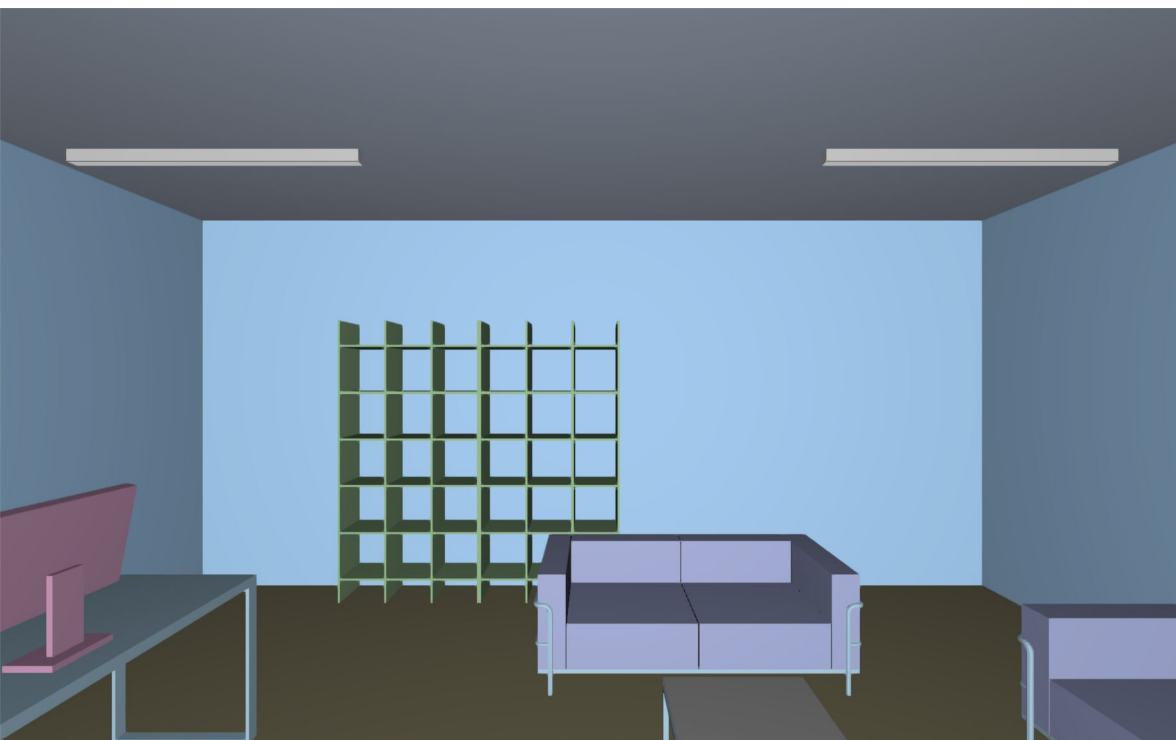




Arak Office

Preface

Notes on planning:

The energy consumption quantities do not take into account light scenes and their dimming levels.

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Site 1 - Building 1

Storey 1

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Site 1 - Building 1 - Storey 1

Room 1

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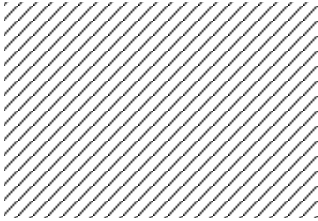
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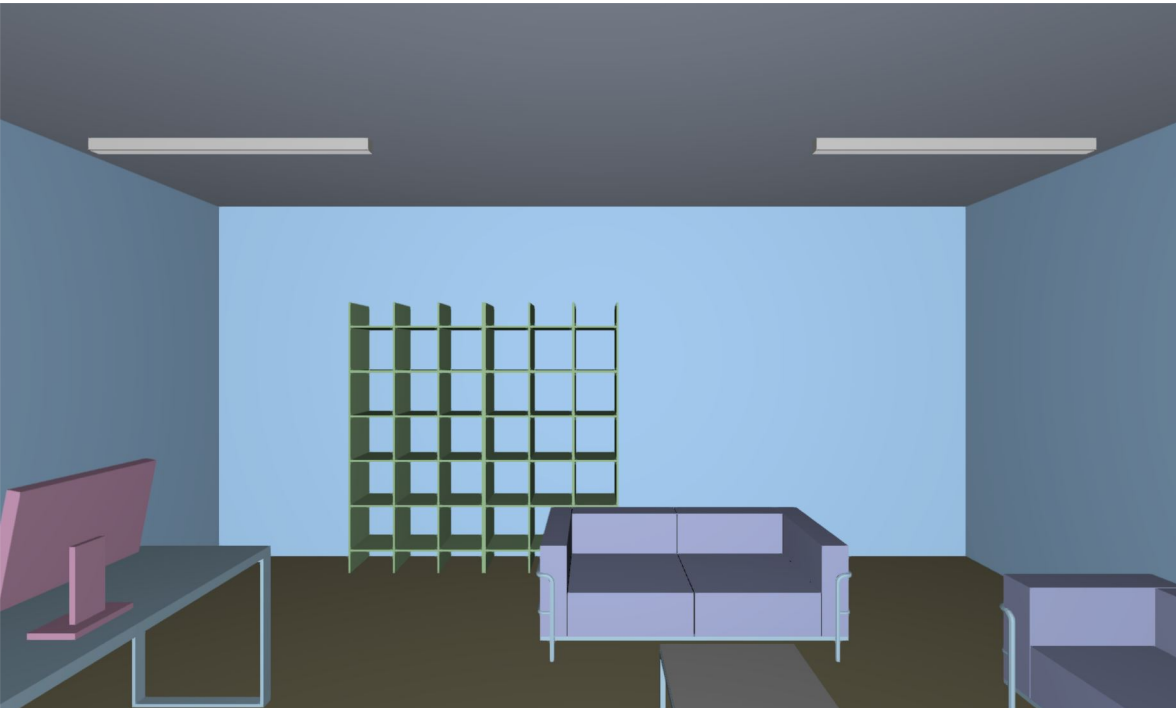
Contacts



Student

Amirhossein Bahrami

Shahid Behshti University



Description

Dialux Project Description: EC+ Certified Biodynamically Enhanced Office Lighting

This Dialux project surpasses standard lighting design to achieve an EC+ certification, creating an exceptional office environment that prioritizes productivity, occupant well-being, and sustainability.

Key Features:

EC+ Compliance: The lighting design will strictly adhere to EC+ guidelines, ensuring exceptional energy efficiency, minimal environmental impact, and occupant comfort.

Melatonic Harmony: We will incorporate advanced lighting fixtures that emit light with a spectrum that dynamically adjusts throughout the day to optimize melatonin production. This can significantly improve focus, sleep quality, and overall mood.

Human Centric Lighting (HCL): The design will incorporate HCL principles, considering factors like color temperature, color rendering index (CRI), and flicker to create a visually comfortable and stimulating environment.

Advanced Controls: We will include a sophisticated lighting control system that allows for daylight harvesting, occupancy sensing, and dynamic adjustments to optimize energy use and occupant comfort.

Benefits:

Student

Amirhossein Bahrami

Shahid Behshti University

Unmatched Productivity: The combination of EC+ certified fixtures, biodynamic lighting, and HCL principles will create an unparalleled environment for employee focus and concentration, leading to maximized productivity.

Enhanced Well-being: By optimizing melatonin production and visual comfort, this project promotes better sleep quality, reduced stress, and a more positive and energizing work experience.

Sustainability Leadership: Achieving EC+ certification demonstrates a commitment to environmental responsibility by minimizing energy consumption and using eco-friendly materials.

Project Deliverables:

Dialux model with lighting layout, illuminance calculations, and EC+ compliance documentation.

Specifications for advanced lighting fixtures with melatonin-supportive spectra and EC+ certification.

Lux level charts demonstrating compliance with recommended standards.

3D rendered visuals showcasing the proposed lighting design.

(Optional) Post-implementation monitoring report demonstrating achieved energy savings and occupant satisfaction.

This project goes beyond basic lighting design. By achieving EC+ certification and incorporating biodynamic principles and HCL, we will create a truly exceptional office environment that fosters a healthy, productive, and sustainable future for your business.

Luminaire list

Φ_{total} 23520 lm	P_{total} 137.6 W	Luminous efficacy 170.9 lm/W
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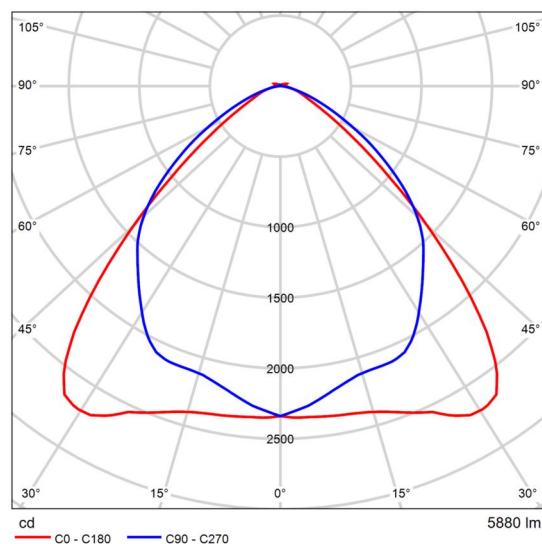
pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	5880 lm	170.9 lm/W

Product data sheet

Regiolux - SRT+SRGCB/1500 LED 6000 830 DALI ww



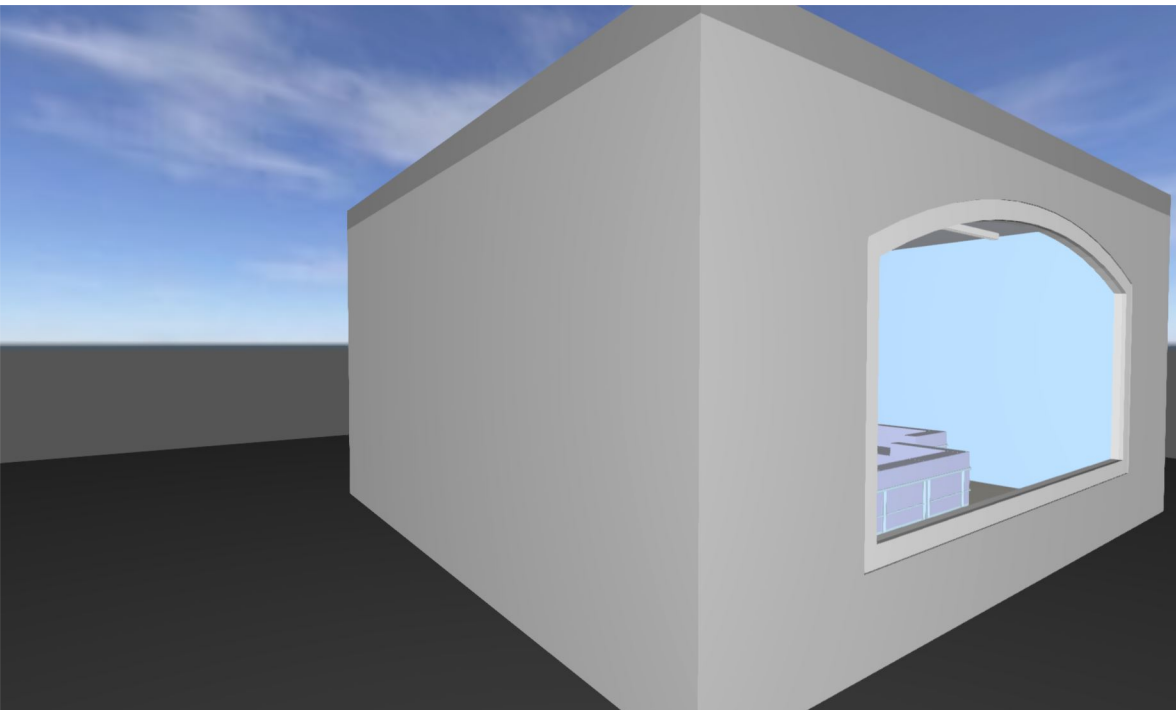
Article No.	SRT+19510006090
P	34.4 W
Φ_{Lamp}	–
$\Phi_{\text{Luminaire}}$	5880 lm
η	–
Luminous efficacy	170.9 lm/W
CCT	3000 K
CRI	80



