

Outdoor Lighting Trialogue

Innovation.Efficiency.Safety

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November 2016



Agenda

- _ Introduction and key messages
 - _ What motivates us today?
 - _ Technology and Humans – a contradiction?
Innovation, Efficiency, Safety
- _ Reducing budgets and energy consumption
 - _ How to leverage technology?
 - _ Total Cost of Ownership
- _ Get a grip about the future
 - _ How to track application innovation?
- _ What is in it for you? Invitation to Trialogue



Poll question



- _ What is your scope of business?
- _ Lighting expert at municipalities
- _ Lighting designer
- _ Mesh expert at municipalities
- _ Electrical consultant
- _ Architect
- _ Electrician
- _ Others, please specify

(one answer)

Zeitgeist, Example Jan Gehl



Make space a place!

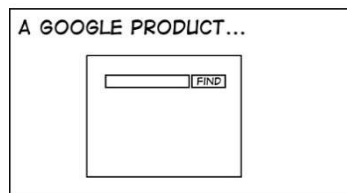
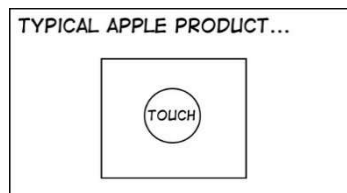
— We take our clients through a process and work closely with them to build a team of collaborators, grow partnership and trust, change perspectives, invite for broader, long-term thinking, test ideas via pilots, all while engaging the users of the city.

Because we take the time to understand people's use of public space, we can make more qualified decisions about how to make cities for people, with our clients. Thereby creating outcomes which are beneficial for everyone, from car drivers to pedestrians, so that our cities and quality of life get increasingly better over time.

Understanding innovation to make investments future-proof



The origins of disruptive innovation. General



YOUR COMPANY'S APP...

FIRST NAME:	TYPE CD:	4 - K
LAST NAME:	TOP STAT:	AJ2
SSN:	VER:	DR9B
ID:	FT/PT:	KKA?
PHONE 1:	CAT CD:	CN9
PHONE 2:	CITY:	AA-9
ADDR 1:	STATE:	
ACCT #:	ZIP:	
	ORD #:	NEW
		DEL

OKAY APPLY SAVE UNDO HELP DELETE EDIT
SELECT BROWSE ERRORS

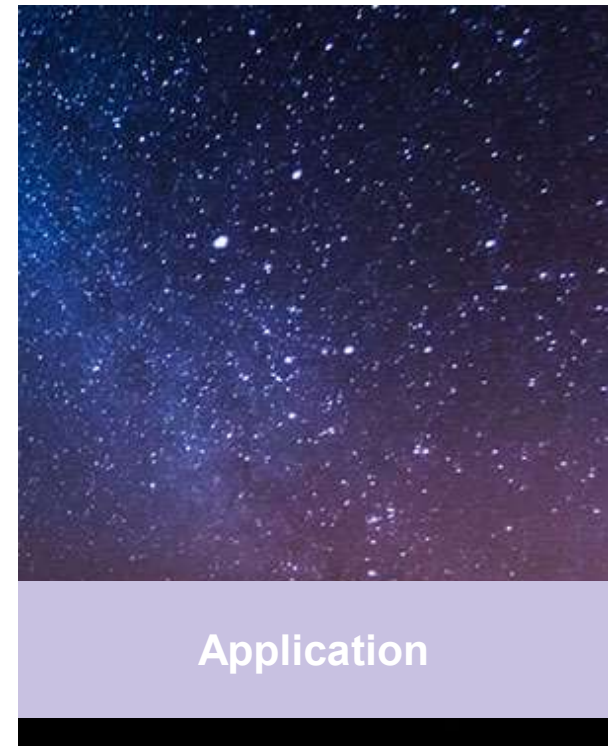
STUFFTHATHAPPENS.COM BY ERIC BURKE



An iPod, a phone, an internet mobile communicator... these are NOT three separate devices! And we are calling it iPhone! Today Apple is going to reinvent the phone. And here it is.

(Steve Jobs)

The origins of disruptive innovation. Lighting



Poll question



_ Which of the three origins of innovations is changing my daily business the most.

_ Technology

_ Market

_ Application

_ None, as far as I see nothing changes

_ All 3 are changing in parallel

(one answer)

Our promise

Technology



Market



Application



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Our promise

Future-proof concepts

Extensive dialogue

Years of experience

Innovation



Market



Application



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Our promise

Future-proof concepts

Extensive dialogue

Years of experience

High-quality components

Operation close to technical
perfection

Innovation



Safety



Application



Our promise

Future-proof concepts

Extensive dialogue

Years of experience

High-quality components

Operation close to technical
perfection

Quick and easy maintenance

Control of lighting system

Reduction in electricity costs

Innovation



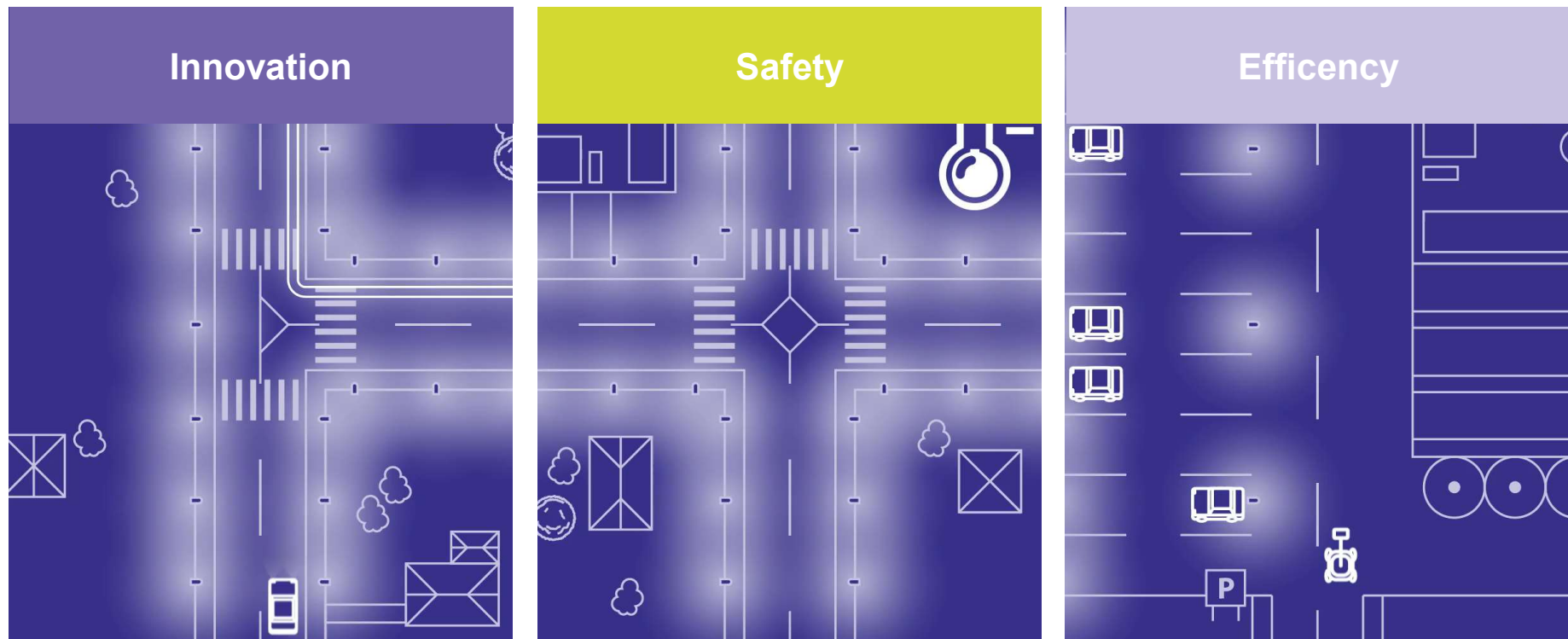
Safety



Efficiency

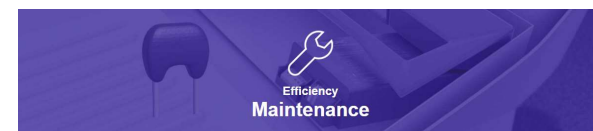


www.tridonic.com/trialogue



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In outdoor lighting we support stakeholders....



Poll



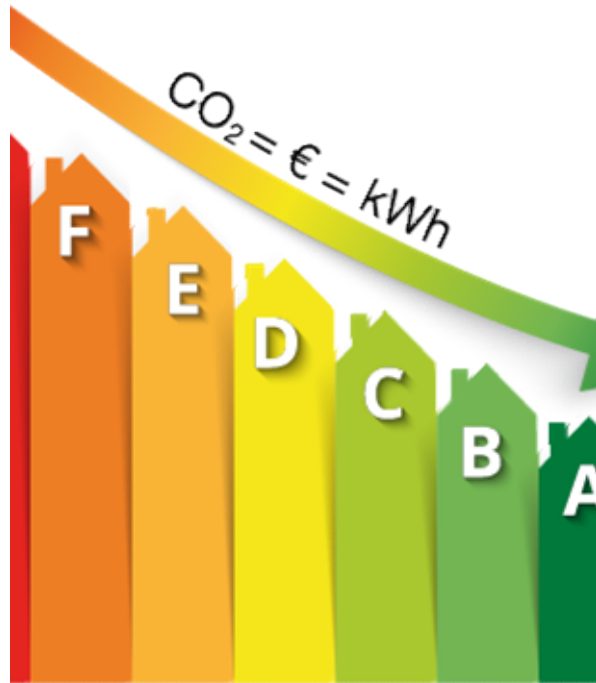
_ In terms of weather challenges, what is more important to you?

- _ The safety of the people
- _ No damage to the lighting solution
- _ Not relevant

(one answer)

Define the measurable units to define foundation for improvement

_ Key technical unit to optimize: Power consumption [kWh]



_ Transferable in €

Europe: 0,15-0,29 € / kWh

incl. production costs, transmission and distribution costs, taxes, renewable energy sources act/similar, ...

_ Transferable in carbon emissions

Europe (weighted average): 0,360 kg CO₂ emissions / kWh

Germany 0,477 Austria 0,215 Great Britain 0,441

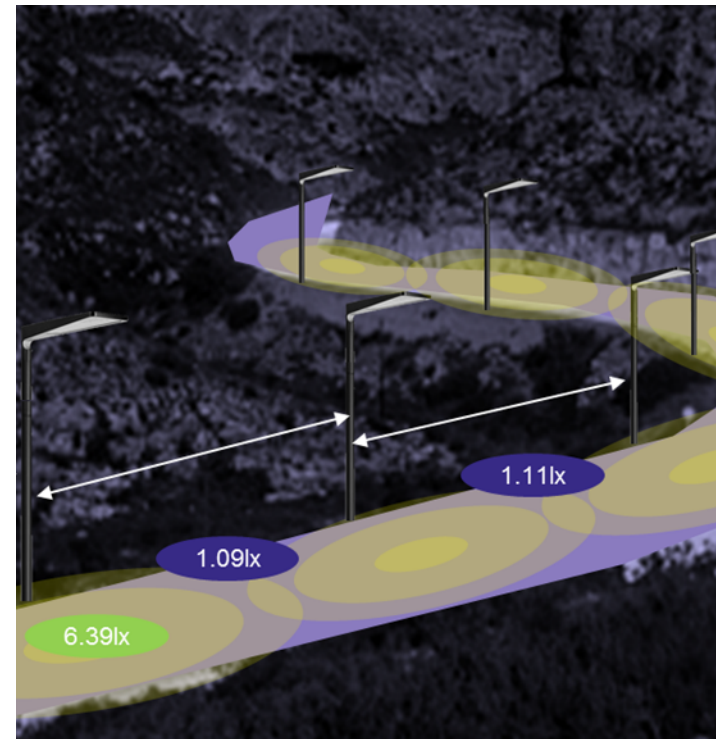
Italy 0,402 Spain 0,291 France 0,100

India 0,859 – not included: off-grid

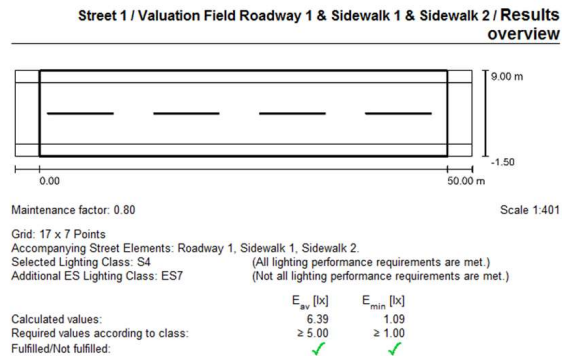
[Iceland 0,000](#)

(simplified) Case study

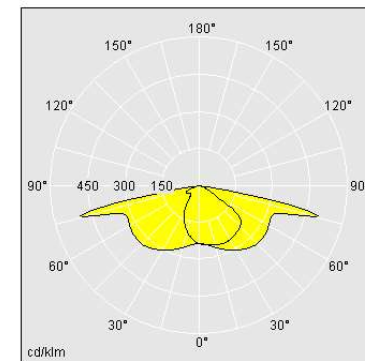
- _ Lamp refurbishment: Mercury 125 W to LED 52 W
- _ 90 luminaires overall
 - _ 30 lum. with a column distance of 50m
 - _ 30 lum. with a column distance of 45m
 - _ 30 lum. with a column distance of 40m
- _ 5 opportunities to reduce energy consumption.



