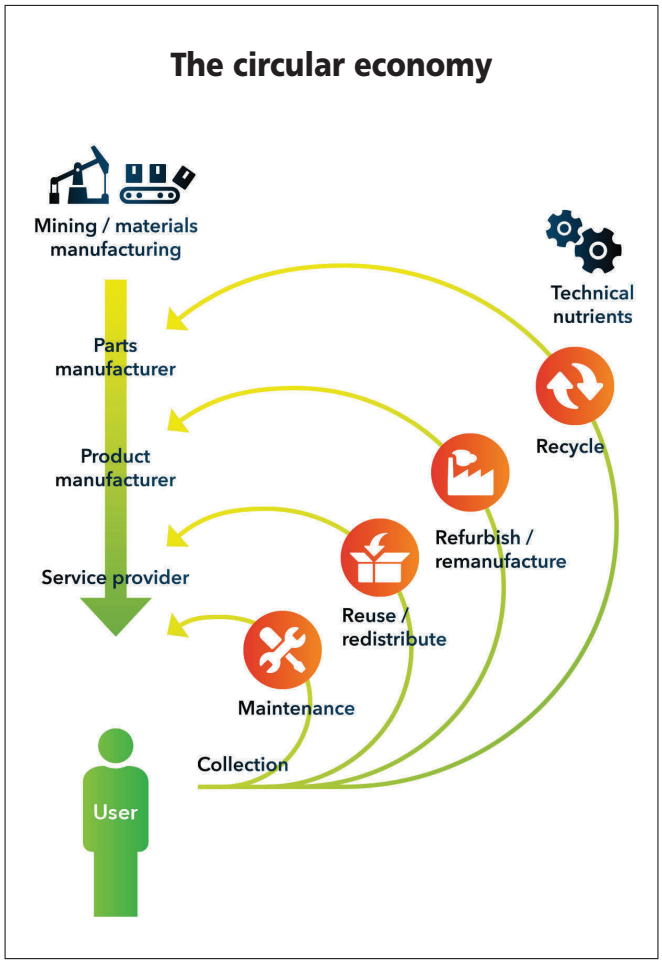
Circular economy

Reduce carbon footprint

- A key objective of the lighting industry is to significantly reduce its environmental footprint. Progress is being made in the recycling of materials. However, the real ambition is to master the next steps on the way to a circular economy:
  - To refurbish and remanufacture;
  - To reuse and redistribute.
- The ultimate goal is the extension of the lifetime of the system by servicing and upgrading at the customer's site. This understanding of a circular economy will change the supply chain. It will have positive consequences for the environment, the economy and society, in addition to creating jobs.

Summation

LAI supports the objectives of the Irish Government's Climate Action Plan, the EU Green Deal and the Renovation Wave Initiative. We are currently actively lobbying the EU through our membership of LightingEurope so that the industry in Ireland has an input into all such initiatives, and to ensure that the interests of stakeholders in Ireland are represented in all future developments.



Market Surveillance Essential

An effective strategy to deal with the proliferation of poor-quality, non-compliant products by way of market surveillance is essential. Ireland already has a Market Surveillance Authority within SEAI but it needs more resources and clout to be effective.

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