Polar LDC

Glare evaluation according to UGR													
p Ceiling	70	70	50	50	30	70	70	50	50	30			
p Walls	50	30	50	30	30	50	30	50	30	30			
p Floor	20	20	20	20	20	20	20	20	20	20			
Room size X Y		Viewing direction at right angles to lamp axis					Viewing direction parallel to lamp axis						
2H	2H	20.9	22.1	21.2	22.4	22.6	22.1	23.3	22.4	23.5	23.8		
	3H	21.0	22.1	21.4	22.4	22.7	22.6	23.6	22.9	23.9	24.2		
	4H	21.0	22.0	21.4	22.3	22.7	22.6	23.6	23.0	23.9	24.3		
	6H	21.1	22.0	21.4	22.3	22.7	22.7	23.6	23.0	23.9	24.2		
	8H	21.1	21.9	21.4	22.3	22.6	22.6	23.5	23.0	23.9	24.2		
	12H	21.0	21.9	21.4	22.2	22.6	22.6	23.5	23.0	23.8	24.2		
4H	2H	21.2	22.2	21.6	22.5	22.9	22.3	23.3	22.6	23.6	23.9		
	3H	21.4	22.3	21.8	22.6	23.0	22.8	23.7	23.2	24.0	24.4		
	4H	21.5	22.3	21.9	22.6	23.0	23.0	23.7	23.4	24.1	24.5		
	6H	21.6	22.2	22.0	22.6	23.1	23.0	23.7	23.5	24.1	24.5		
	8H	21.6	22.2	22.1	22.6	23.1	23.0	23.6	23.5	24.0	24.5		
	12H	21.6	22.2	22.1	22.6	23.1	23.0	23.6	23.5	24.0	24.5		
8H	4H	21.6	22.2	22.0	22.6	23.0	22.9	23.5	23.4	24.0	24.4		
	6H	21.7	22.2	22.2	22.6	23.1	23.0	23.5	23.5	24.0	24.5		
	8H	21.7	22.1	22.2	22.6	23.2	23.0	23.5	23.6	24.0	24.5		
	12H	21.8	22.1	22.3	22.6	23.2	23.0	23.4	23.6	23.9	24.5		
12H	4H	21.5	22.1	22.0	22.5	23.0	22.9	23.5	23.4	23.9	24.4		
	6H	21.7	22.1	22.2	22.6	23.1	23.0	23.4	23.5	23.9	24.4		
	8H	21.7	22.1	22.2	22.6	23.1	23.0	23.4	23.6	23.9	24.5		
Variation of the observer position for the luminaire distances S													
S = 1.0H		+0.8 / -1.4					+0.4 / -0.6						
S = 1.5H		+2.0 / -3.1					+0.9 / -1.6						
S = 2.0H		+3.4 / -4.2					+1.8 / -2.8						
Standard table		BK02					BK02						
Correction summand		4.1					5.4						
Corrected glare indices referring to 5880lm Total luminous flux													

UGR diagram (SHR: 0.25)



Building 1

Description

Building 1

Luminaire list Φ_{total}

23520 lm

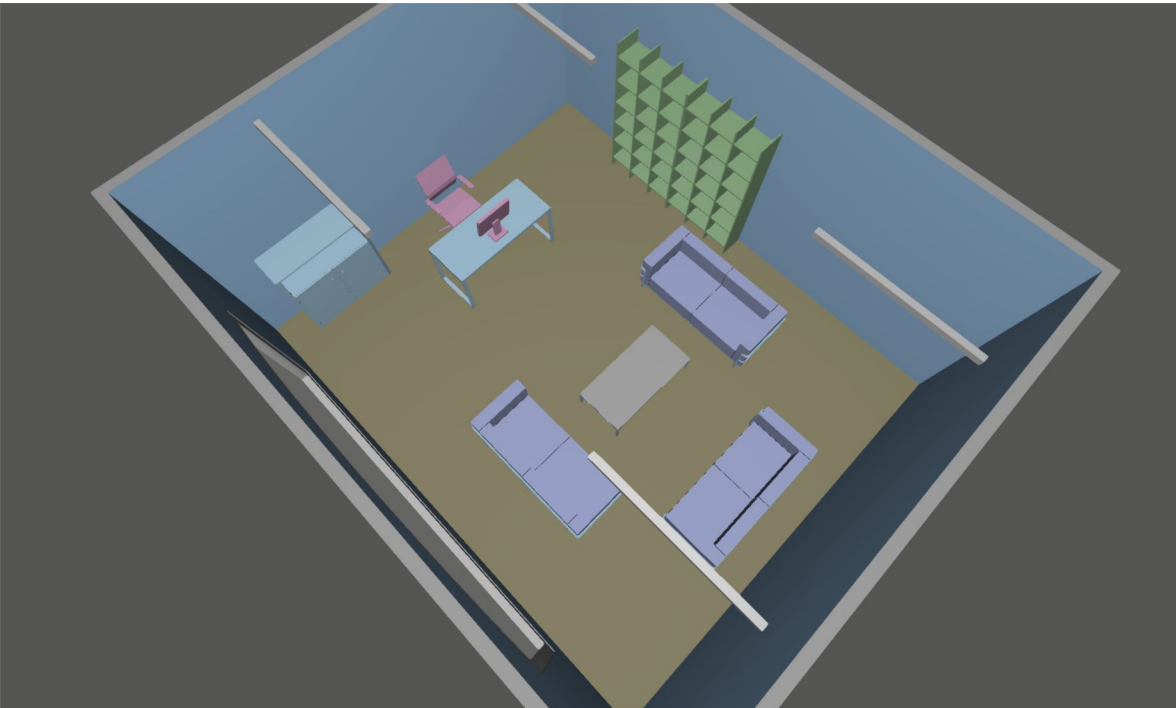
 P_{total}

137.6 W

Luminous efficacy

170.9 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	5880 lm	170.9 lm/W



Building 1 · Storey 1

Description

Building 1 · Storey 1 (Light scene 1)

Room list

Room 1

Building 1 · Storey 1 (Light scene 1)

Room list

Room 1

P_{total} 137.6 W	A_{Room} 30.00 m ²	Lighting power density 4.59 W/m ² = 0.84 W/m ² /100 lx (Room) 6.88 W/m ² = 1.26 W/m ² /100 lx (Working plane)	$E_{\text{perpendicular (Working plane)}}$ 544 lx
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pcs.	Manufacturer	Article No.	Article name	P	$\Phi_{\text{Luminaire}}$
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	5880 lm

Building 1 · Storey 1

Luminaire list Φ_{total}

23520 lm

 P_{total}

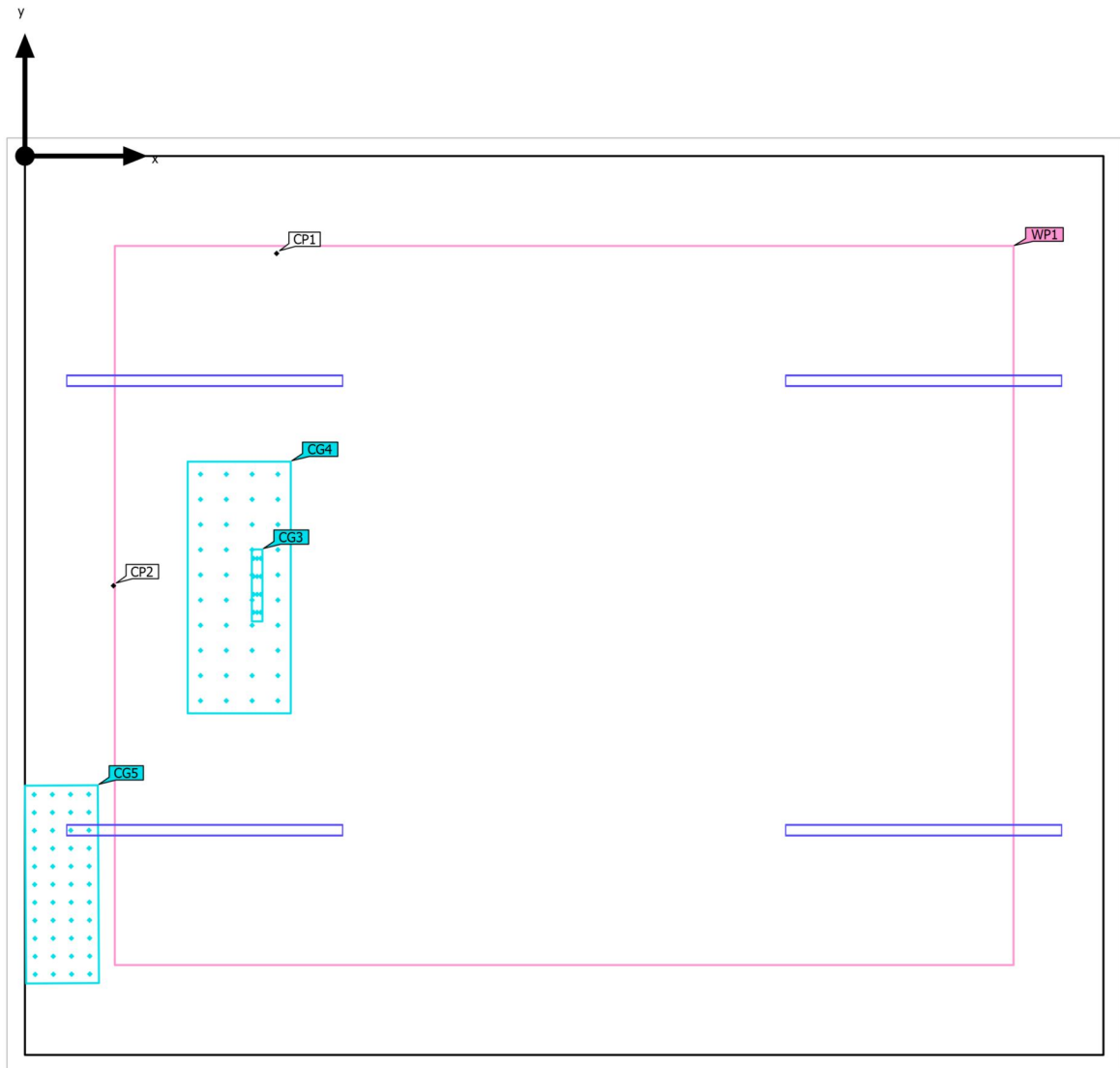
137.6 W

Luminous efficacy

170.9 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	5880 lm	170.9 lm/W

Building 1 · Storey 1 (Light scene 1)

Calculation objects

Building 1 · Storey 1 (Light scene 1)

Calculation objects

Working planes

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Room 1) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.500 m	544 lx (≥ 500 lx) ✓	330 lx	750 lx	0.61 (≥ 0.60) ✓	0.44	WP1

Calculation surfaces

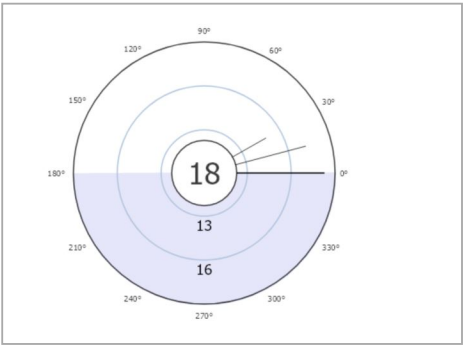
Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
SCREEN Horizontal illuminance Height: 1.047 m	671 lx	656 lx	682 lx	0.98	0.96	CG3
SCREEN Cylindrical illuminance Height: 1.047 m	289 lx	280 lx	293 lx	0.97	0.96	CG3
TABLE Horizontal illuminance Height: 0.765 m	649 lx	433 lx	731 lx	0.67	0.59	CG4
TABLE Cylindrical illuminance Height: 0.765 m	347 lx	245 lx	403 lx	0.71	0.61	CG4
SHELF Perpendicular illuminance Height: 1.200 m	640 lx	508 lx	737 lx	0.79	0.69	CG5

Building 1 · Storey 1 (Light scene 1)

Calculation objects

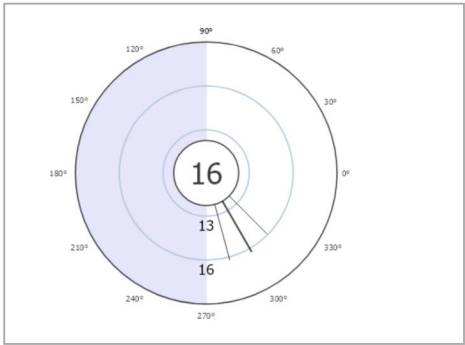
STAND (UGR)