Example calculation and distribution



Dimensions: 655 x 362 x 155 mm
 Total power: 52 W
 Weight: 9.56 kg
 Scx: 0.05 m²

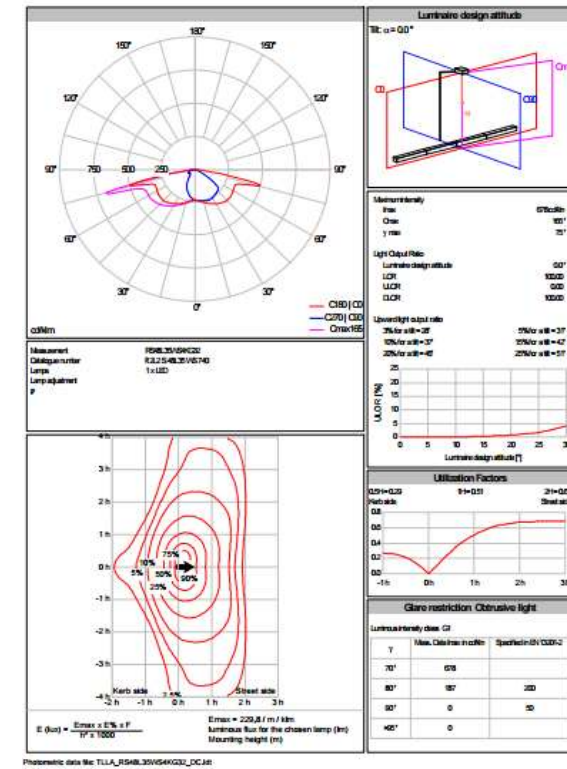


Lamp position: STD - standard
 Light Source: LED
 Luminaire luminous flux*: 6016 lm
 Luminaire efficacy*: 116 lm/W
 Lamp efficacy: 116 lm/W
 Colour Rendering Index min.: 70
 Correlated colour temperature*: 4000 Kelvin
 Rated median useful life*: 100000h L90 at 25°C
 Ballast: 1x EL2
 Luminaire input power*: 52 W Lambda = 0.95
 Dimming: DIM_LED

