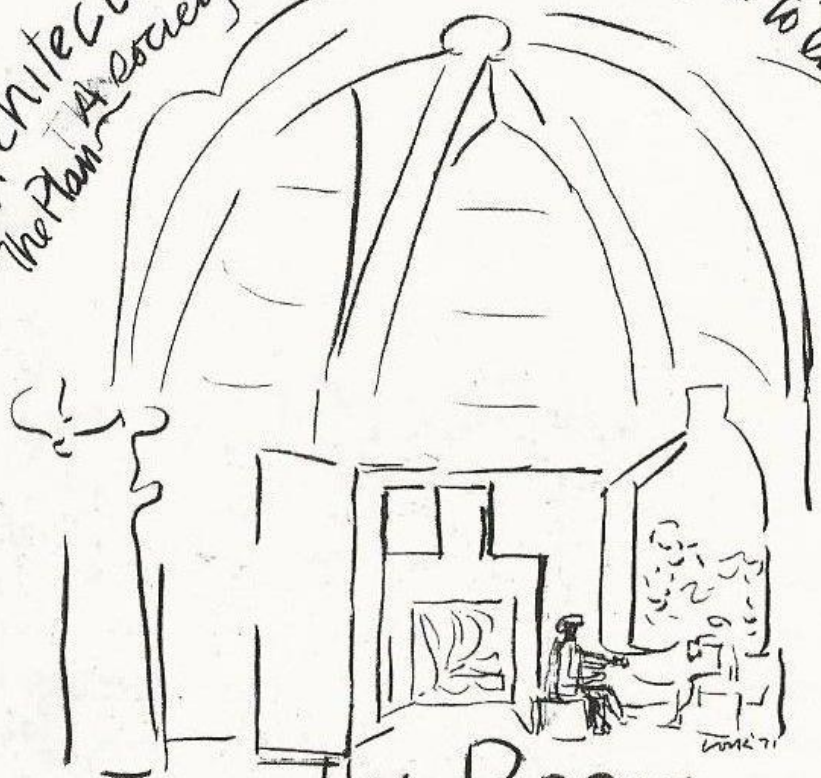


CHANGING TOWARDS DAYLIGHT'S CHANGEABILITY

THIS PRESENTATION WILL DISCUSS HOW THE VARIATIONS OF DAYLIGHT CAN BE ACCENTUATED IN MODERN OFFICE BUILDINGS BY PROPOSING NEW STRATEGIES FOR CONTROLLING ELECTRICAL LIGHTING

MERETE MADSEN, ARCHITECT MAA, PHD, LIGHTING DESIGNER, SWECO DK

Architecture comes from The Making of a Room
The Plan A ^{series} of rooms is a place good to live work learn



The Room

A great American Poet once asked The Architect "What slice of the sun does your building have. What light enters your Room as if to say the sun now know how great it is until it strikes the side of a building."

is The place of the mind. In a small room one does not say what one would in a large room. In a room with only one other person could be generalists. The vectors of each meet. A room is not a room without natural light. natural light gives the time of day and the mood of the seasons to enter.

As Luis Kahn said: "Of the elements of a room the window is the most marvellous. The great American poet, Wallace Stevens, prodded the architect, "what slice of the sun does your building have?"... what slice of the sun enters your room? What range of moods does the light offer from morning to night, from day to day, from season to season and all through the years?"

Source: Vassella, Alessandro (Editor), *Louis I. Kahn - Silence and Light: The Lecture at ETH Zurich, February 12, 1969*, Park Books, 2013