Strongest glare at	0°
max	18.3
Target	≤19.0
Viewing sector	0° - 180°
Step width	15°
Height	1.100 m
Index	CP1

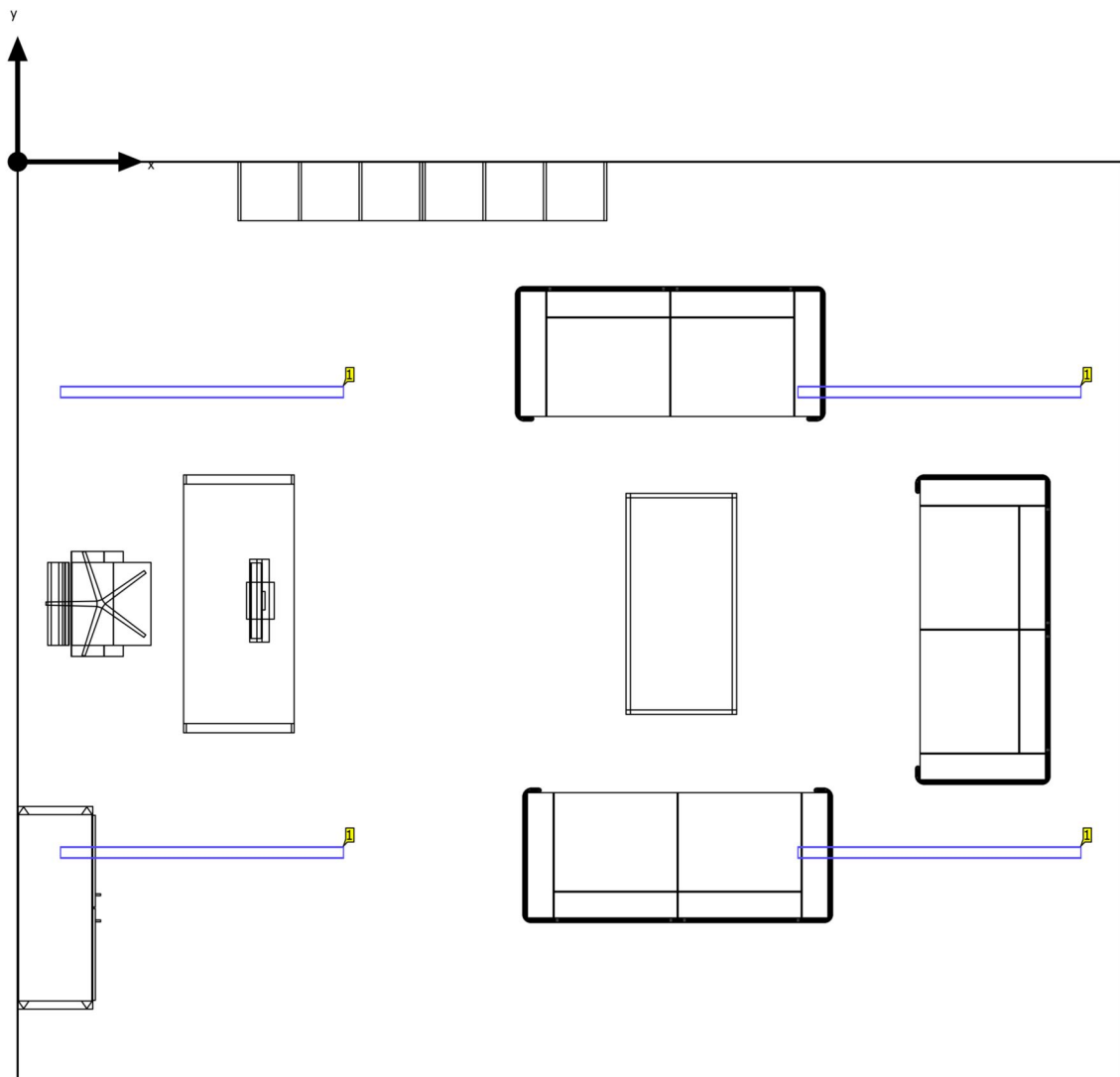


SITTING (UGR)

Strongest glare at	300°
max	16.2
Target	≤19.0
Viewing sector	270° - 90°
Step width	15°
Height	0.445 m
Index	CP2



Building 1 · Storey 1

Control group CG 1

Building 1 · Storey 1

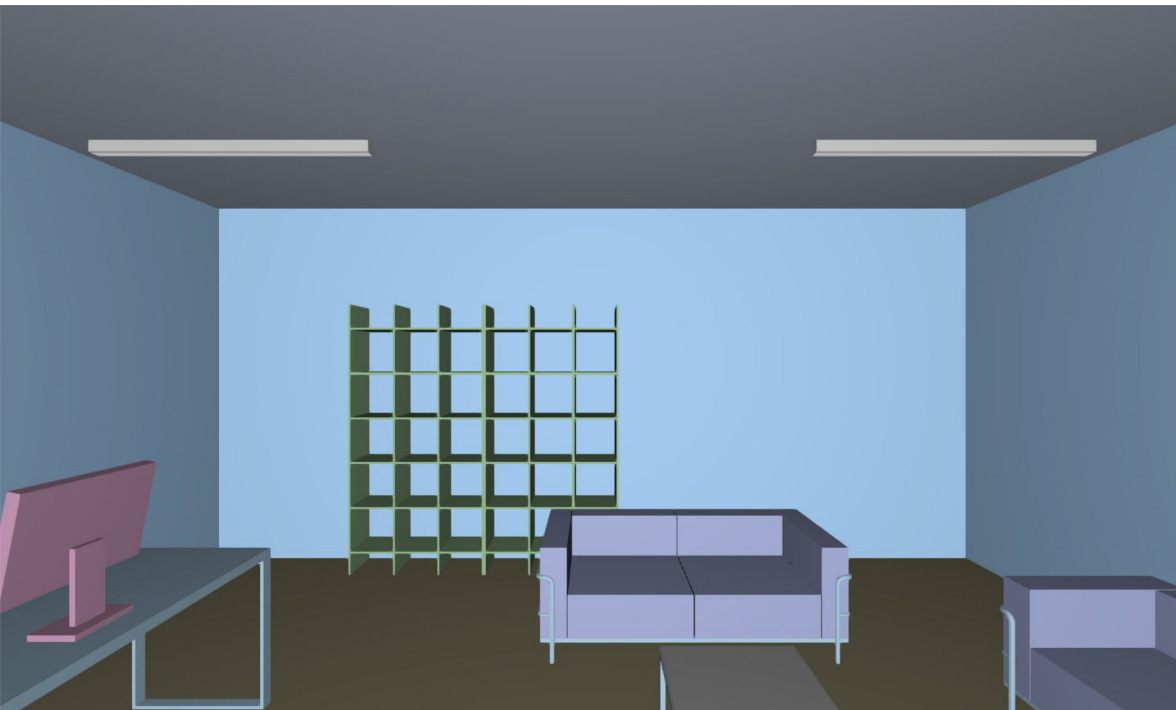
Control groups

Control group CG 1

Light scene 1 100

Dimming values [%]

pcs.	Manufacturer	Article No.	Article name	P	Index
4	Regiolux	SRT+1951000609 0	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	1

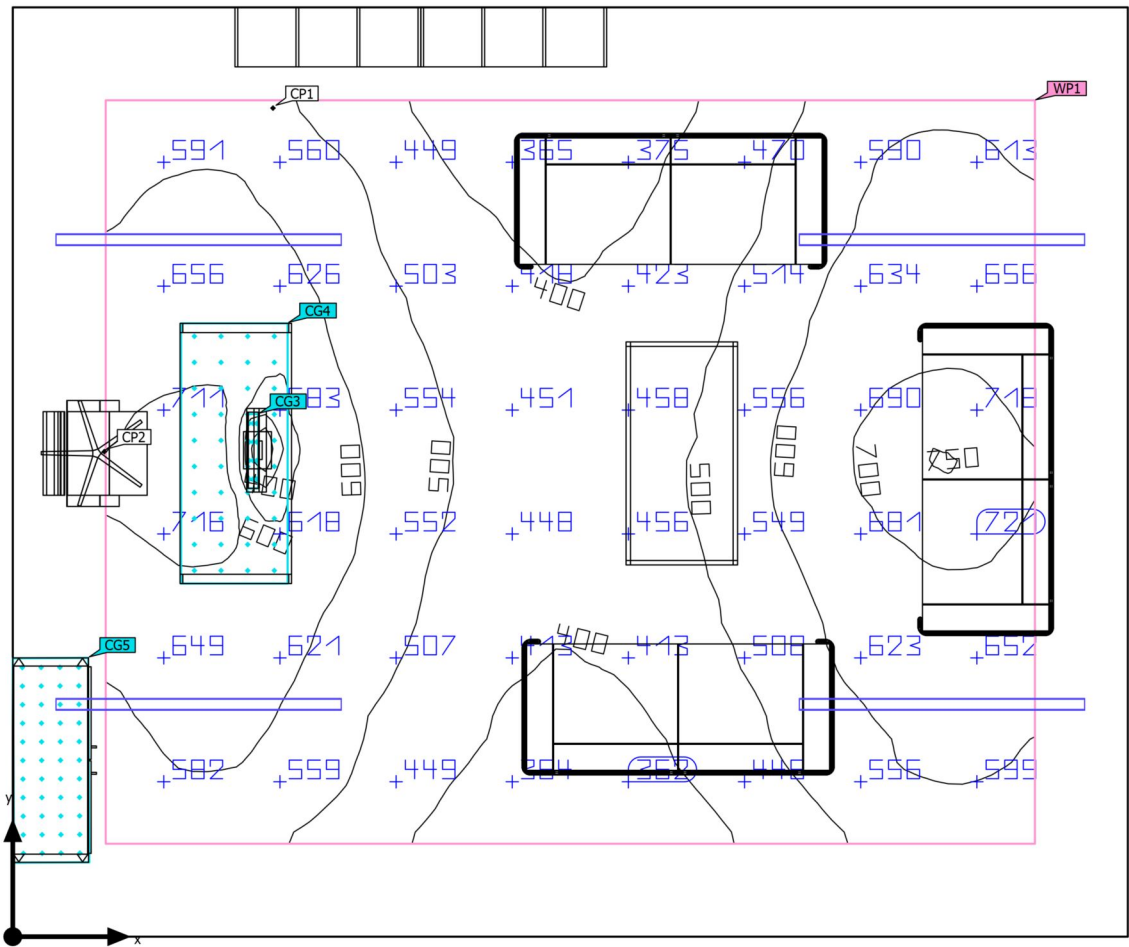


Building 1 · Storey 1 · Room 1

Description

Building 1 · Storey 1 · Room 1 (Light scene 1)

Summary



Ground area	30.00 m ²
Reflection factors	Ceiling: 80.0 %, Walls: 65.0 %, Floor: 30.0 %
Maintenance factor	0.80 (fixed)

Clearance height	2.800 m
Mounting height	2.800 m
Height _{Working plane}	0.800 m
Wall zone _{Working plane}	0.500 m

Building 1 · Storey 1 · Room 1 (Light scene 1)

Summary

Results

	Symbol	Calculated	Target	Check	Index
Working plane	$\bar{E}_{\text{perpendicular}}$	544 lx	≥ 500 lx	✓	WP1
	$U_o (g_1)$	0.61	≥ 0.60	✓	WP1
	Lighting power density	6.88 W/m ²	–		
		1.26 W/m ² /100 lx	–		
Glare	UGR_{max}	18.3	≤ 19.0	✓	CP1
Glare valuation ⁽¹⁾	$R_{UG, \text{max}}$	23	≤ 19	✗	
Energy estimation ⁽²⁾	Consumption	61.6 kWh/a	–		
Room	Lighting power density	4.59 W/m ²	–		
		0.84 W/m ² /100 lx	–		

(1) Based on a rectangular space of 6.000 m x 5.000 m and SHR of 0.25.