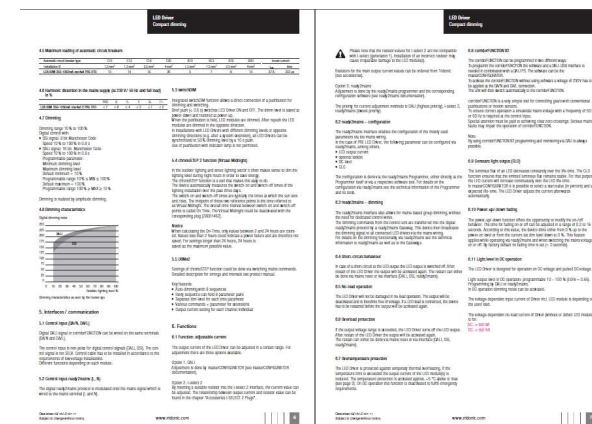
LED CE ENE IK08 IP66

T_a50

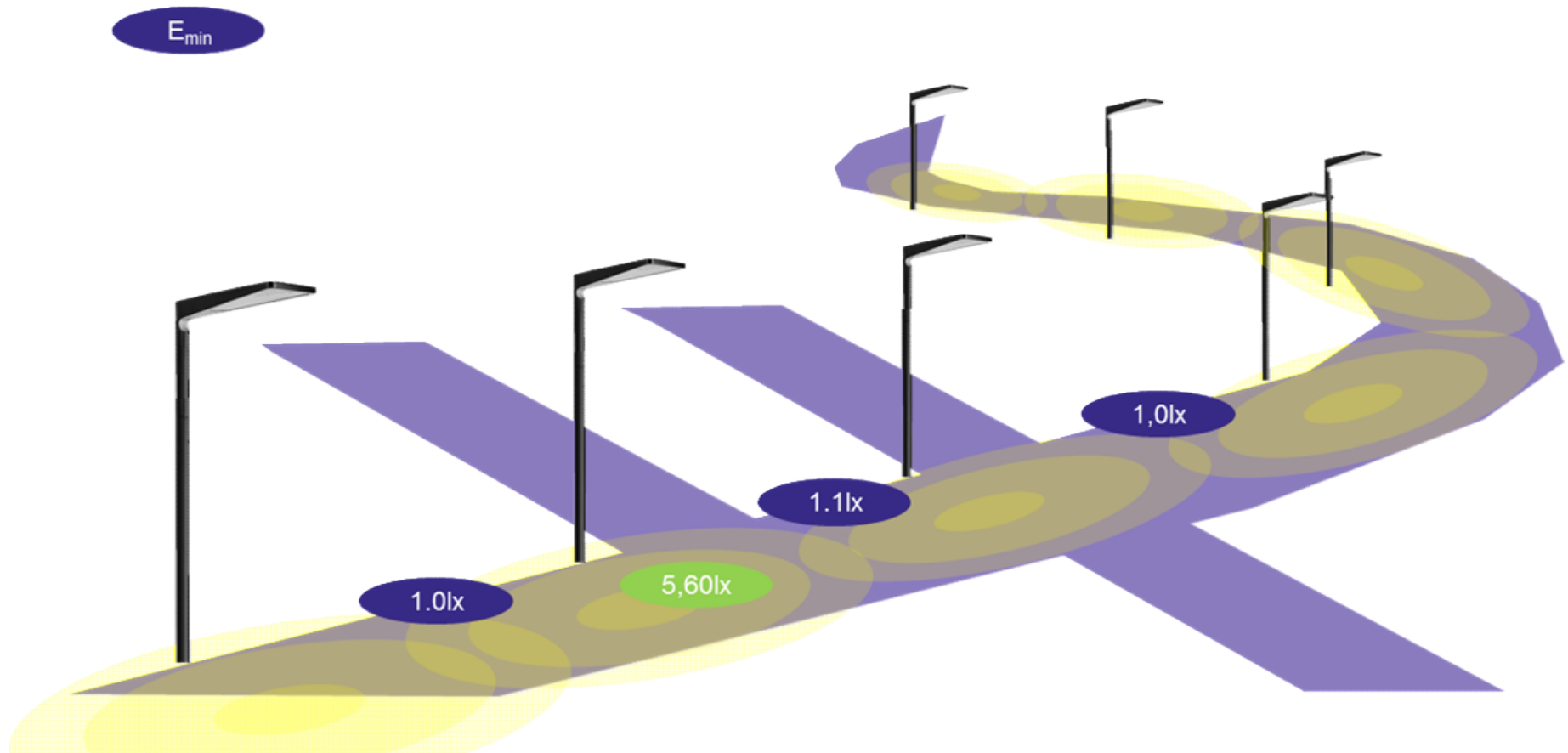
Example luminaire and data

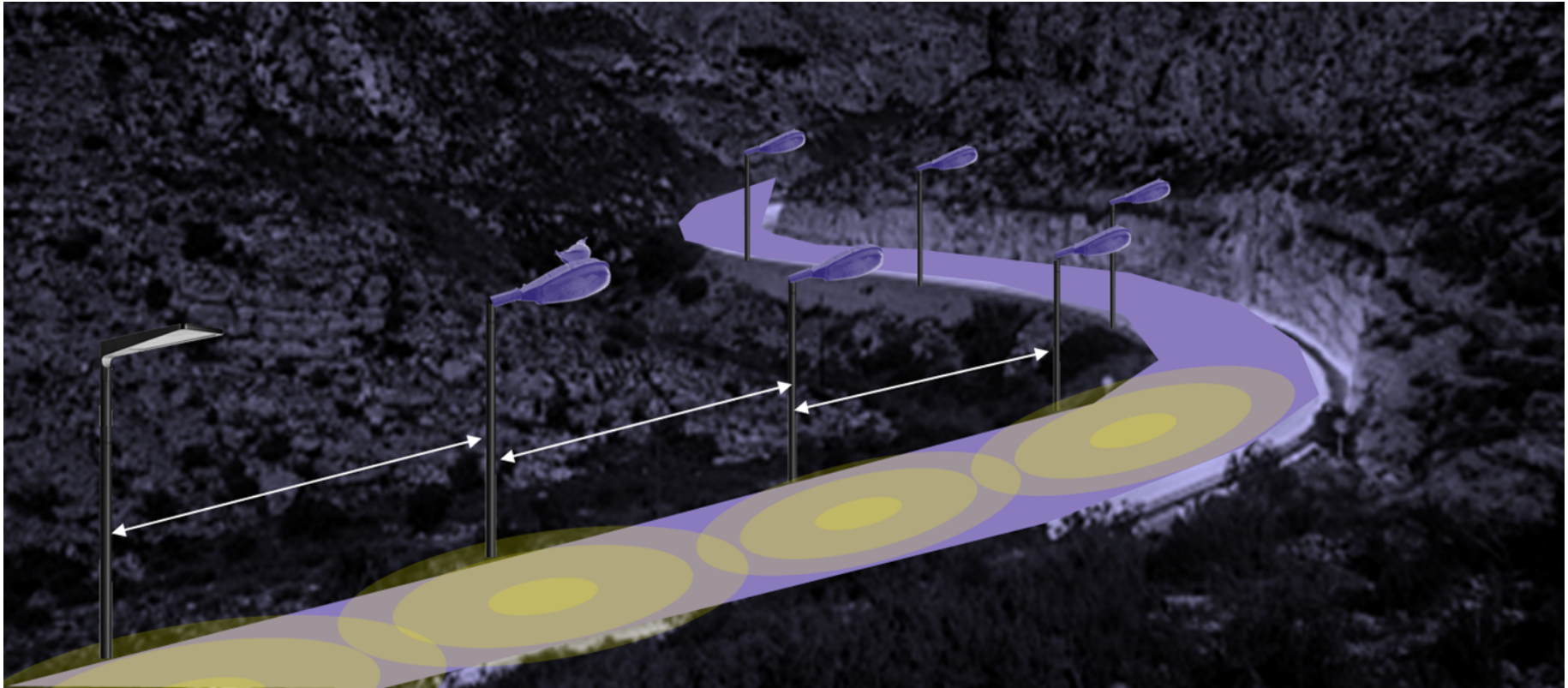


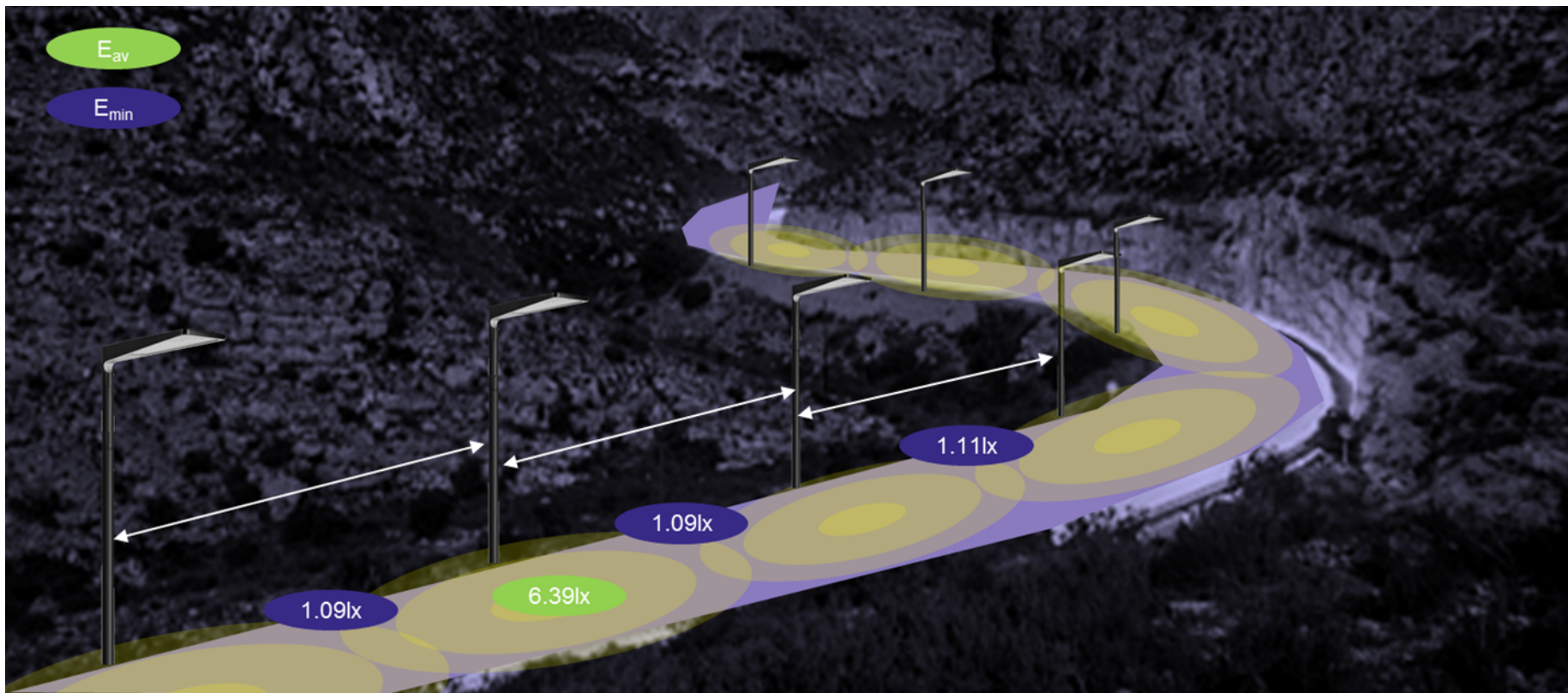
And this is us ... not to forget



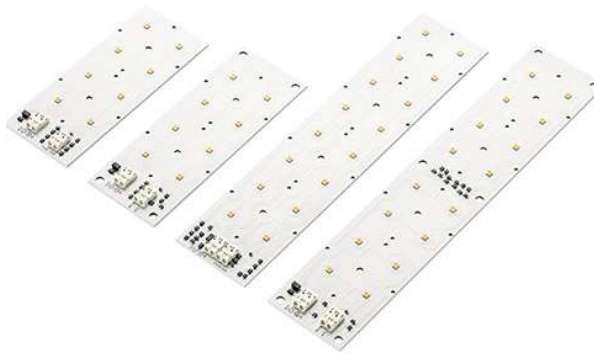
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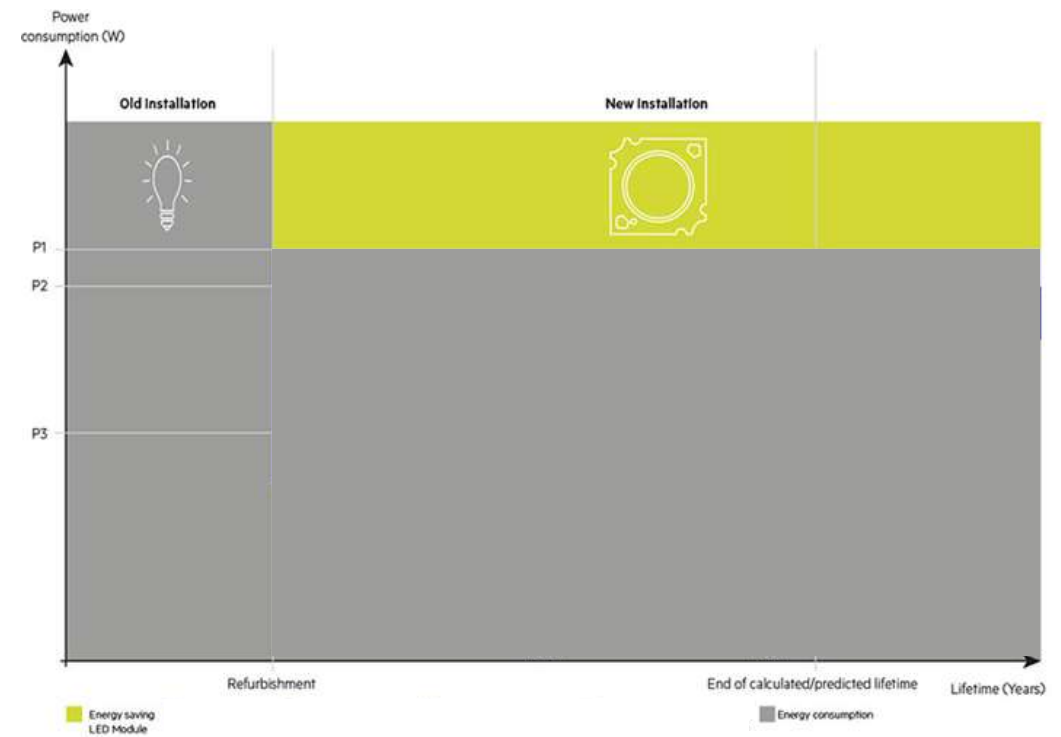