DAYLIGHT'S CHANGEABILITY

THE ESSENTIAL QUALITY OF DAYLIGHT



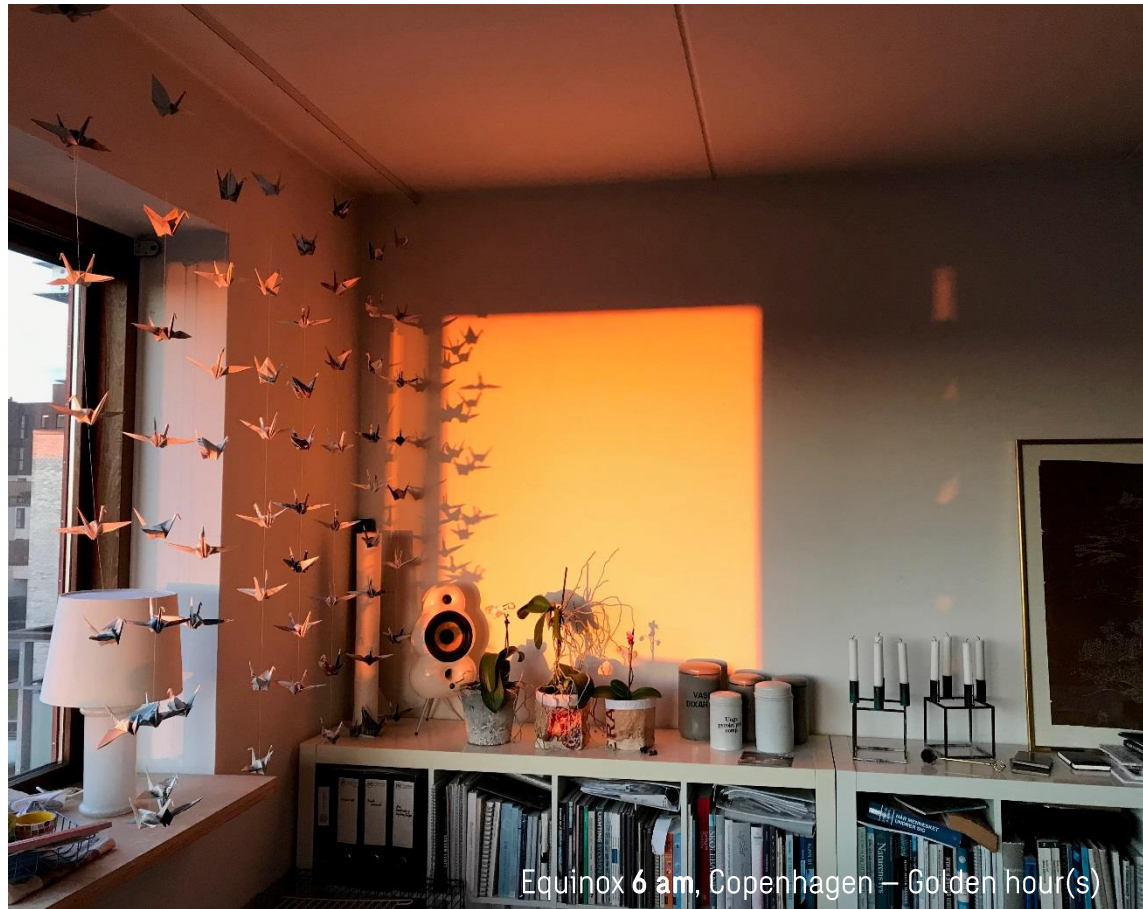
Photo credit: Merete Madsen



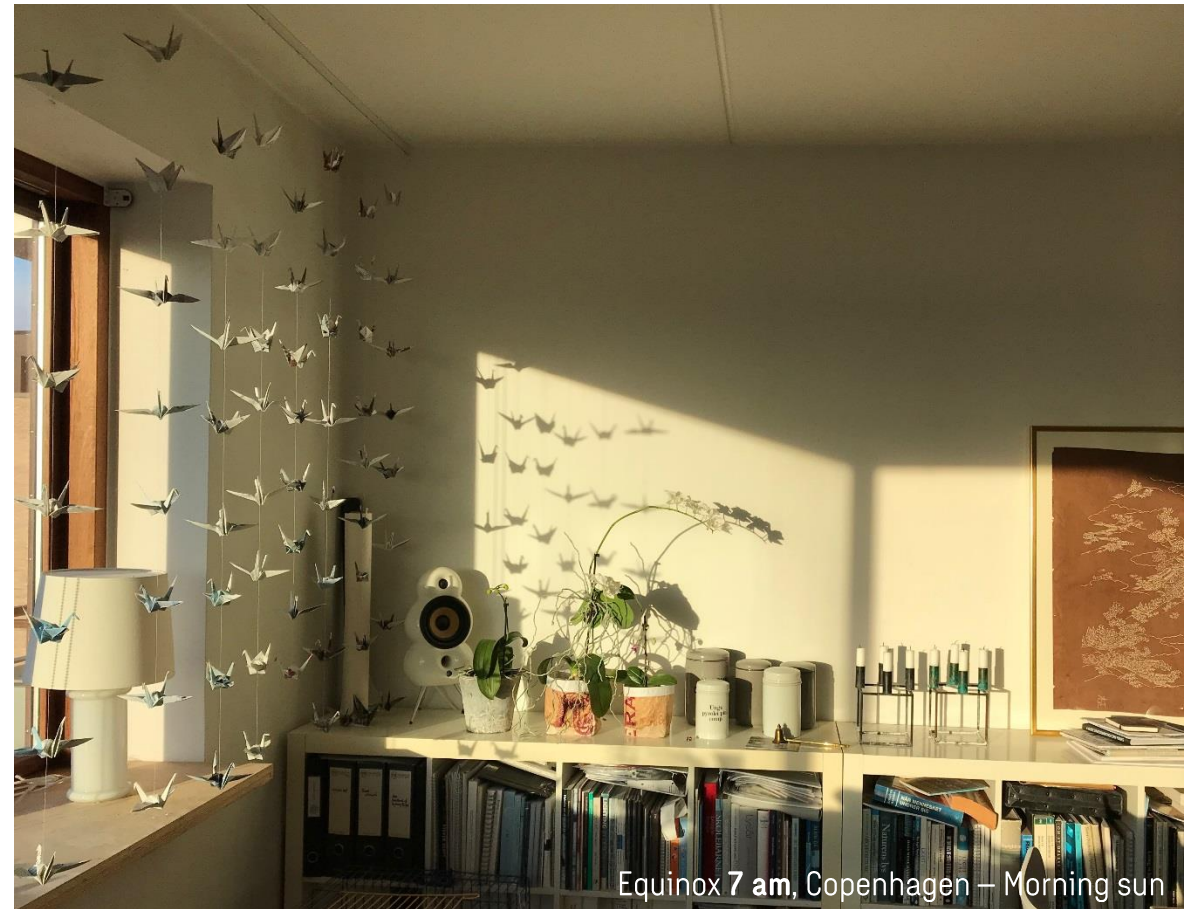
Photo credit: Ian Cheney

QUALITIES OF NORDIC SUNLIGHT & DAYLIGHT

GOLDEN HOUR, LOW SUN-ANGLES, LONG TWILIGHT HOURS & CHANGABILITY THROUGHOUT DAY AND SEASONS

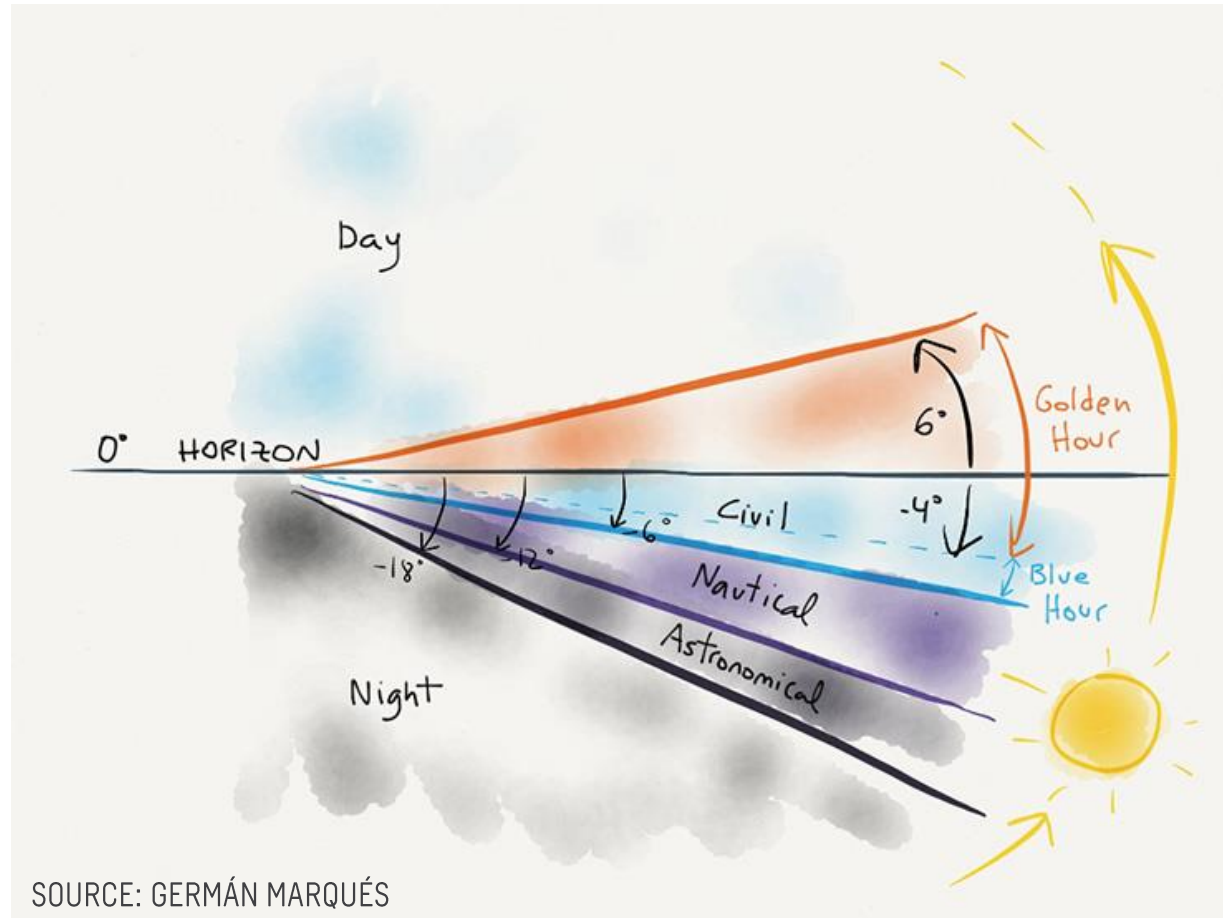


Equinox 6 am, Copenhagen – Golden hour(s)



Equinox 7 am, Copenhagen – Morning sun

THE POETIC POLYCHTOMATIC GLOW OF TWILIGHT, WHICH ONCE WAS FORMERLY OBSERVED AS A MOMENT OF CONTEMPLATION IN THE NORDIC



SOURCE: GERMÁN MARQUÉS

At the countryside, it was common to keep *skumringstime* [the hour of twilight]. People gathered indoor and sat quietly without turning the lights on while it was getting dark. There, stories were told, songs were sung – and people listened.