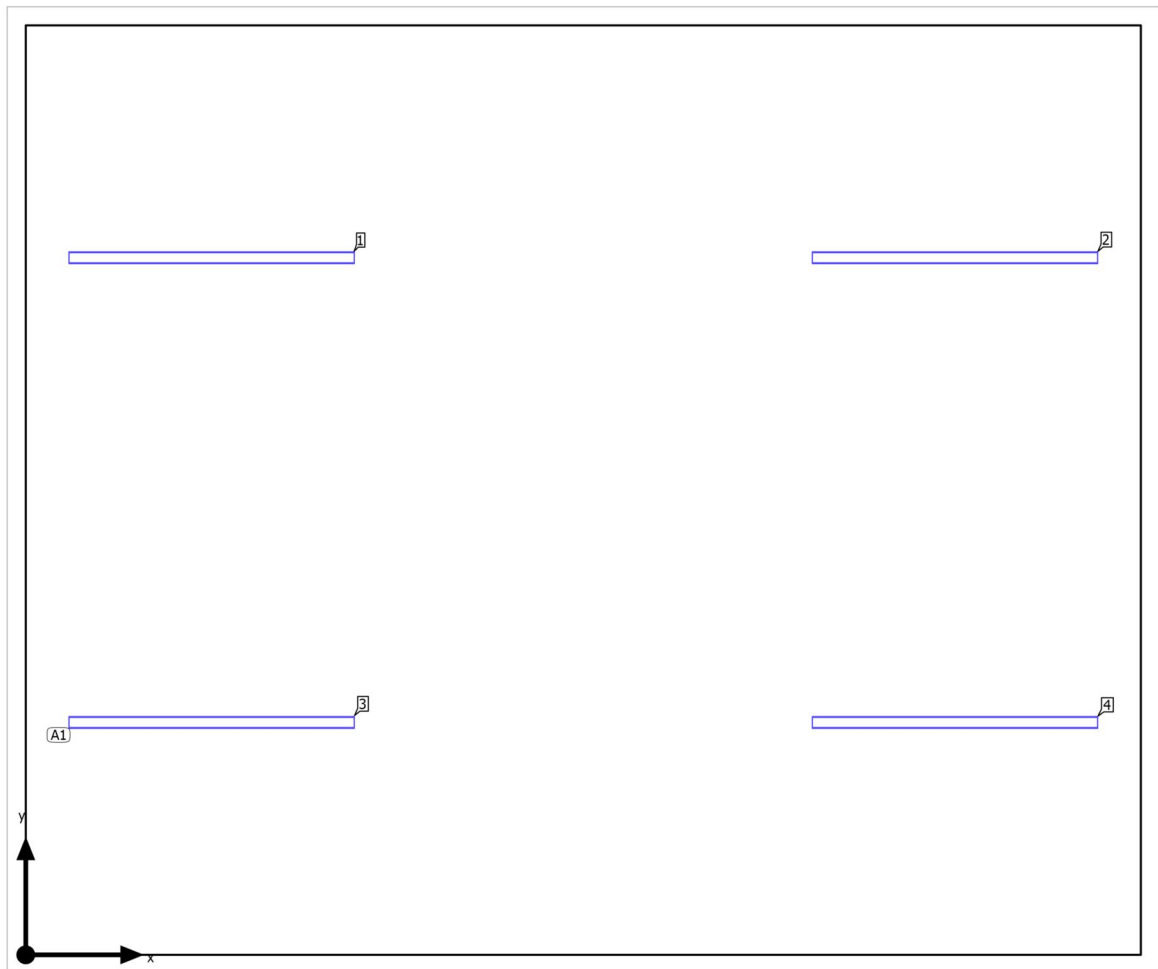
(2) Calculated using hourly rating method with medium sky (without direct sunlight).

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

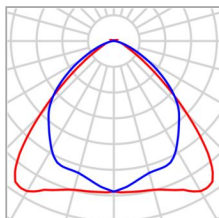
Luminaire list

pcs.	Manufacturer	Article No.	Article name	R_{UG}	P	Φ	Luminous efficacy
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	23	34.4 W	5880 lm	170.9 lm/W

Building 1 · Storey 1 · Room 1

Luminaire layout plan

Building 1 · Storey 1 · Room 1

Luminaire layout plan

Manufacturer	Regiolux	P	34.4 W
Article No.	SRT+19510006090	Φ _{Luminaire}	5880 lm
Article name	SRT+SRGCB/1500 LED 6000 830 DALI vw		
Fitting	1x 4x LED		

4 x Regiolux GmbH SRT+SRGCB/1500 LED 6000 830 DALI vw

Type	Field Arrangement	X	Y	Mounting height	Luminaire
1st luminaire (X/Y/Z)	5.000 m / 3.750 m / 2.800 m	1.000 m	3.750 m	2.800 m	1
X-direction	3 pcs., Centre - centre, Distances not equal	5.000 m	3.750 m	2.800 m	2
		1.000 m	1.250 m	2.800 m	3
Y-direction	2 pcs., Centre - centre, Distances not equal	5.000 m	1.250 m	2.800 m	4
Arrangement	A1				

Building 1 · Storey 1 · Room 1

Luminaire list Φ_{total}

23520 lm

 P_{total}

137.6 W

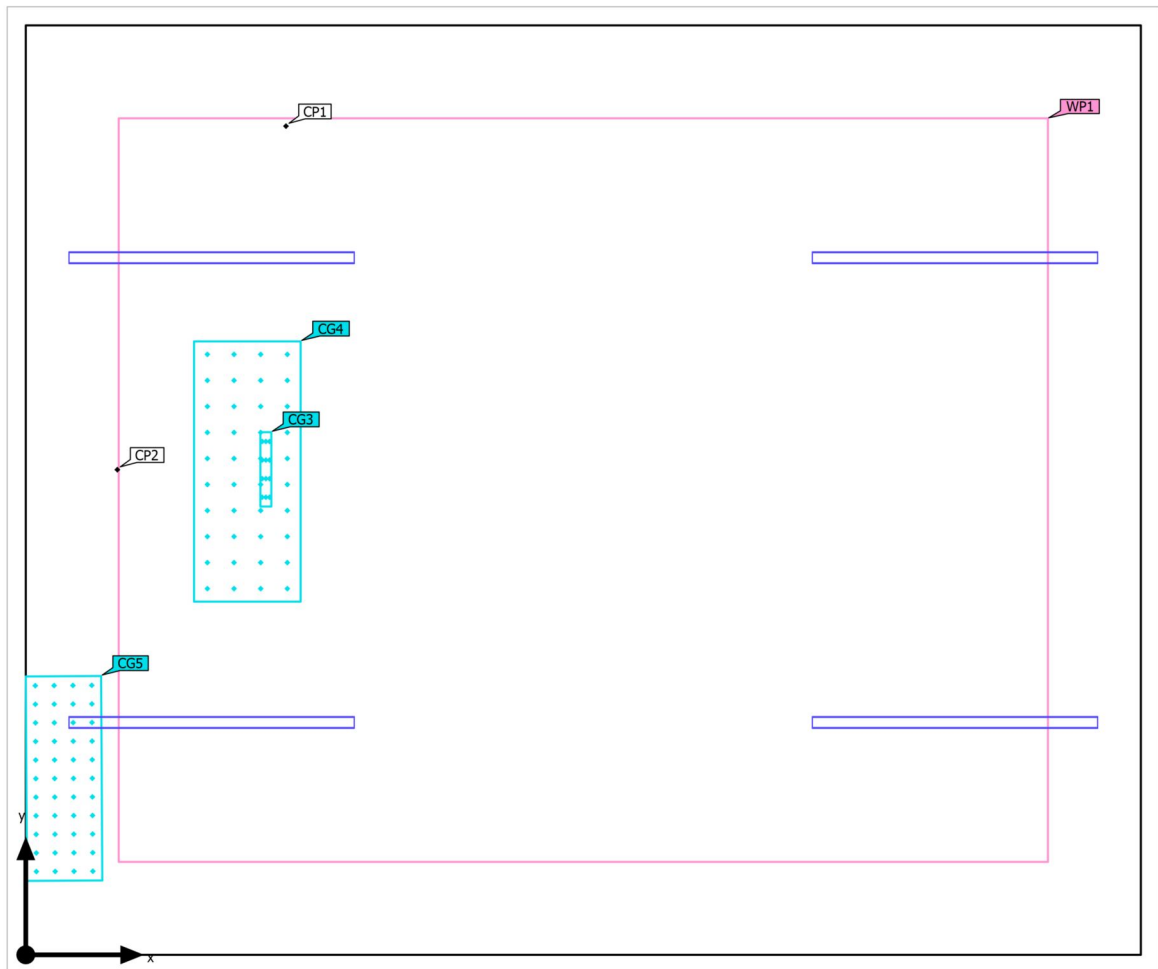
Luminous efficacy

170.9 lm/W

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
4	Regiolux	SRT+1951 0006090	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	5880 lm	170.9 lm/W

Building 1 · Storey 1 · Room 1 (Light scene 1)

Calculation objects



Building 1 · Storey 1 · Room 1 (Light scene 1)

Calculation objects

Working planes

Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Room 1) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.500 m	544 lx (≥ 500 lx) ✓	330 lx	750 lx	0.61 (≥ 0.60) ✓	0.44	WP1

Calculation surfaces

Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
SCREEN Horizontal illuminance Height: 1.047 m	671 lx	656 lx	682 lx	0.98	0.96	CG3
SCREEN Cylindrical illuminance Height: 1.047 m	289 lx	280 lx	293 lx	0.97	0.96	CG3
TABLE Horizontal illuminance Height: 0.765 m	649 lx	433 lx	731 lx	0.67	0.59	CG4
TABLE Cylindrical illuminance Height: 0.765 m	347 lx	245 lx	403 lx	0.71	0.61	CG4
SHELF Perpendicular illuminance Height: 1.200 m	640 lx	508 lx	737 lx	0.79	0.69	CG5

Building 1 · Storey 1 · Room 1 (Light scene 1)

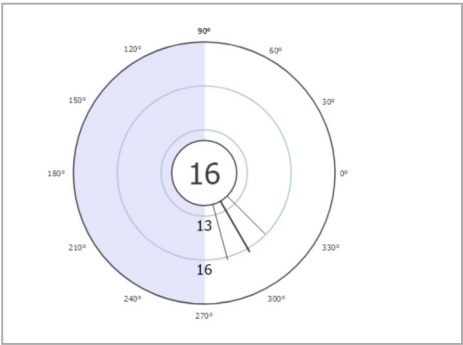
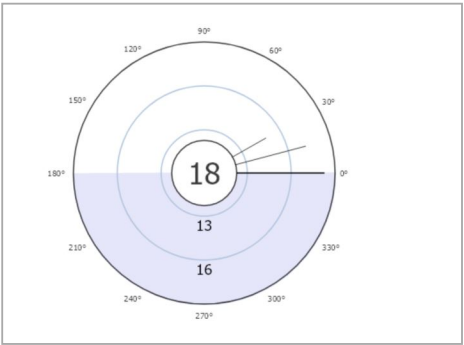
Calculation objects

STAND (UGR)

Strongest glare at	0°
max	18.3
Target	≤19.0
Viewing sector	0° - 180°
Step width	15°
Height	1.100 m
Index	CP1

SITTING (UGR)