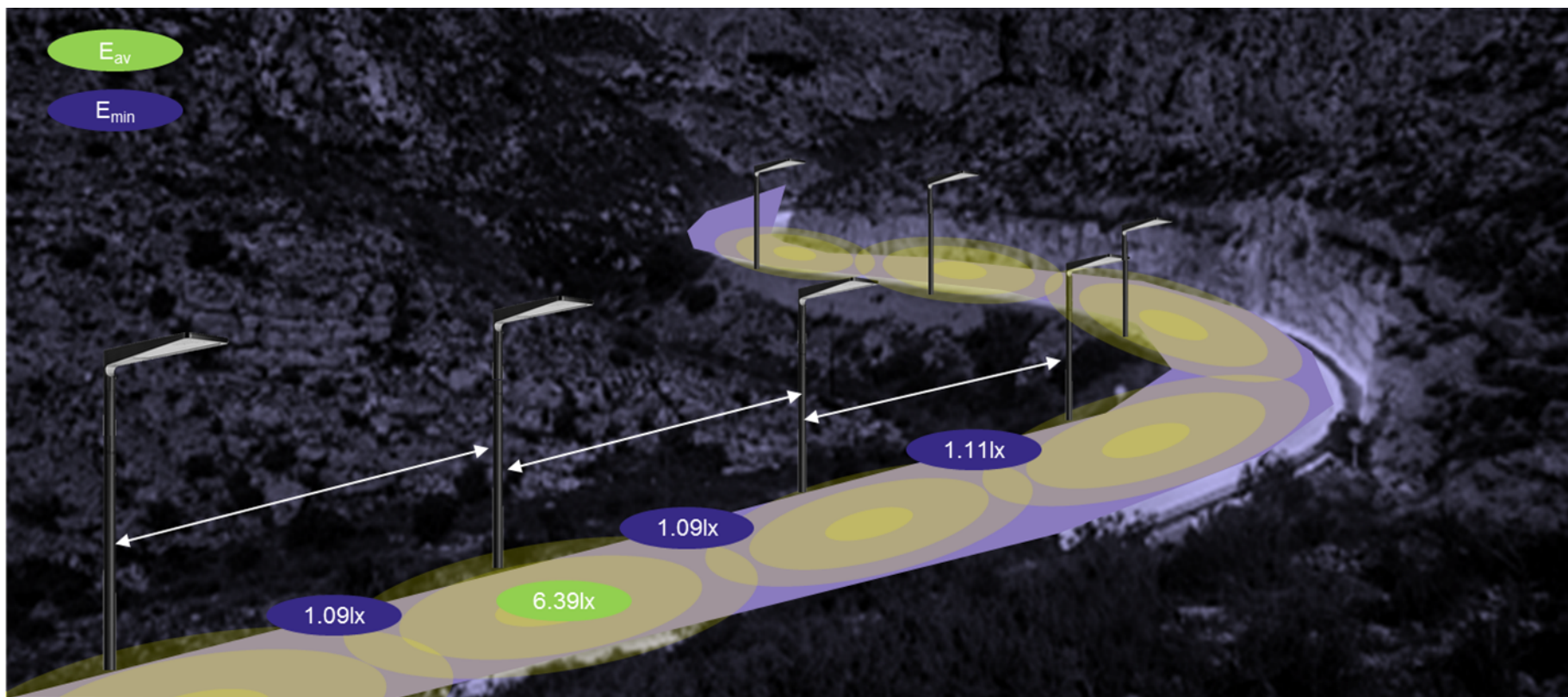


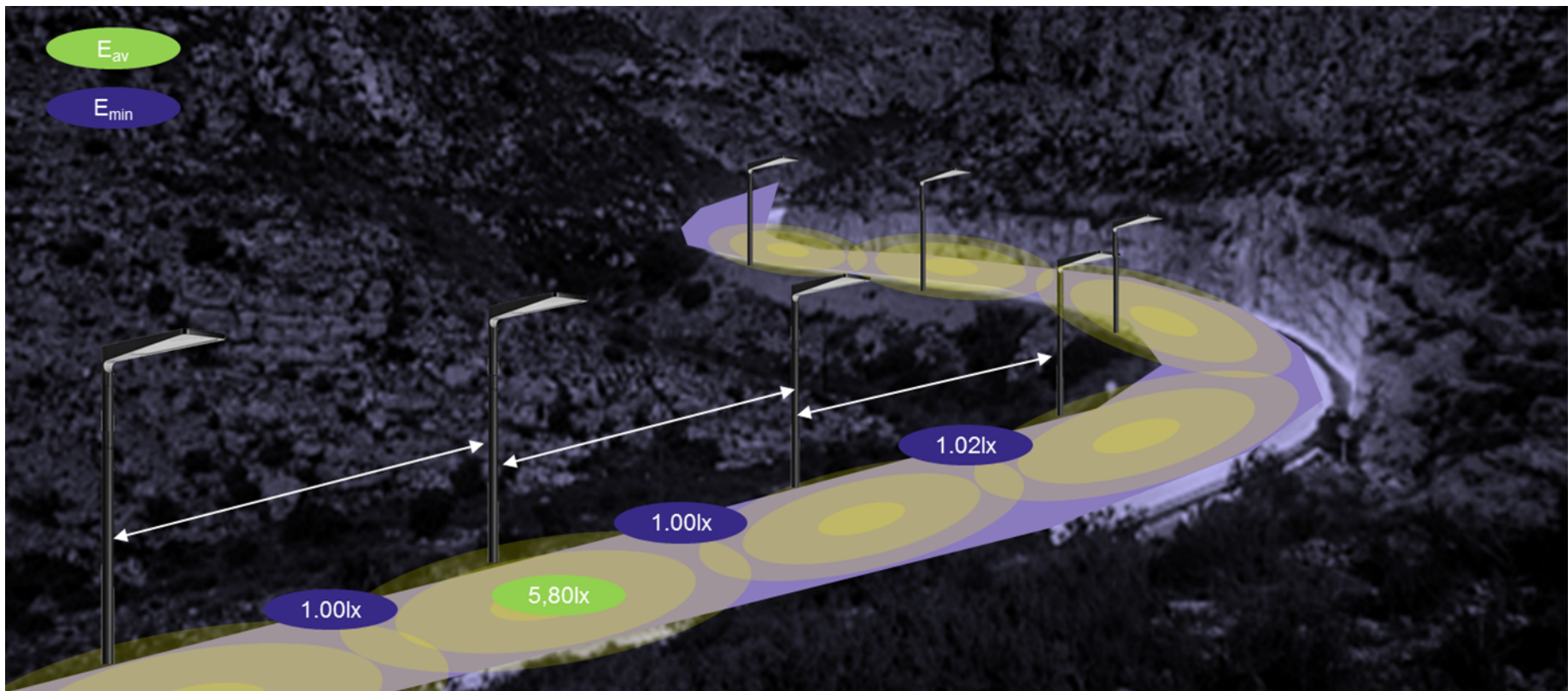
Energy saving 1/5



> 12t carbon reduction / year



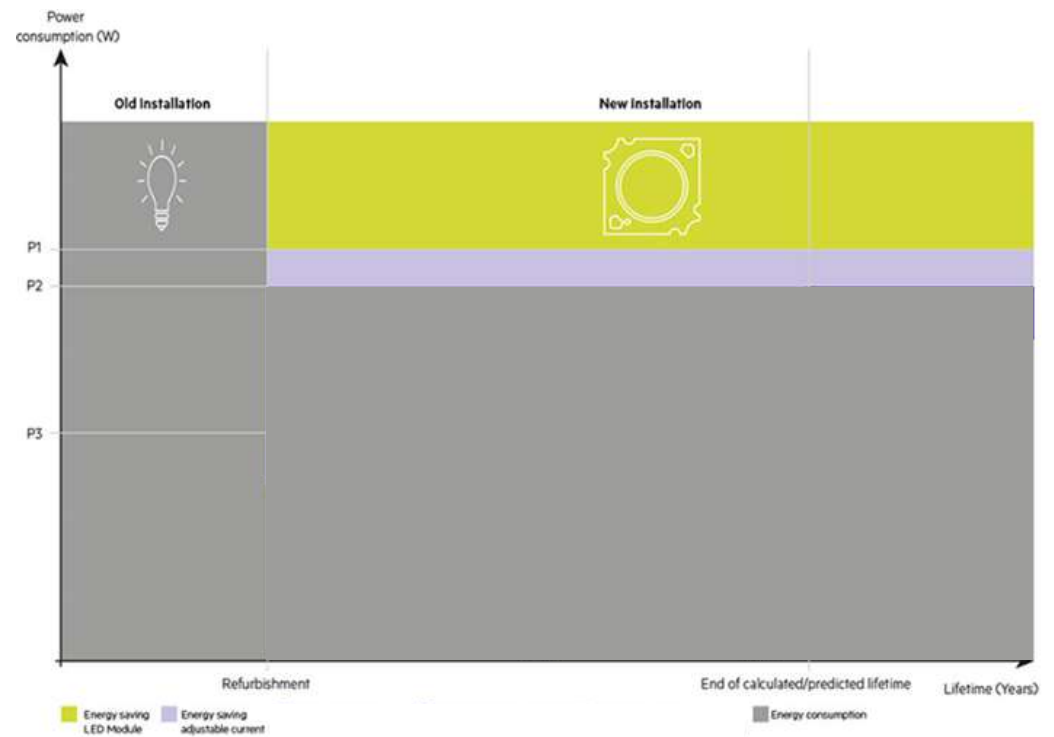




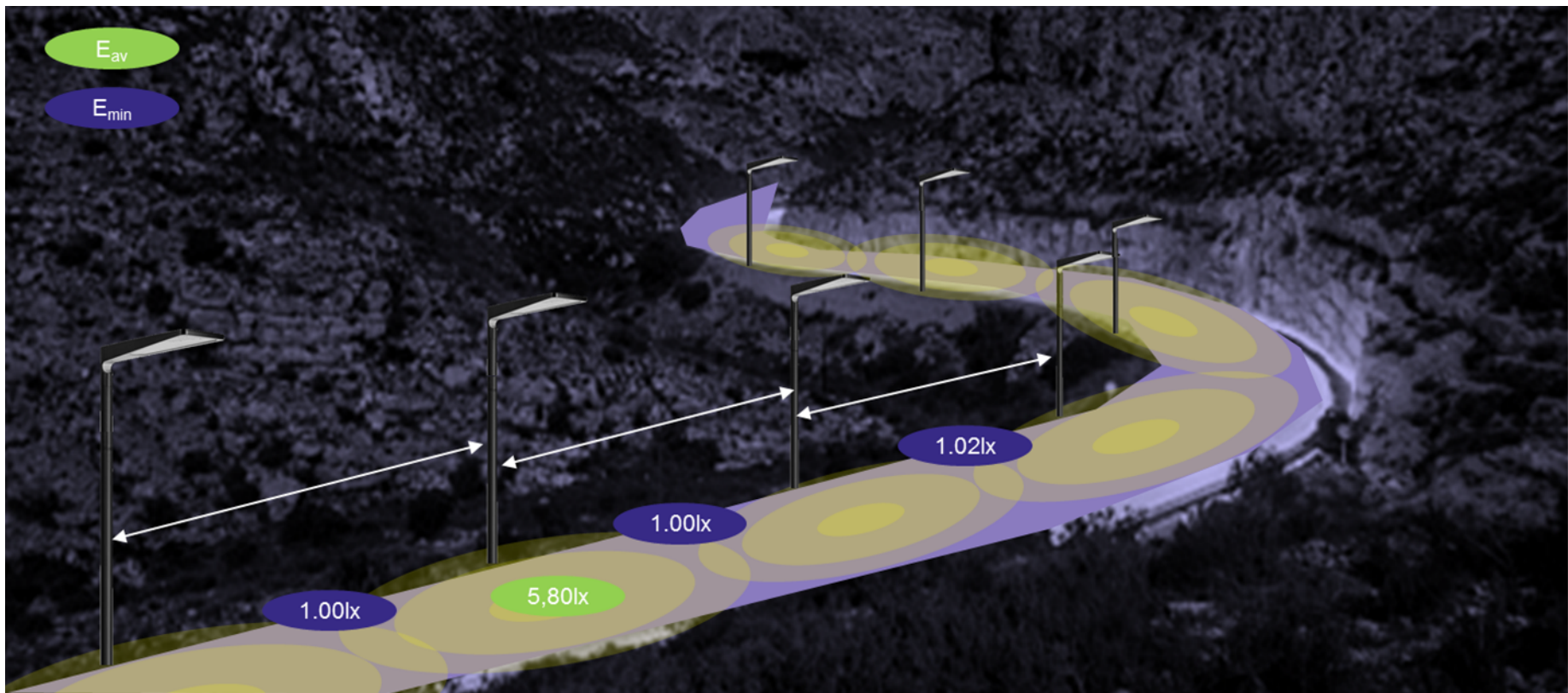
Energy saving 2/5