The Royal Danish Library

Celebrating [the hour of] twilight or crepuscular [hours] is a popular tradition that has been maintained for centuries in the Nordic countries. Perhaps the hours of the day and the year is perceived different by people living in the Nordic. At equator, darkness is poured out over the day light a bucket of black paint, while the transition between day and night here with us enchants and transforms nature and people... At dusk you don't have to *do* anything. It is the time of the day when the soul seeks nourishment in deep hiding-places and where the brain's electrical activities are dimmed.

It may feel nice (Det må godt føles rart) by Terje Nordberg

DAYLIGHT RESPONSIVE DIMMING SYSTEMS

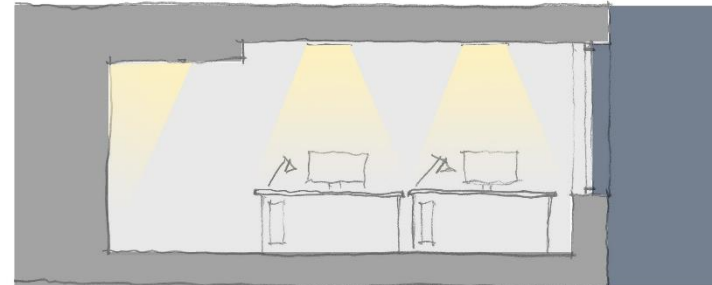
NEEDED AT DAYTIME, BUT TOO MUCH GENERAL CEILING LIGHTING AT TWILIGHT AND EVENINGS



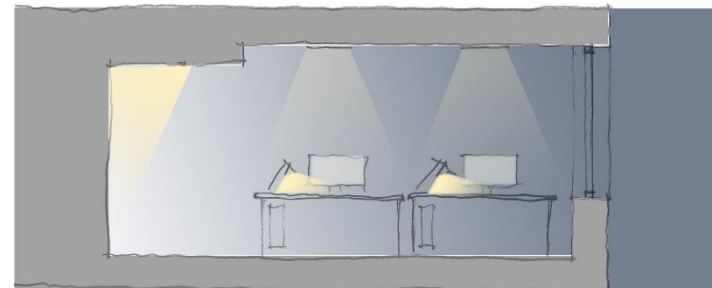
Sweco Denmark HQ around the twilight-hour



Standard daylight responsive dimming system at daytime



Electrical lighting according to lighting standards at night



Proposal for a new twilight – and evening lighting control scenario

A NIGHT-TIME SCENARIO FOR OFFICE LIGHTING

'FAÇADE LIGHTING' BY DIMMED INTERNAL LIGHTING + VIEW FROM OUTSIDE AND FROM INSIDE



RICHARD KELLY'S THREE TENETS OF LIGHTING DESIGN

USED AS THE POINT OF DEPARTURE FOR A MORE SUSTAINABLE STRATEGY FOR CONTROLLING ELECTRICAL LIGHTING

Richard Kelly's theoretical statements on lighting design:

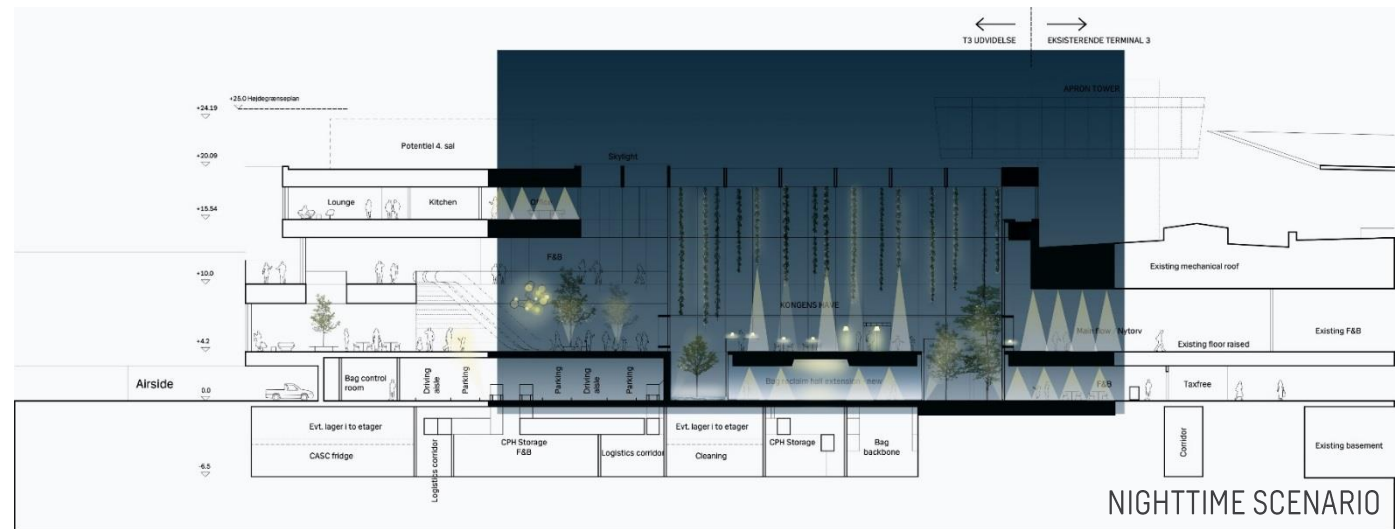
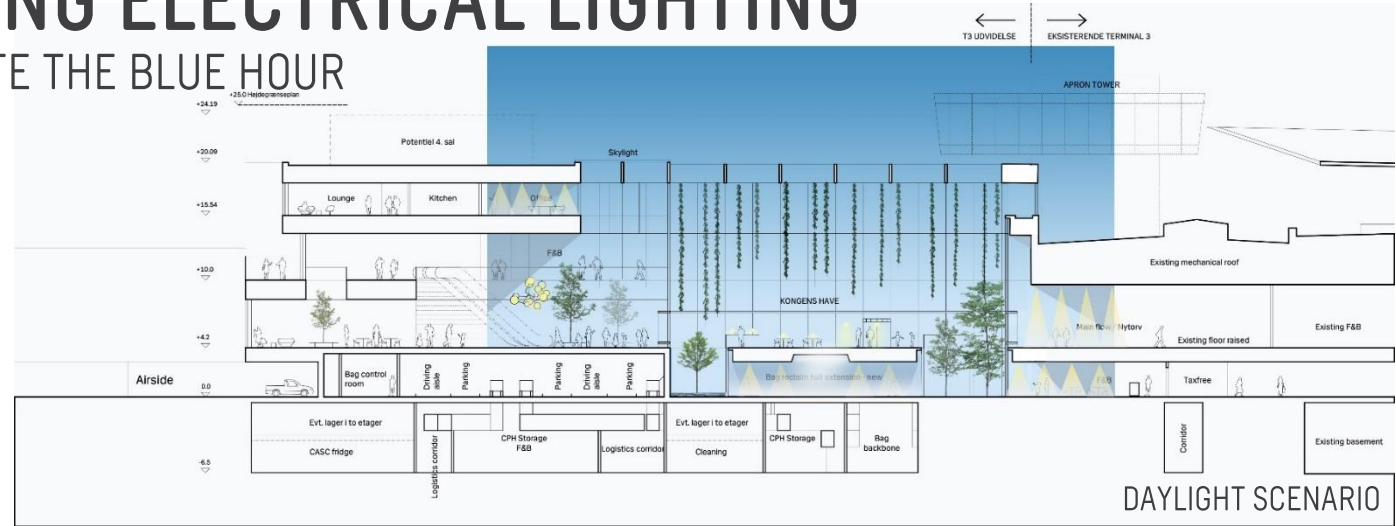
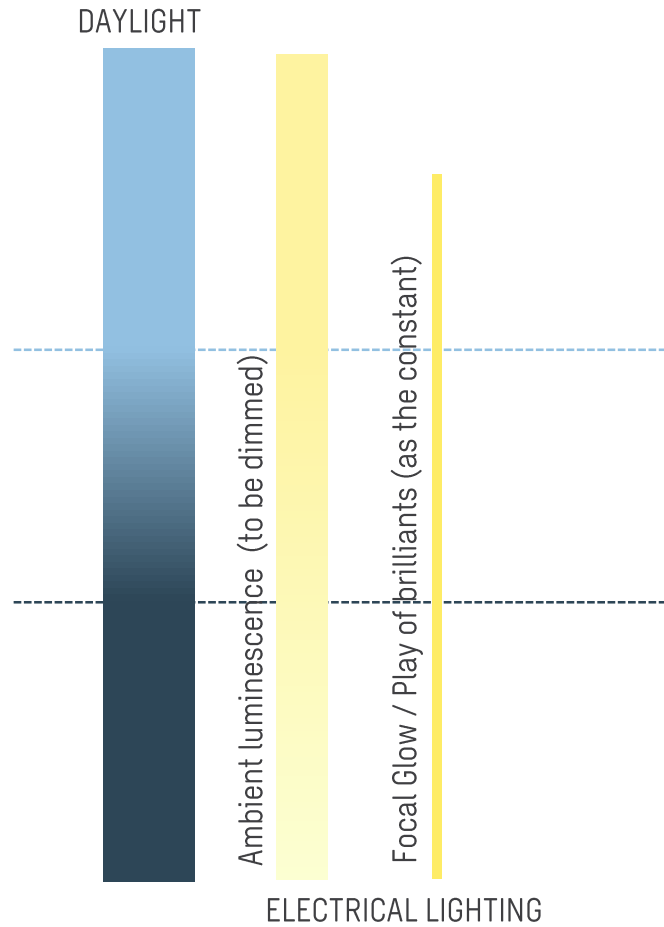
- **Focal Glow** (... draws attention, pulls together diverse parts, separates the important from the unimportant, helps people see...)
- **Ambient luminescence** (... is the background lighting that serves to perceive the environment in general)
- **Play of brilliants** (light as information, which can be dynamic or colorful... excites the optic nerves, and in turn stimulates the body and spirit...)