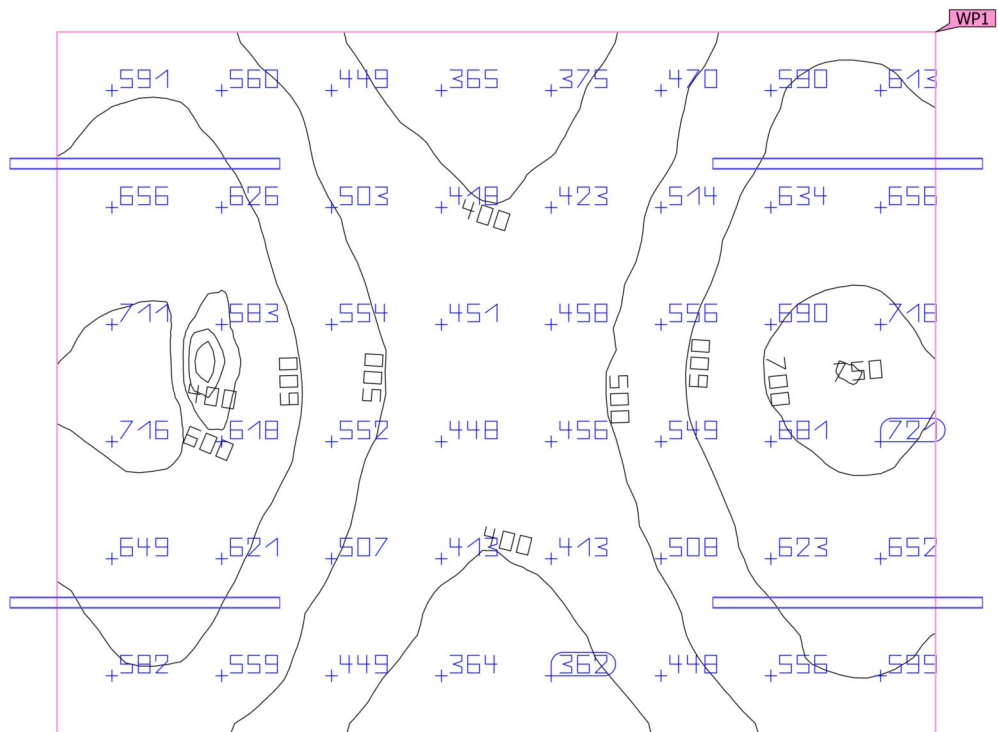
Strongest glare at	300°
max	16.2
Target	≤19.0
Viewing sector	270° - 90°
Step width	15°
Height	0.445 m
Index	CP2



Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

Working plane (Room 1)

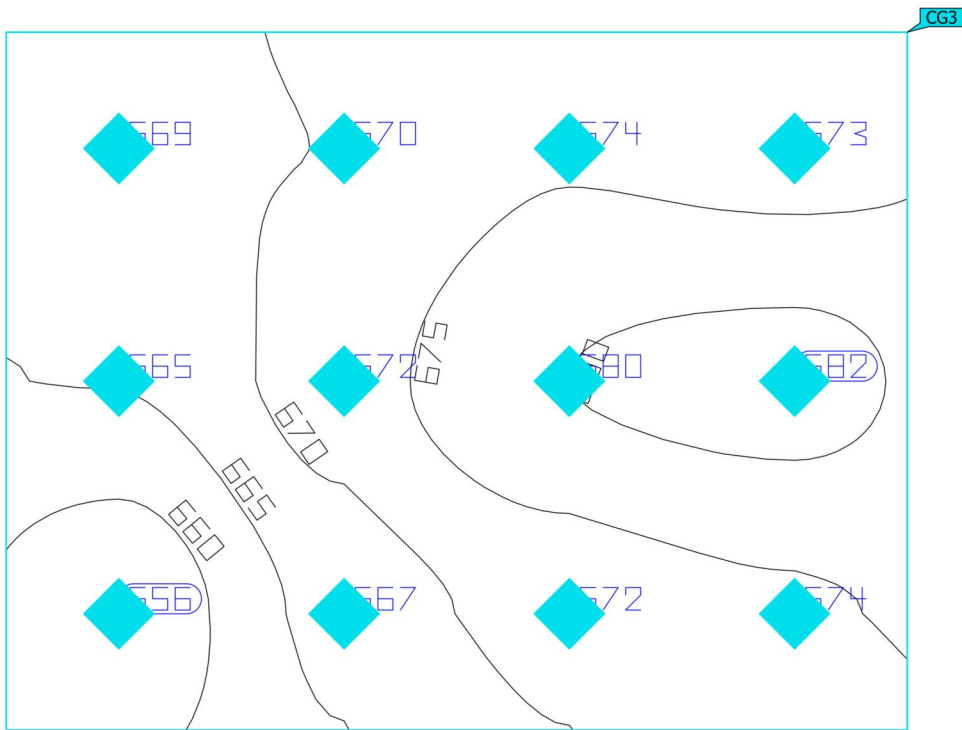
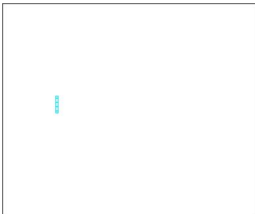


Properties	$\bar{E}$ (Target)	E_{min}	E_{max}	$U_o (g_1)$ (Target)	g_2	Index
Working plane (Room 1) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.500 m	544 lx (≥ 500 lx) ✓	330 lx	750 lx	0.61 (≥ 0.60) ✓	0.44	WP1

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

SCREEN

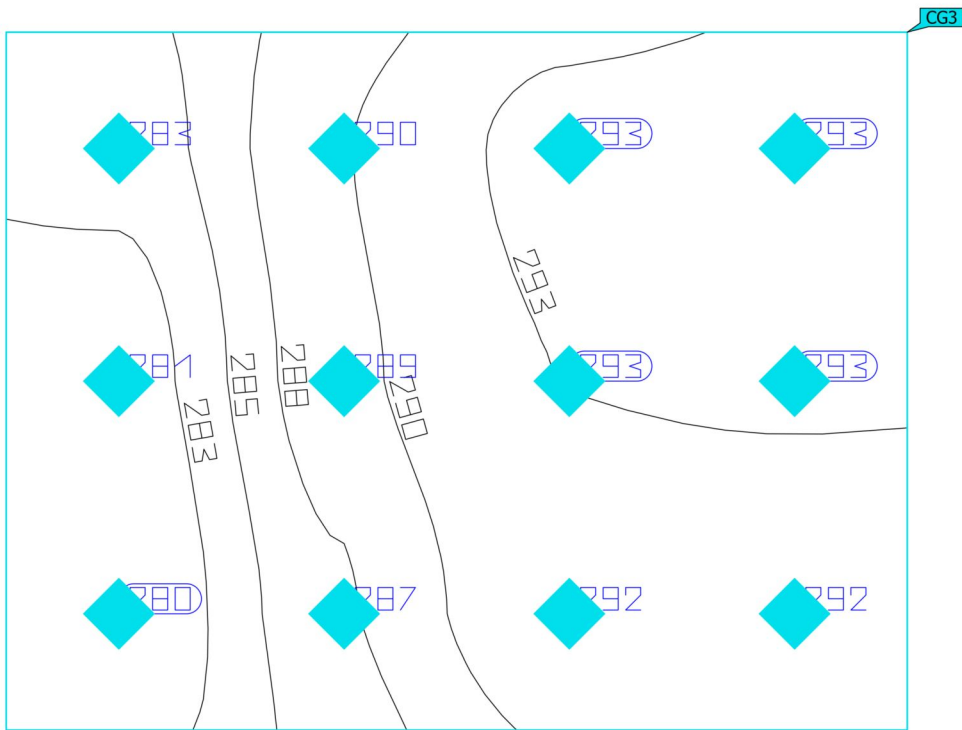
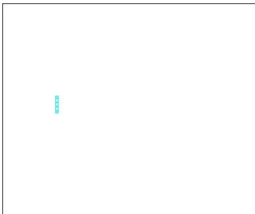


Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
SCREEN Horizontal illuminance Height: 1.047 m	671 lx	656 lx	682 lx	0.98	0.96	CG3

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

SCREEN

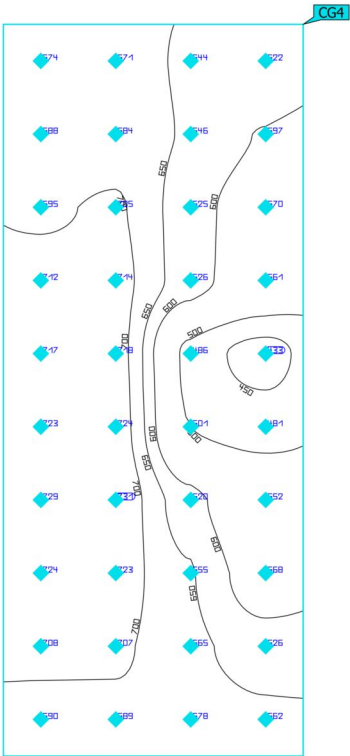
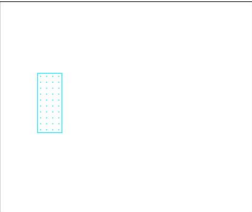


Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
SCREEN Cylindrical illuminance Height: 1.047 m	289 lx	280 lx	293 lx	0.97	0.96	CG3

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

TABLE

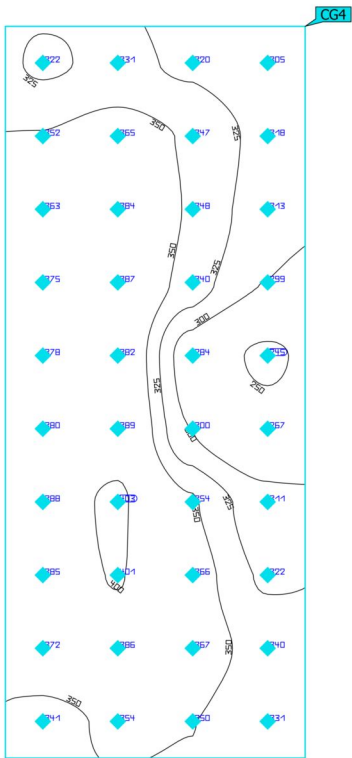
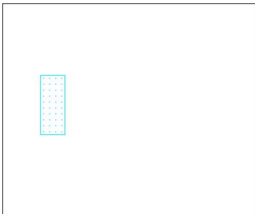


Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
TABLE Horizontal illuminance Height: 0.765 m	649 lx	433 lx	731 lx	0.67	0.59	CG4

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

TABLE

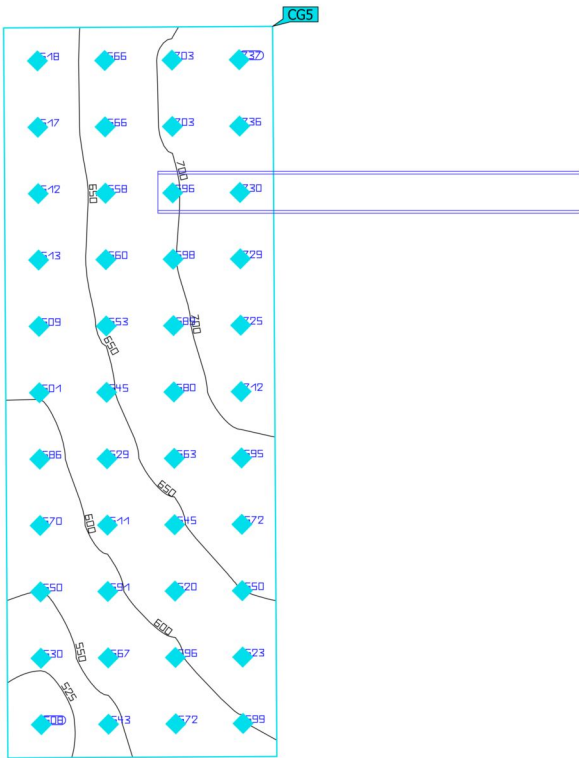


Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
TABLE Cylindrical illuminance Height: 0.765 m	347 lx	245 lx	403 lx	0.71	0.61	CG4

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1 (Light scene 1)