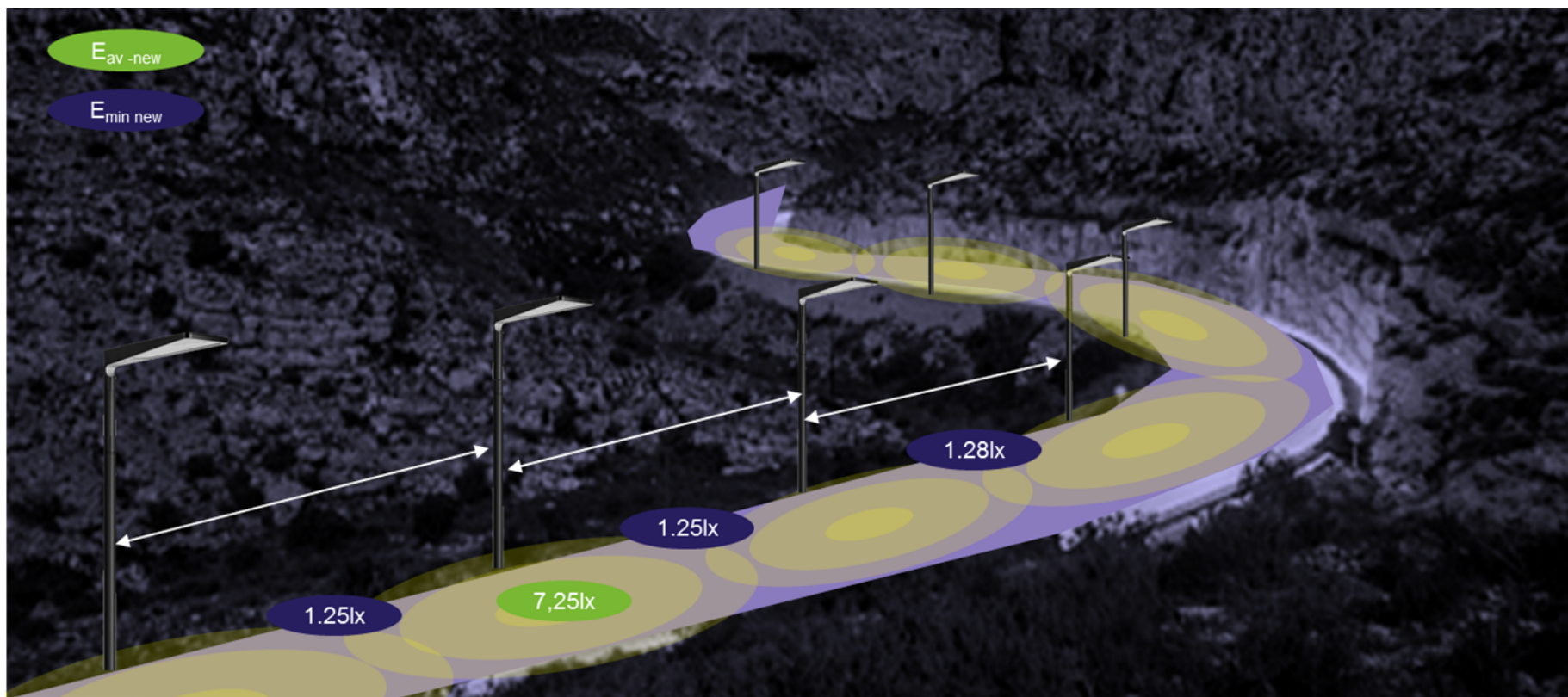


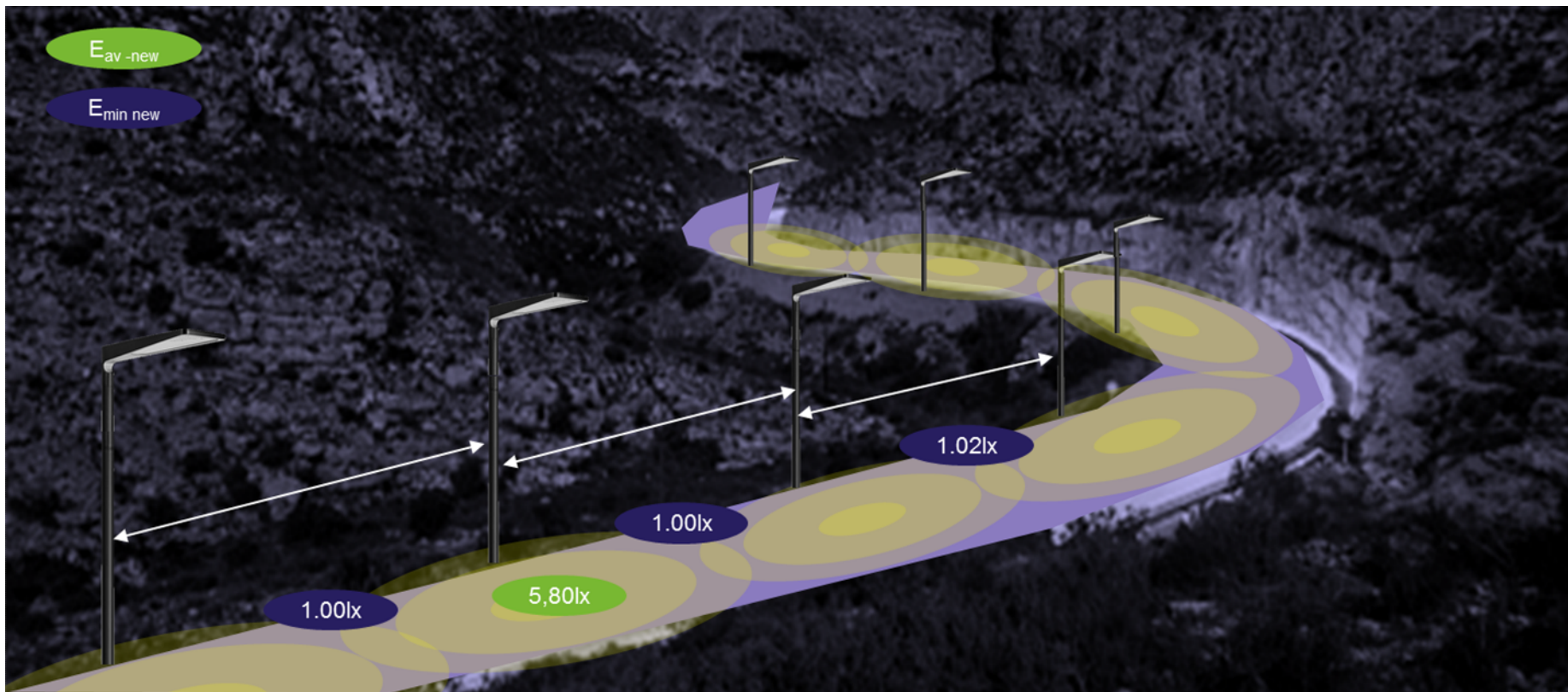
_ 9 % savings



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Energy saving 3/5

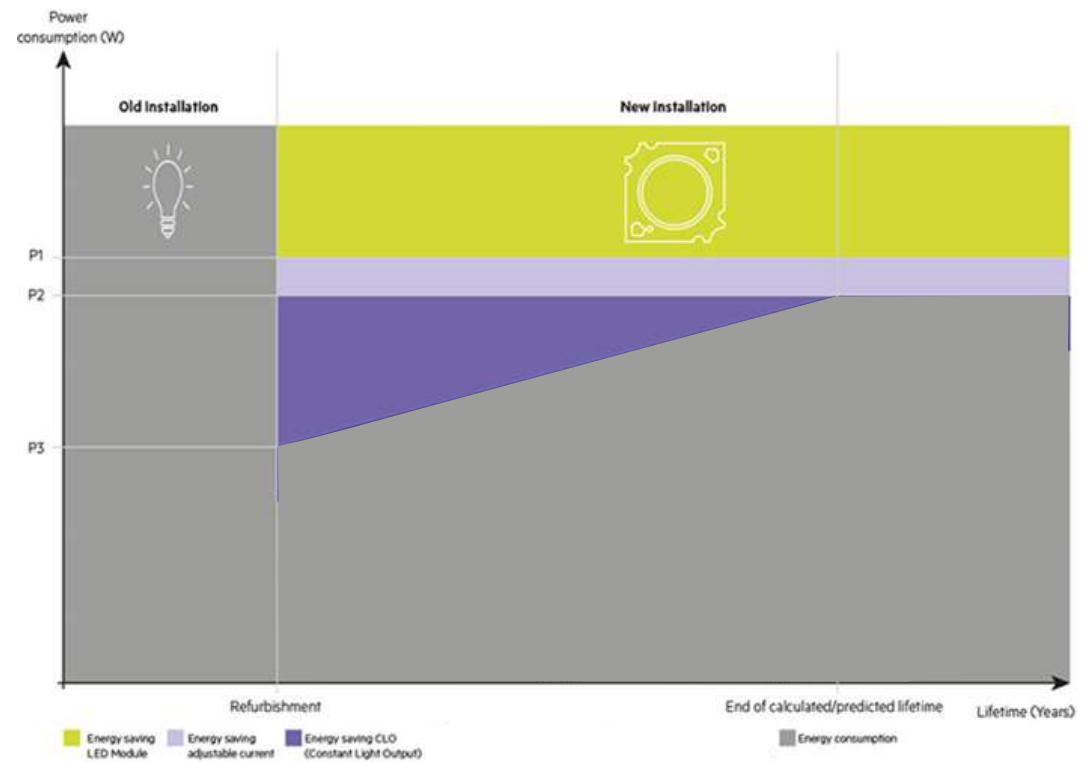
$$MF = (LLMF \times LSF) \times LMF \times SMF$$