Kelly was also a proponent of daylighting and believed natural light to be the primary type of light that defines a space, and that electric lighting should serve a supplementary role.



A STRATEGI FOR CONTROLLING ELECTRICAL LIGHTING

CREATE LIGHT-ZONES CONSTANTS TO ACCENTUATE THE BLUE HOUR



STRATEGIES FOR CONTROLLING ELECTRICAL LIGHTING

CREATE A 'TWILIGHT SCENARIO' AS A TRANSITION BETWEEN THE DAYLIGHT - AND NIGHT SCENARIO

Daylight scenario:

Utilize daylight (quantity and quality) as much as possible. Optimise the automatic daylight responsive dimming system and motion detection to save as much energy as possible while fulfilling standards and people's needs.

Night-time scenario:

Use dimmed ambient luminescence to reveal spaces with a special focus on background illumination (typically wall-wash lighting), light along walkways and at exits.

Twilight scenario:

Plan the transition between the daylight - and the night-time scenarios. Dim the *Ambient luminescence* during the golden hour (6° to 0°) to the light level of the night-time scenario, while keeping the *Focal glow* and *Play of brilliants* lighting element as the constant that accentuate the dynamic and polychromatic glow of twilight as it enters the spaces.



1 NO POVERTY



2 NO HUNGER



3 GOOD HEALTH



4 QUALITY EDUCATION




5 GENDER EQUALITY




6 CLEAN WATER AND SANITATION



7 RENEWABLE ENERGY



8 GOOD JOBS AND ECONOMIC GROWTH



9 INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION



13 CLIMATE ACTION




14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE AND JUSTICE



17 PARTNERSHIPS FOR THE GOALS



THE GLOBAL GOALS
For Sustainable Development