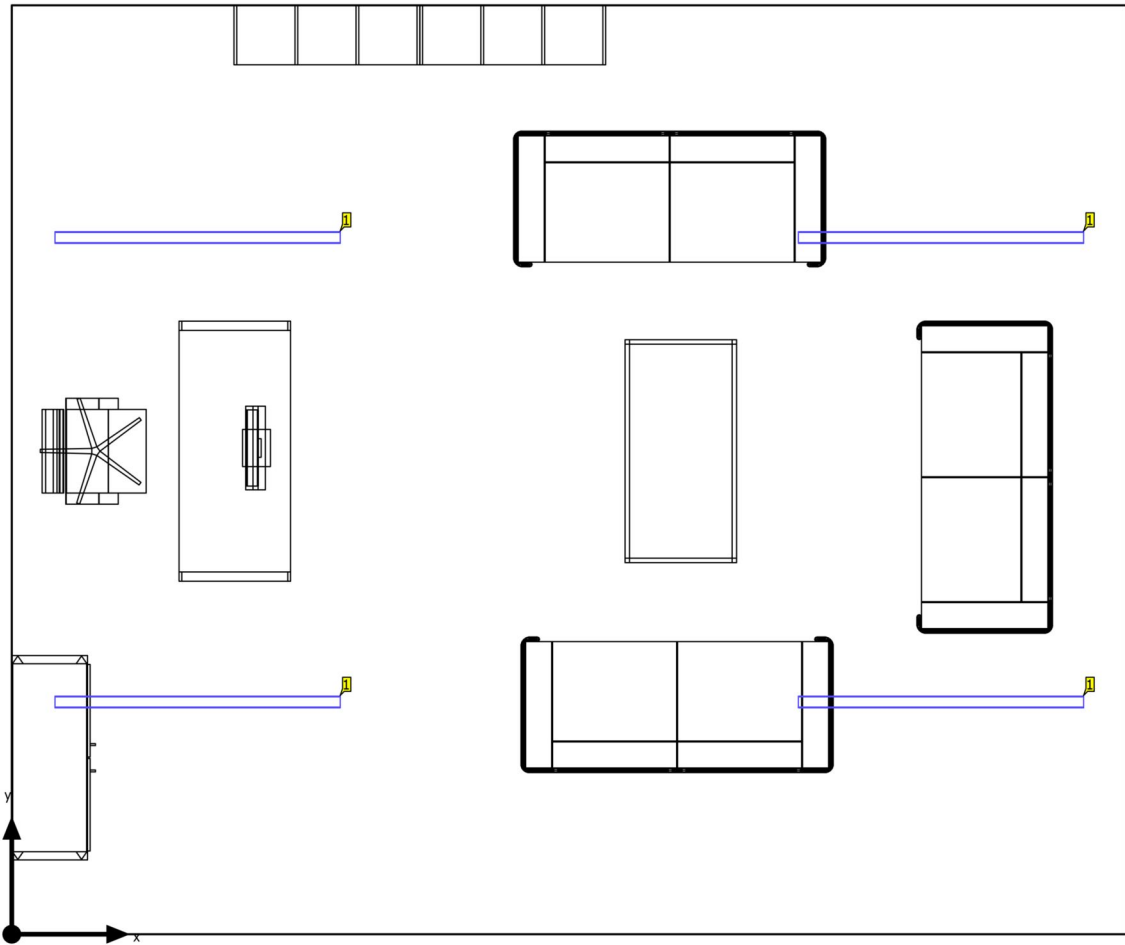
SHELF



Properties	$\bar{E}$	E_{min}	E_{max}	$U_o (g_1)$	g_2	Index
SHELF Perpendicular illuminance Height: 1.200 m	640 lx	508 lx	737 lx	0.79	0.69	CG5

Utilisation profile: Offices (34.2 Writing, typewriting, reading, data processing)

Building 1 · Storey 1 · Room 1

Control group CG 1

Building 1 · Storey 1 · Room 1

Control groups

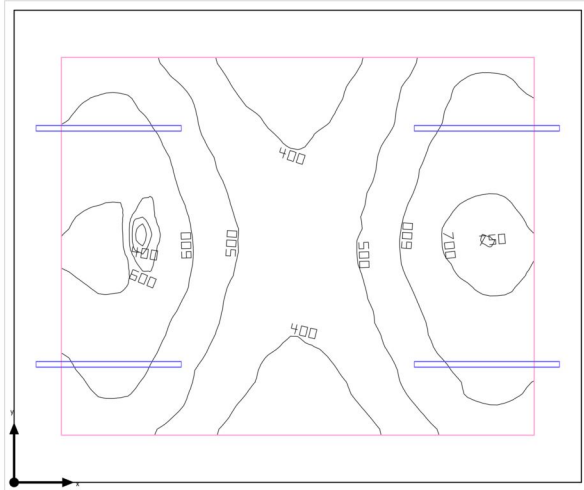
Control group CG 1

Light scene 1 100

Dimming values [%]

pcs.	Manufacturer	Article No.	Article name	P	Index
4	Regiolux	SRT+1951000609 0	SRT+SRGCB/1500 LED 6000 830 DALI ww	34.4 W	1

Building 1 · Storey 1 · Room 1

Energy evaluation year

Annual energy consumption

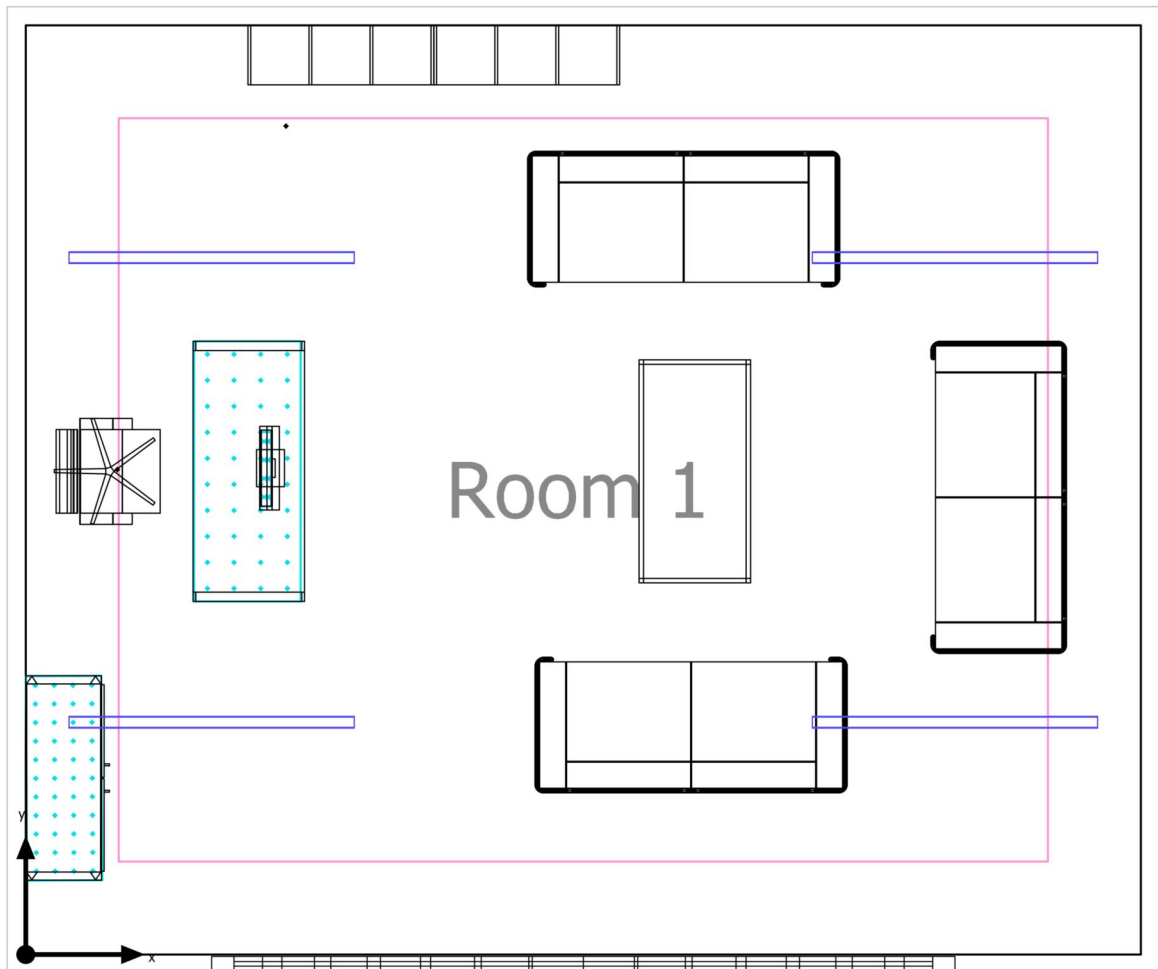
	Uncontrolled	Controlled	Saving
Energy consumption (kWh/a)	275	61.6	214
LENI (kWh/(m ² * a))	9.18	2.05	7.13
Costs (RIA/a)	82.64	18.48	64.17
CO ₂ (kg/a)	110	24.7	85.8

Daylight autonomy: 65 %

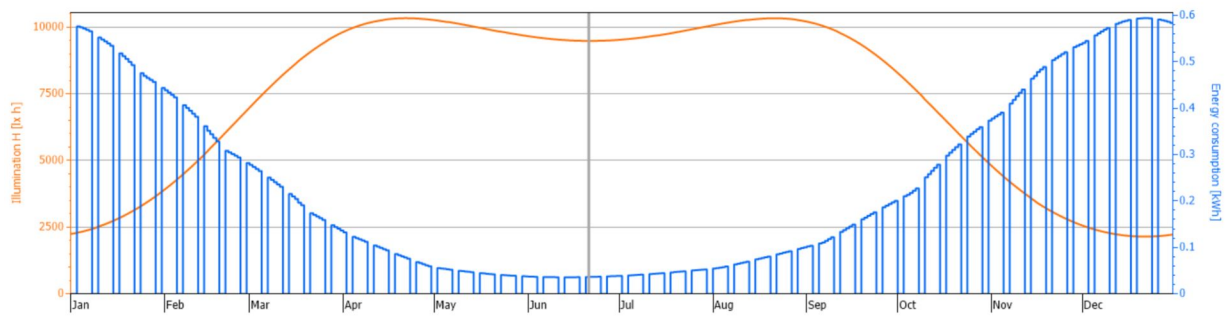
Planning data

Utilisation profile	Offices (34.2 Writing, typewriting, reading, data processing)
Target illuminance	500 lx
Utilisation times	7:00 - 18:00 o'clock
Days per Week	5 (Mon - Fri)

Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 09:00)

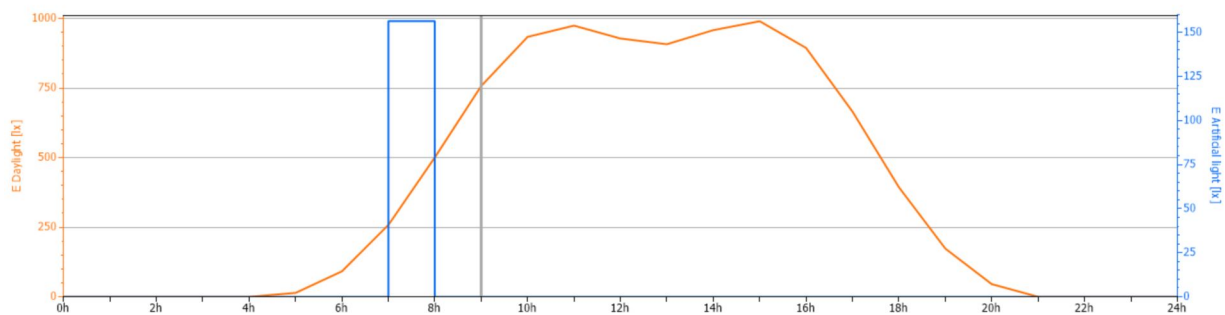
Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 09:00)

Annual energy consumption

Daily viewing: 6/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	1.02 kWh
Controlled	0.036 kWh	Costs	0.31 RIA
		CO ₂	0.41 kg