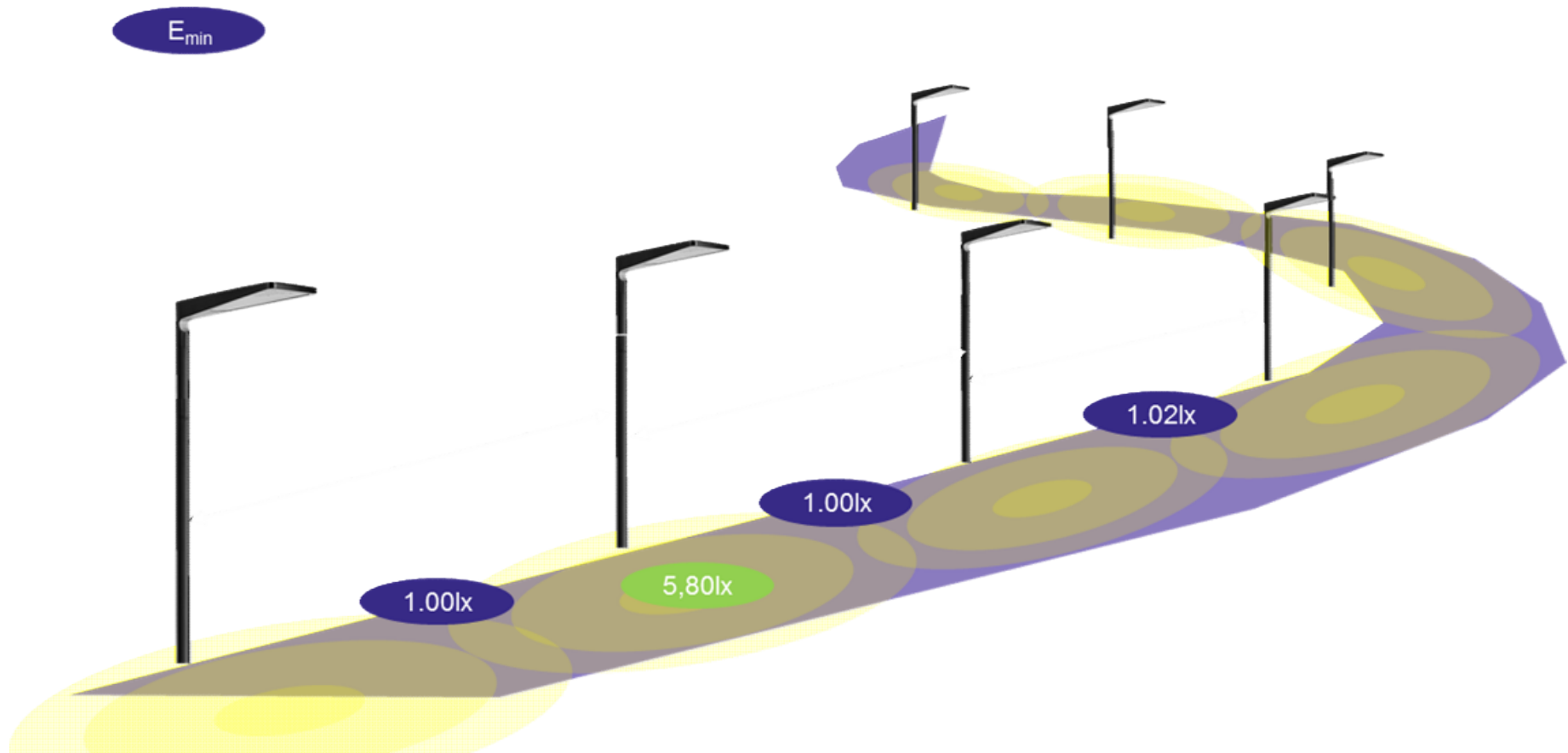
> 10 % savings

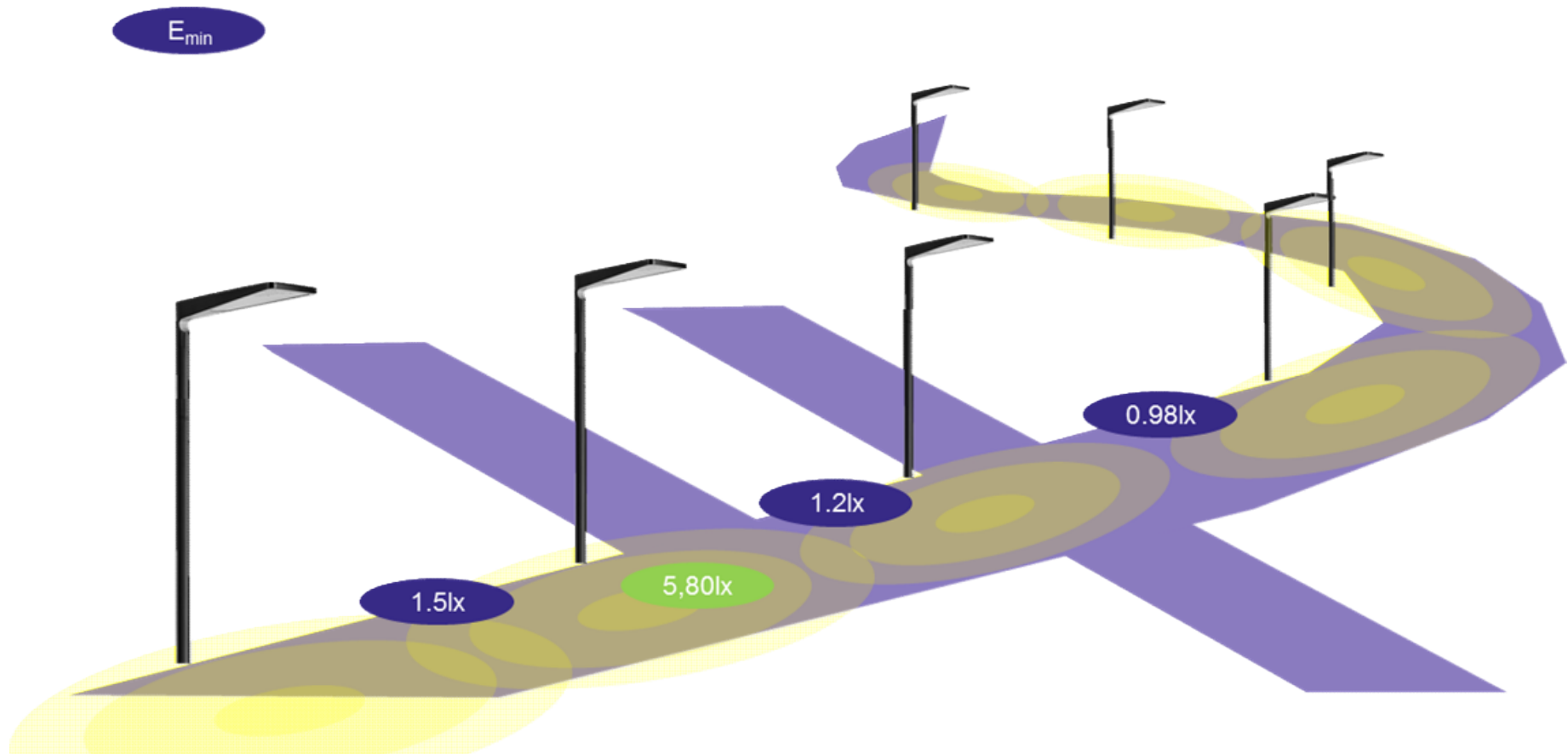
> 700€/year

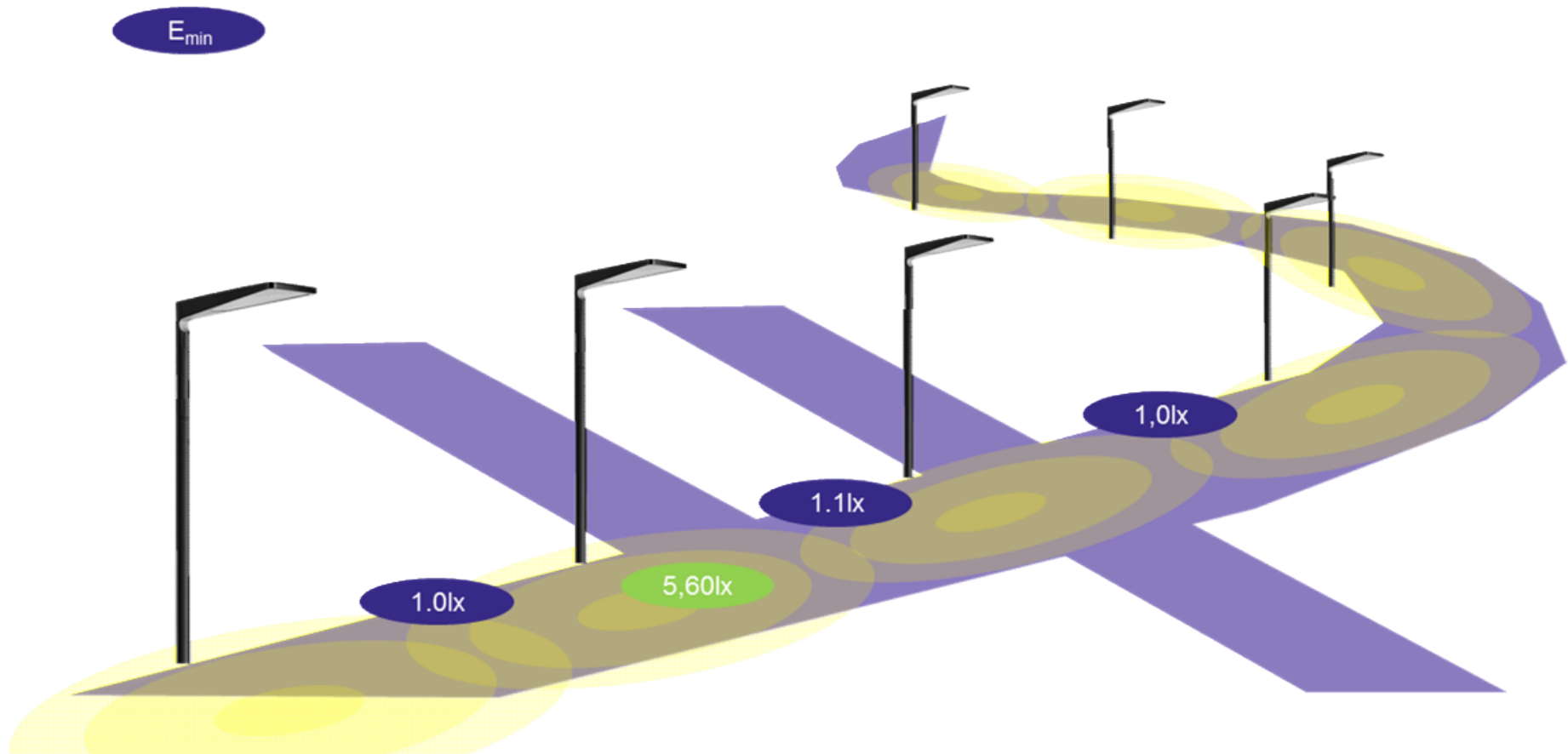
> 1,7t carbon reduction / year



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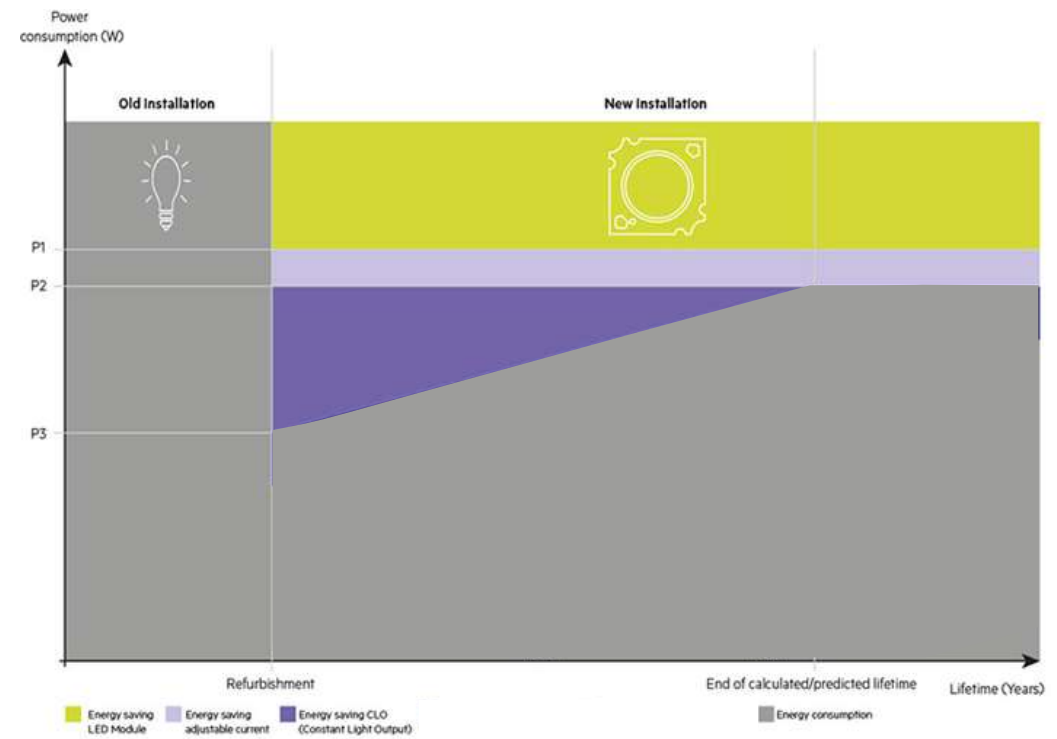




Energy saving 2/5 (2)



- > 23 % savings
- > 1700€ cost saving / year
- > 4t carbon reduction / year



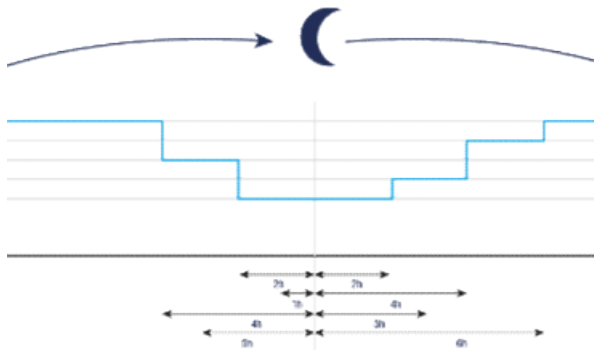


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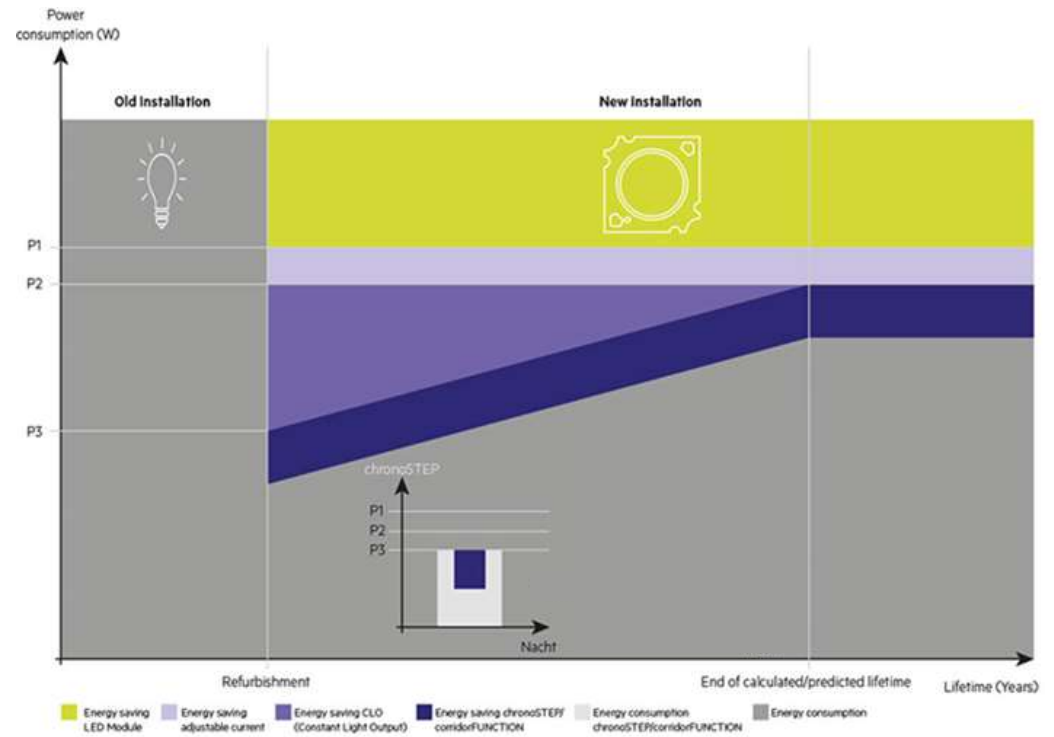
Energy saving 4/5