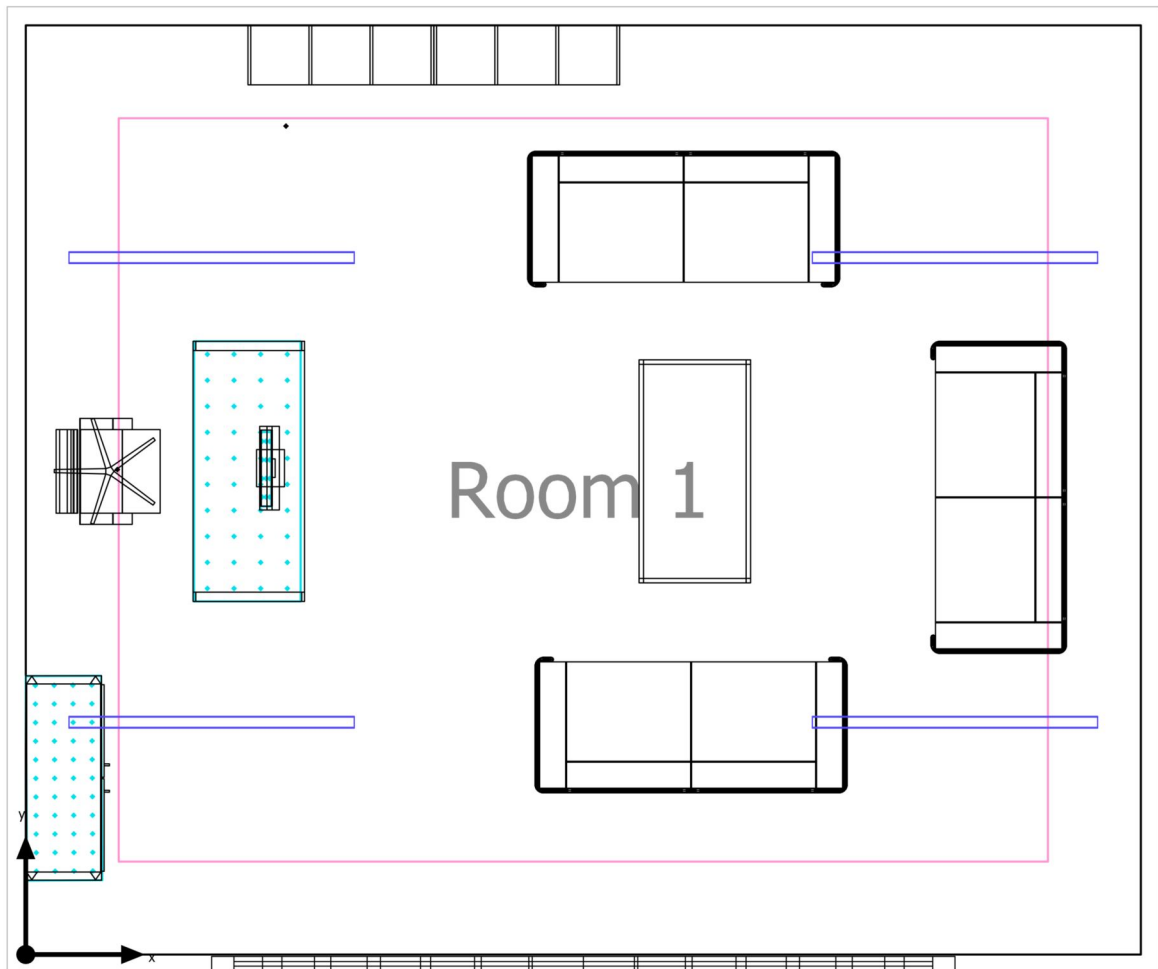


Daily schedule

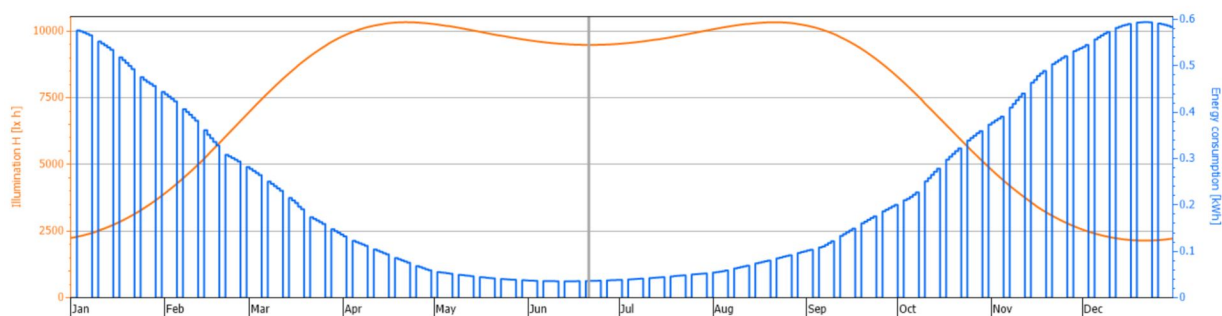
Point in time viewing: 09:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	758 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 12:00)

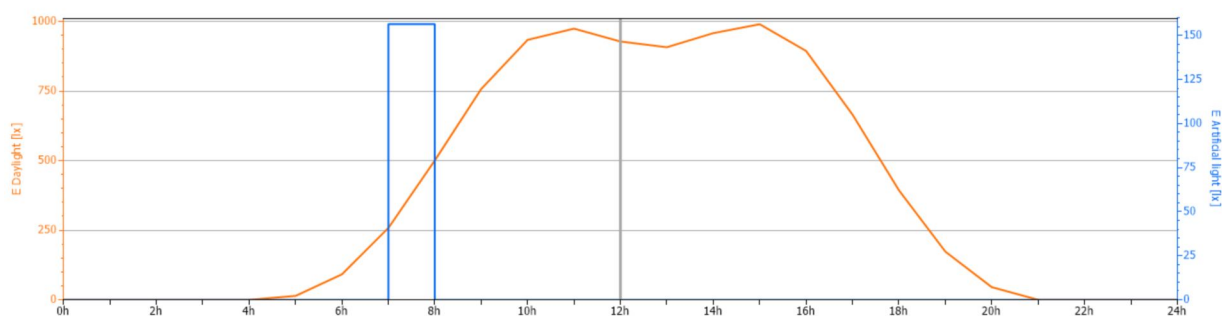
Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 12:00)

Annual energy consumption

Daily viewing: 6/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	1.02 kWh
Controlled	0.036 kWh	Costs	0.31 RIA
		CO ₂	0.41 kg

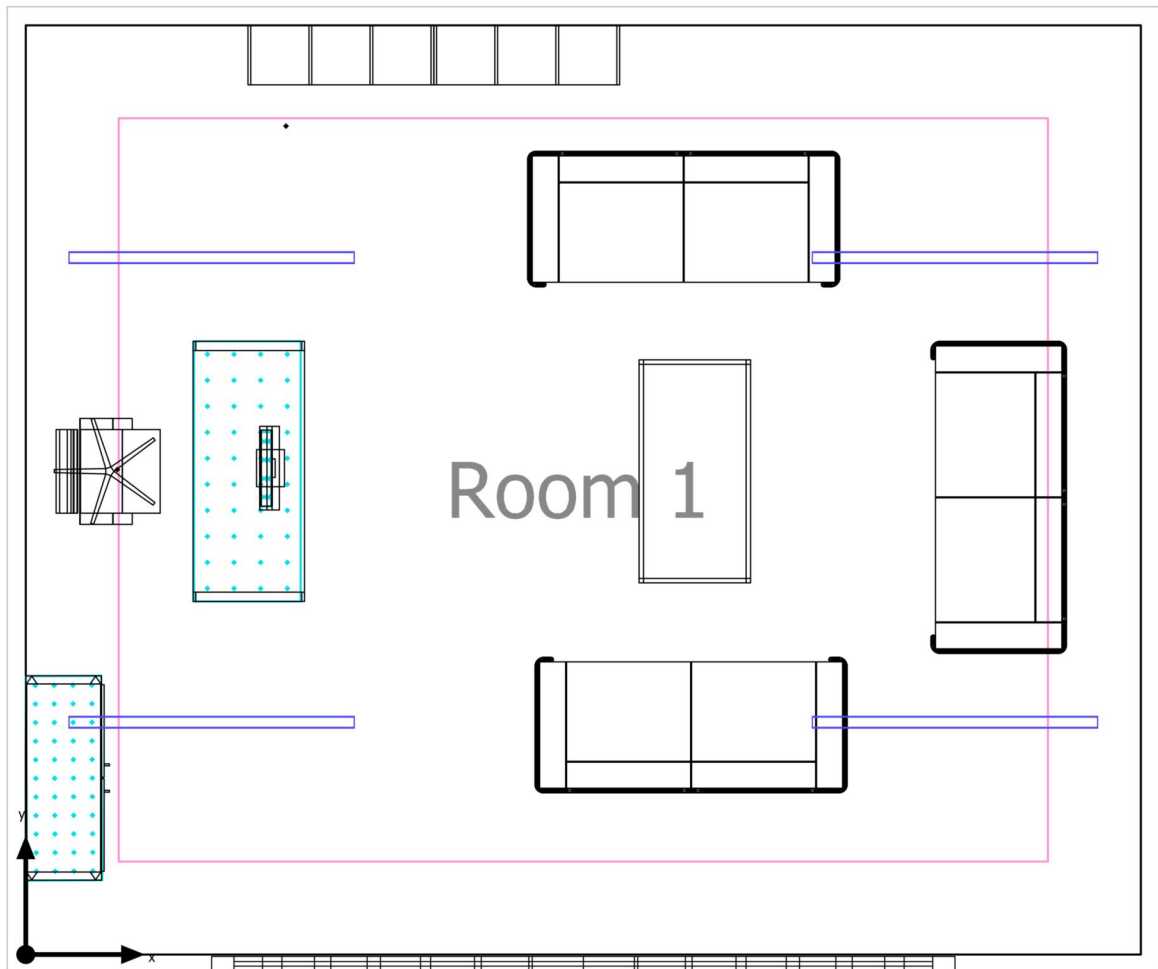


Daily schedule

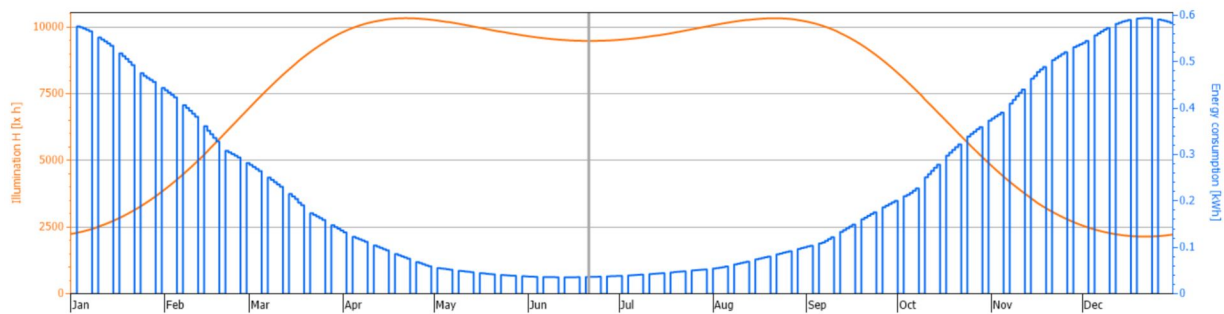
Point in time viewing: 12:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	928 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 15:00)

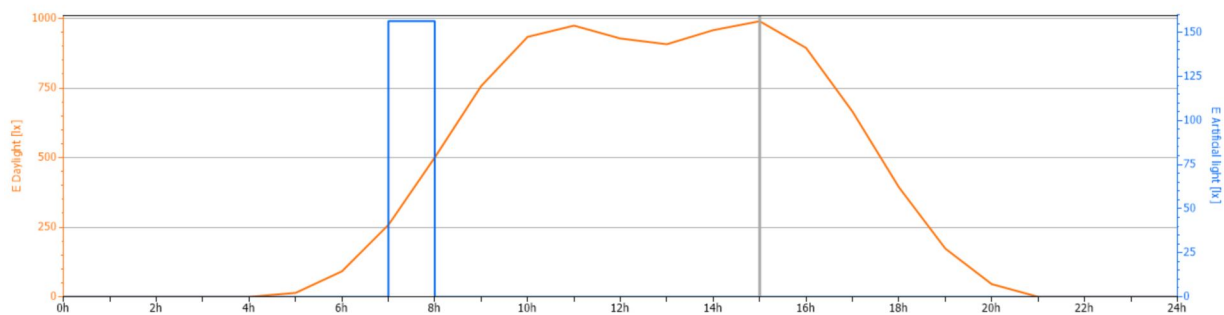
Building 1 · Storey 1 · Room 1

Energy evaluation day (6/21/2022 15:00)

Annual energy consumption

Daily viewing: 6/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	1.02 kWh
Controlled	0.036 kWh	Costs	0.31 RIA
		CO ₂	0.41 kg