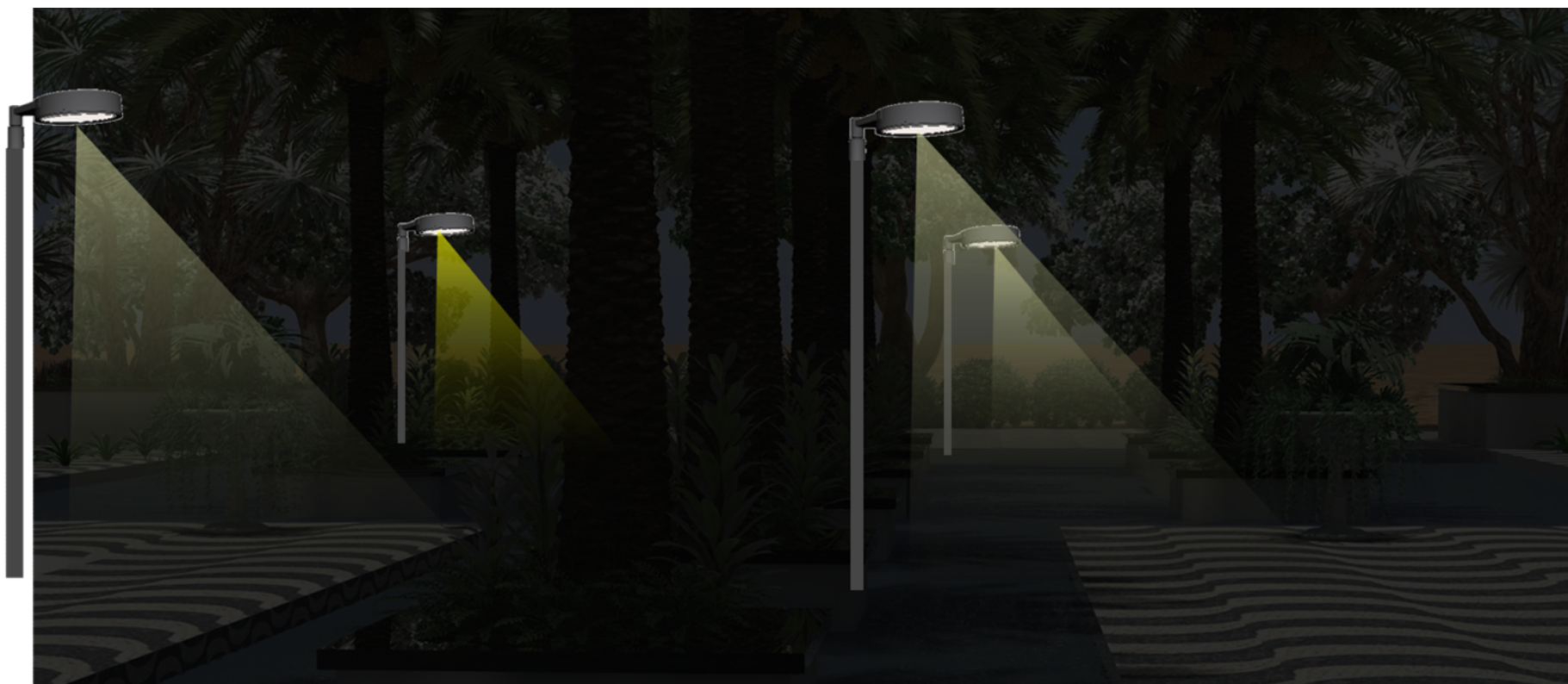
> 33 % savings

> 1800 + 1700€ cost saving / year

> 8t carbon reduction / year



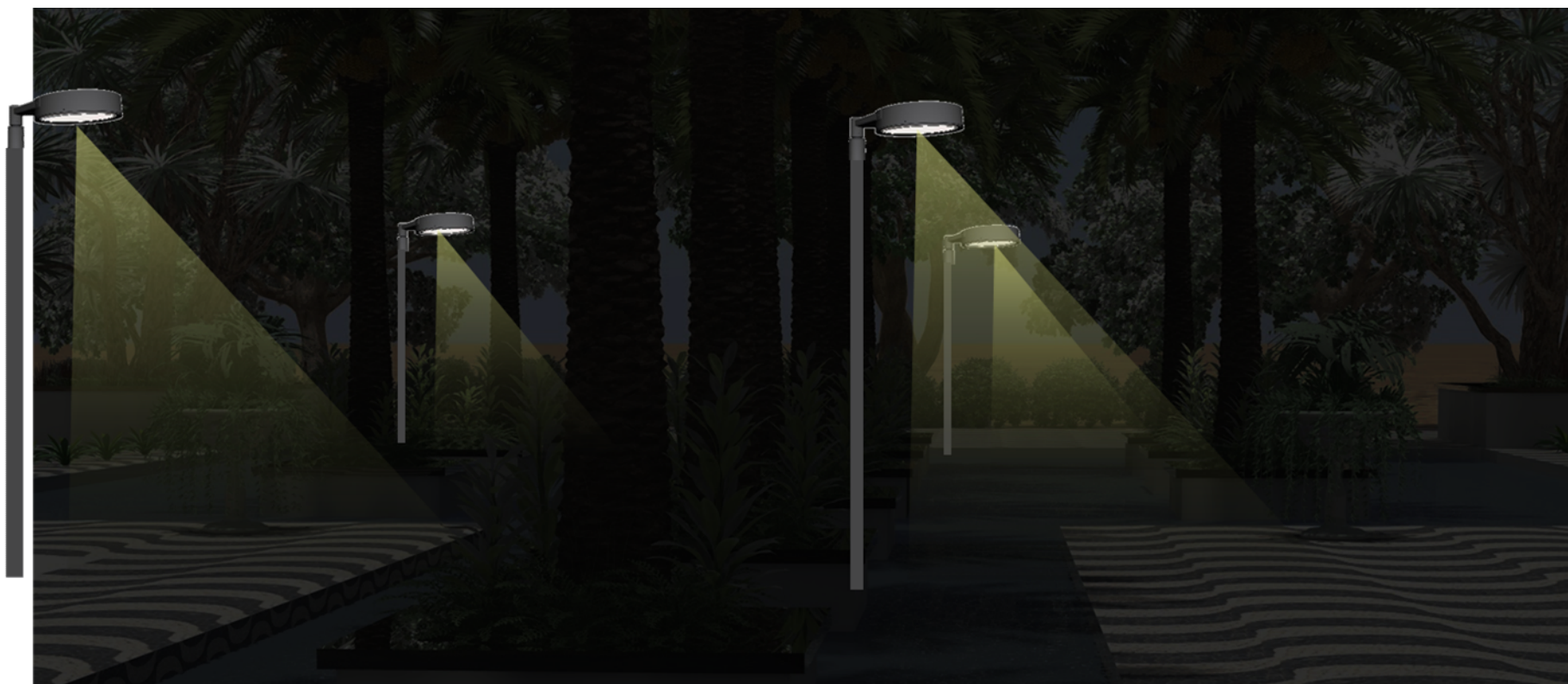
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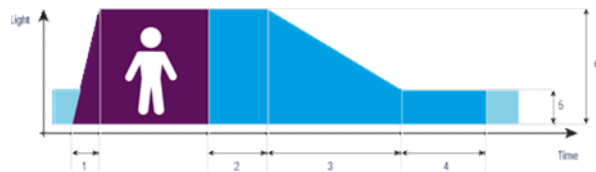








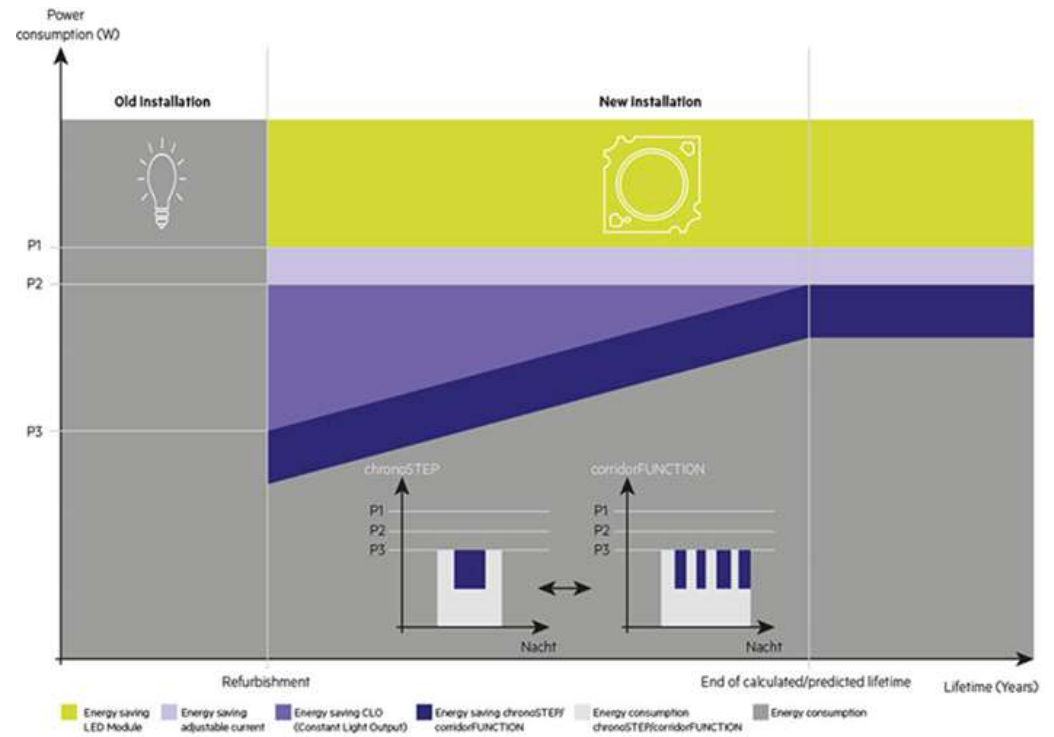
Energy saving toolbox 5/5: corridorFUNCTION



> 21 % savings

> 1500€/year

> 3,75t carbon reduction / year



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Poll question



_ Which of the 5 tools in our toolbox sounds interesting to you?

_ Lamp refurbishment

_ Adjustable current

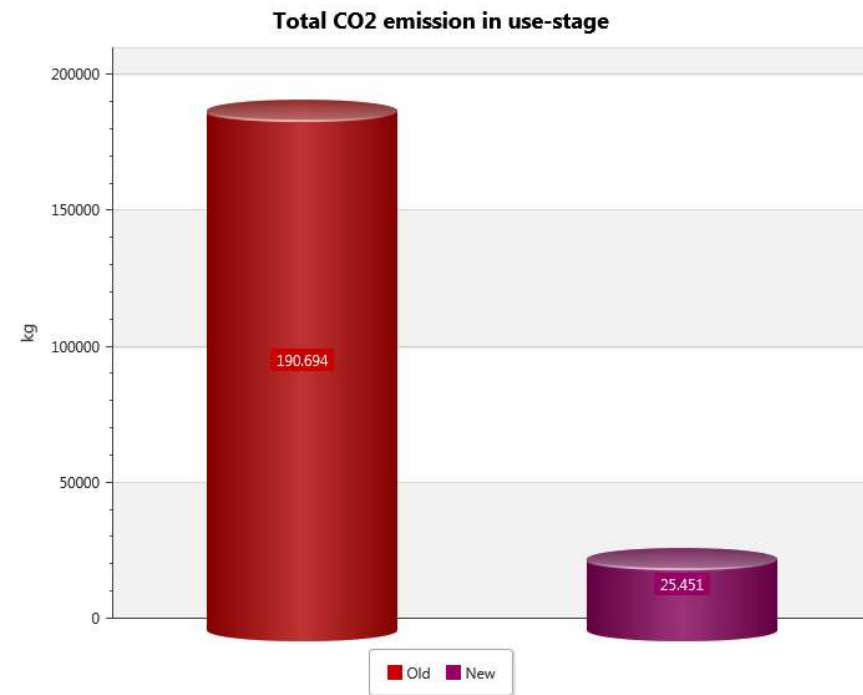
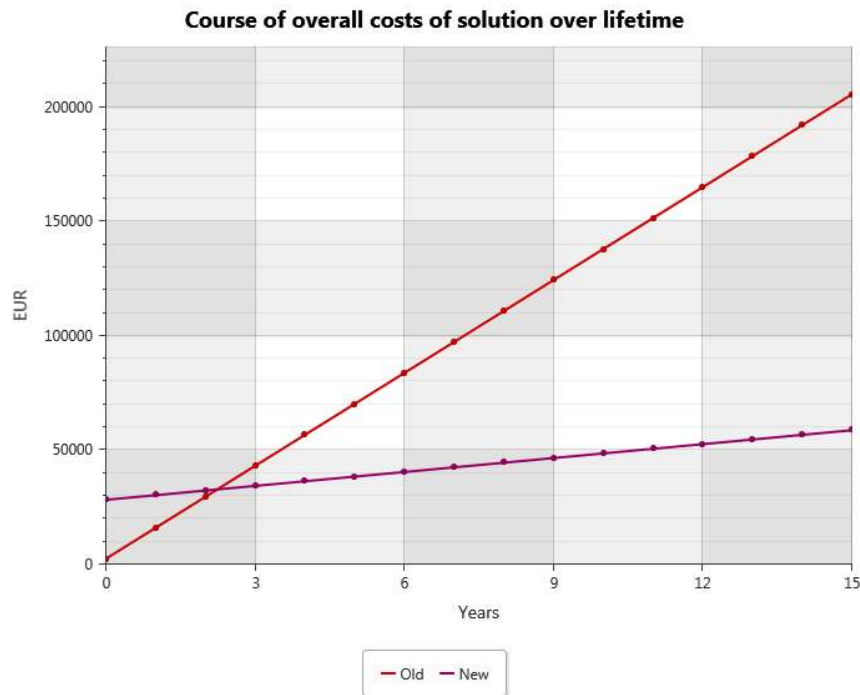
_ Constant Light Output (CLO)

_ chronoSTEP

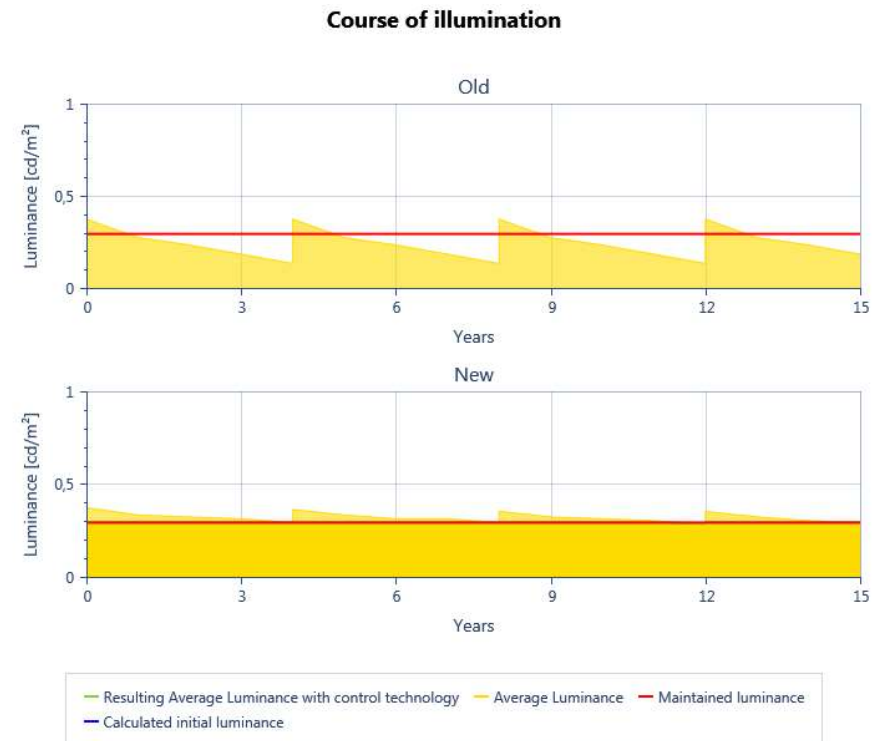
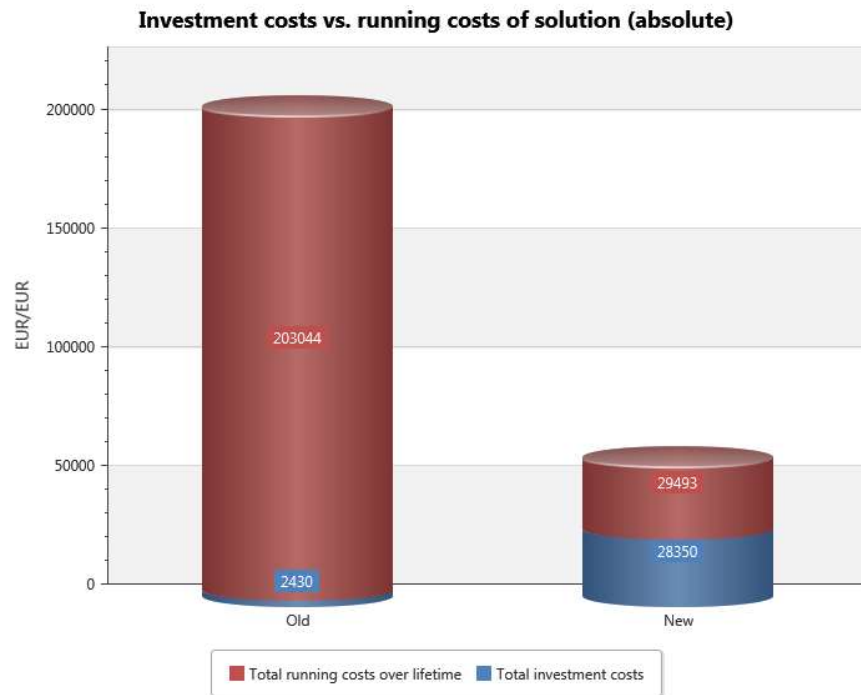
_ corridorFUNCTION

(multiple answers)

Now it is time for TCO and ROI: ecoCALC



Analyzing budgets and lighting quality: ecoCALC



A look insight: ecoCALC

The screenshot displays the ecoCALC software interface, titled "ecoCALC | Test City". The interface includes a menu bar (File, Edit, Insert, Window, Extras, ?) and a toolbar. The main workspace is divided into several sections:

- Project:** Contains icons for Targets, Project, General, Solution, Results, Output, and NOW!
- Solutions:** A tree view on the left showing "Old" and "New" categories, with "Luminaires" and "Luminaire 1" under "Old", and "Luminaires" and "TL R2L2 S 48L35 NR L740 CL2" under "New".
- Targets:** Includes fields for "Calculated initial luminance" (0,35 cd/m²), "Maintenance factor" (0,8), and "Light distribution" (Direct).
- Utilisation:** Includes a field for "Burning hours" (4380 h/a).
- Maintenance:** Includes fields for "Luminaire maintenance type" (IP6X), "Number of workers (maintenance)" (1), "Consider vehicular rental?" (checked), "Luminaire cleaning time" (10 min), "Luminaire cleaning interval" (4 a), "300,00 EUR/pcs", "25 min", "Group", "15 a", and "5 a".
- Daylight dependent lighting control:** Includes a dropdown for "Manual", "Fd =" (1,00), "Utilisation rate installation" (79 %), "Average dimming level" (53 %), and "Light output level(s)" (1: % 2: %).
- Green criteria:** Includes fields for "Disposal fees per luminaire" and "Disposal fees per lamp" (both EUR/pcs).
- General:** Includes fields for "Average exchange costs of spare parts" (0,00 EUR/a) and "Scouting costs" (0,00 EUR/a).

A large green box with the text "250 input values" is overlaid on the center of the interface.

Wired or wireless,
refurbishment or new build,
intelligent luminaire or intelligent systems,
the functions are easy to realize in every infrastructure



Carbon / Budget savings supports investment in future-proof



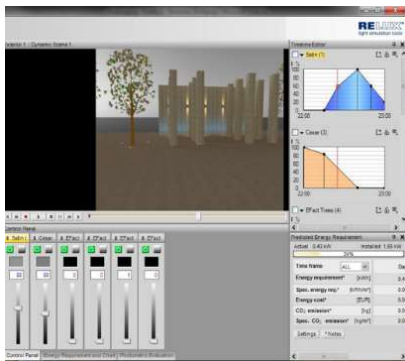
Following up innovation > NIGHTSCAPES

LANDSCAPING
ACTIVITIES

RATING
SCENARIOS +10Y

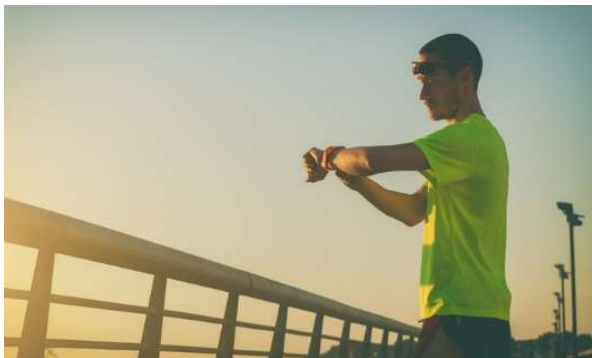
STUDYING
BEACONS

ACTIVITIES - Keywords



- _ **[Energy]** TCO . ROI . Zero carbon footprint . EN13201-2 . LED
- _ **[Adaptation]** Off grid . CCTV . Embedded . Controls . TalQ . Analytics
- _ **[Hidden technology]** Sensors . 24/7 . Miniaturization . Smart(Highway)
- _ **[Connectivity]** IoT . API . 6LoWPAN . IPv6 . Web-based management
- _ **[Business model]** Urban service . ESCO . Triple Helix . PPI . Dialogue
- _ **[BIM Design]** Revit . Modularity . Google . GIS . Platform . Add-on
- _ **[Visualisation]** Hilite . Vivaldi . 3D . Photorealistic . VR . Data layers
- _ **[Interest]** Liveability . Vibrance . Darkness . Time dependency
- _ **[Interaction]** Devices . App . Personalized . Experience . Location

SCENARIOS +10Y - Usecases



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Visual guidance for joggers

A young lady decides to jog. Based on her profile, the city app proposes a track and shows the way via coloured lights on the next two to three poles in relation to her actual position. Via the movement of the smartphone, the lighting reacts and changes the parameter to adapt to her actual run. Thus, she can still enjoy the music and landscape without having to check the GPS based map on her phone.



Please rate this page: Excellent

1

2

3

4

5

6

Submit

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BEACONS - Copenhagen



- _ 1000 new inhabitants net / month
- _ Carbon neutral by 2025.
- _ District heating and cooling will be carbon neutral by 2025.
- _ Carbon reduction from commercial buildings by 20%.
- _ Carbon reduction from public buildings by 40%.
- _ Carbon reduction from street lighting by 50%.
- _ Electricity production comes all from renewable sources and is bigger than consumption.
- _ Citizens will take 75% of trips by bicycle, foot or public transport.
- _ Energy consumption on lighting: 2003, 20,9GWh/year, 2013, 15,7GWh/year, political goal 2016, 9,75GWh/year, Citelum's promise 2016: 8,30GWh/year
- _ 20000 new lighting fixtures individually controlled, 24000 old lighting fixtures cabinet-level controlled, 8000 lighting fixtures stand alone
- _ Mesh network at 833MHz

Megatrends in outdoor lighting



WHY

- _ Create livability



HOW

- _ Merging silos
- _ Digital master-planning
- _ Ownership
- _ New/Improved tender processes

Poll question



_ Which of the 5 mega trends you believe you feel / you already experienced will be first visible to you?

- _ Create livability
- _ Merging silos
- _ Digital master-planning
- _ Ownership of infrastructure
- _ New/Improved tender processes

(one answer)



Outdoor Lighting Trialogue

- Perfectly matched lighting calls for good cooperation between urban planners, local authorities, luminaire manufacturers and lighting component manufacturers. A dialogue between everyone involved is the only way to create the best individual lighting solutions and new pioneering concepts. The logical consequence: Outdoor Lighting Trialogue.
- The Outdoor Lighting Trialogue is a strong partnership consisting of a wide variety of lighting experts and specialists working intensely on current and future lighting solutions. The latest issues are discussed, innovations developed and pragmatic solutions produced – always with the focus on safety, efficiency and progress.



Thank you for your attention

We are looking forward to opinions, questions and discussions.



Attention! Next steps ahead

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Light you want to follow.



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