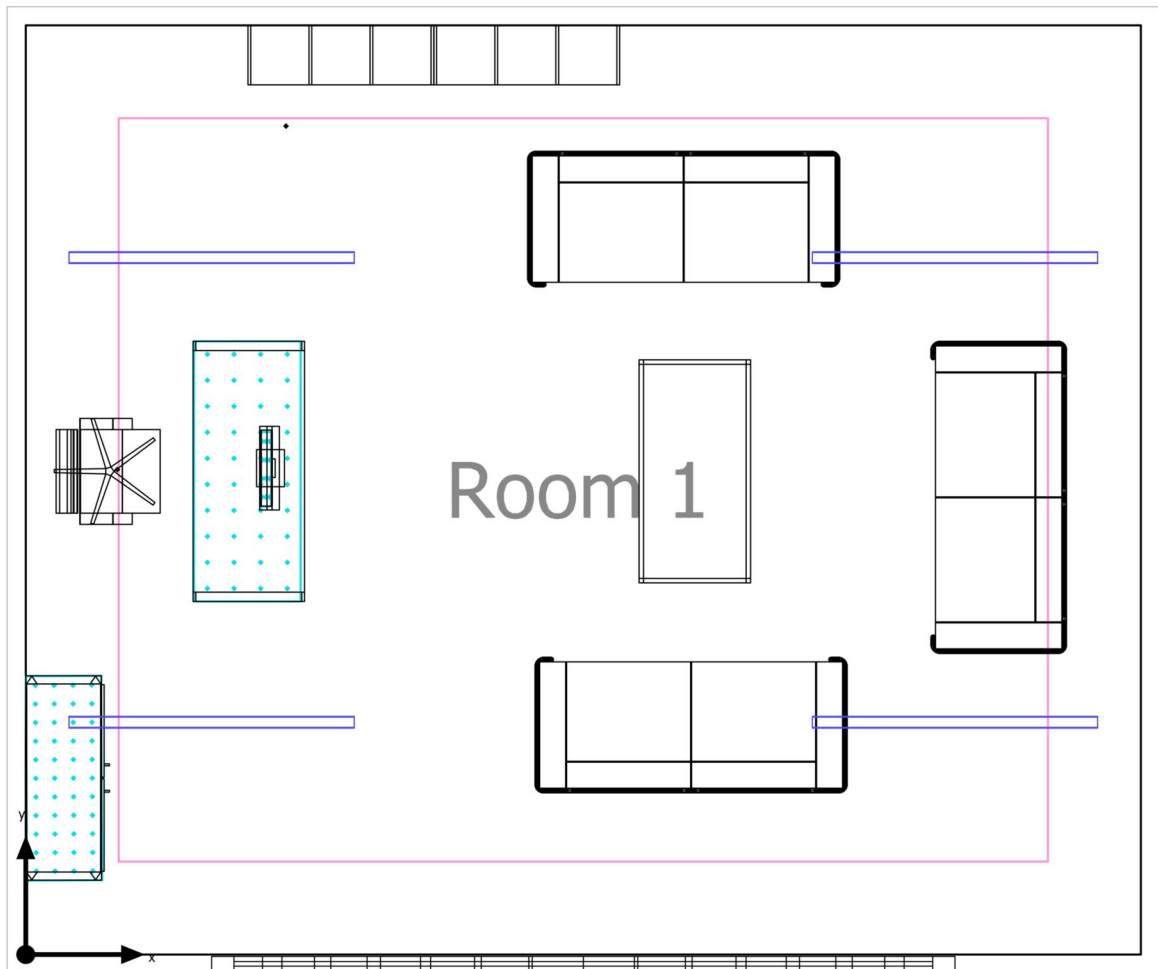


Daily schedule

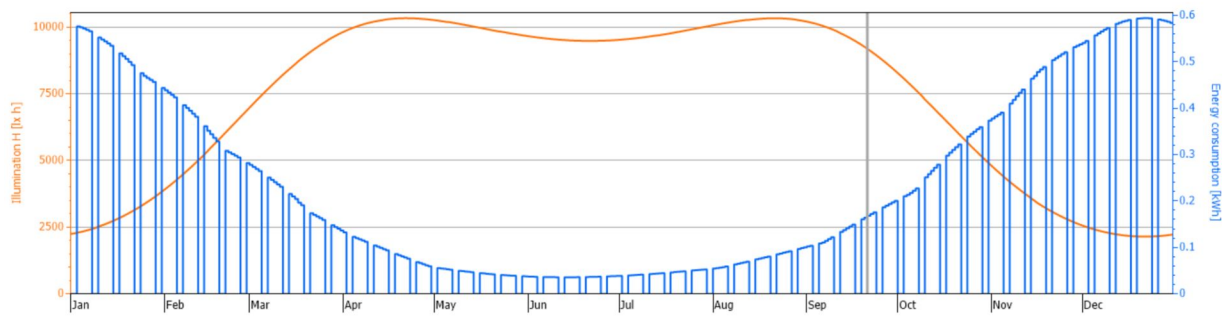
Point in time viewing: 15:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	990 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 09:00)

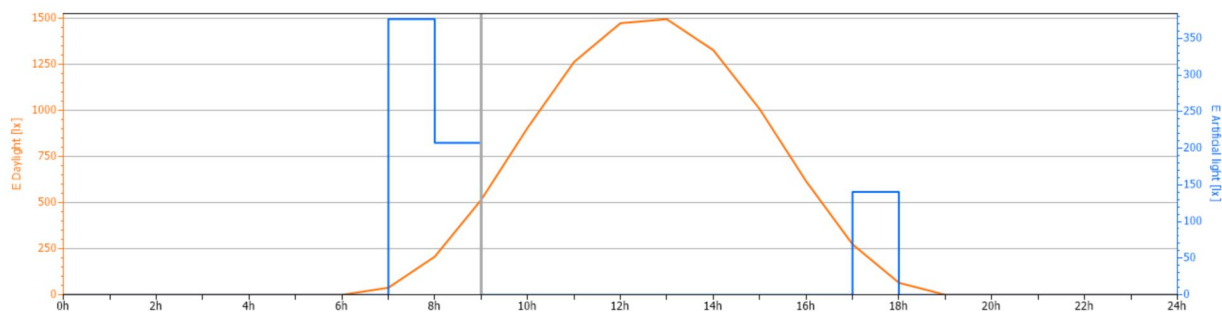
Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 09:00)

Annual energy consumption

Daily viewing: 9/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.89 kWh
Controlled	0.17 kWh	Costs	0.27 RIA
		CO ₂	0.36 kg

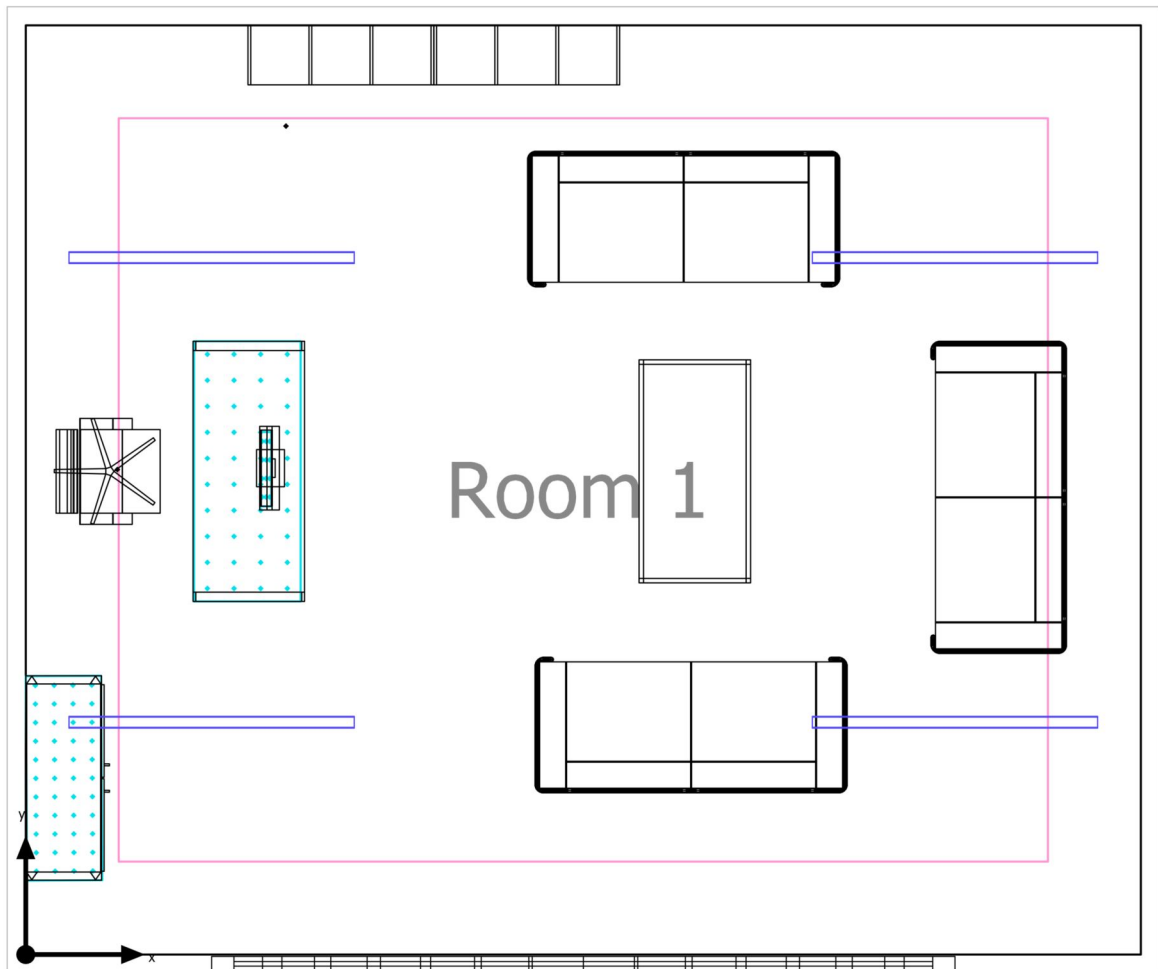


Daily schedule

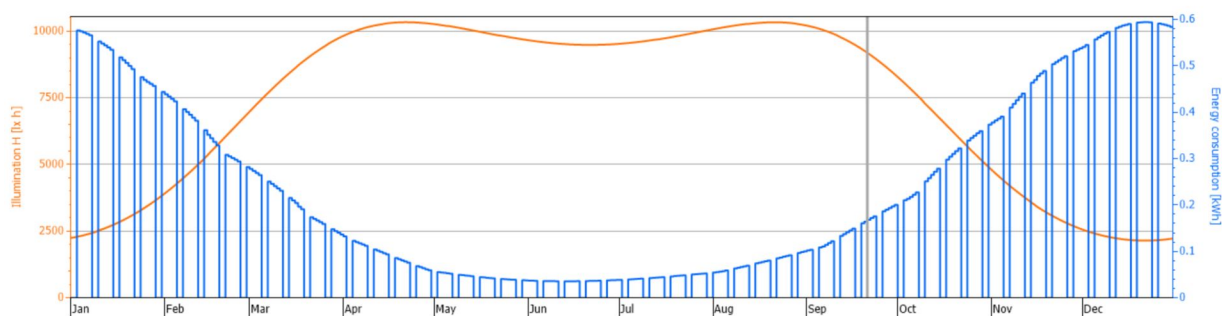
Point in time viewing: 09:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	515 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 12:00)

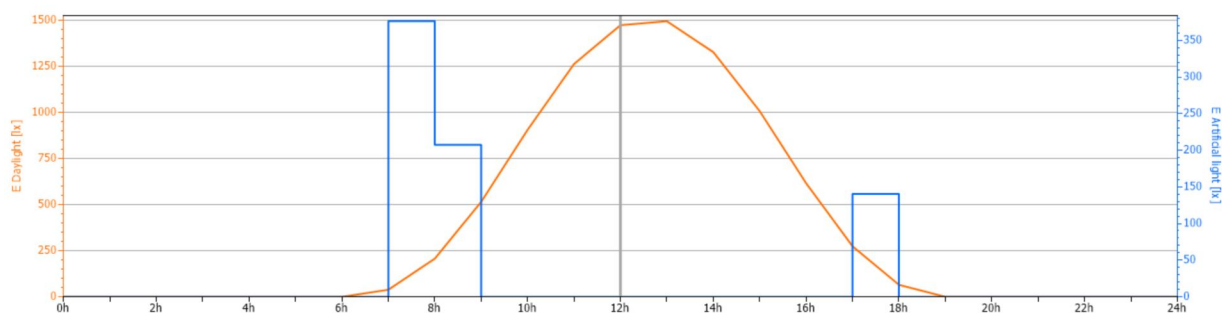
Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 12:00)

Annual energy consumption

Daily viewing: 9/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.89 kWh
Controlled	0.17 kWh	Costs	0.27 RIA
		CO ₂	0.36 kg

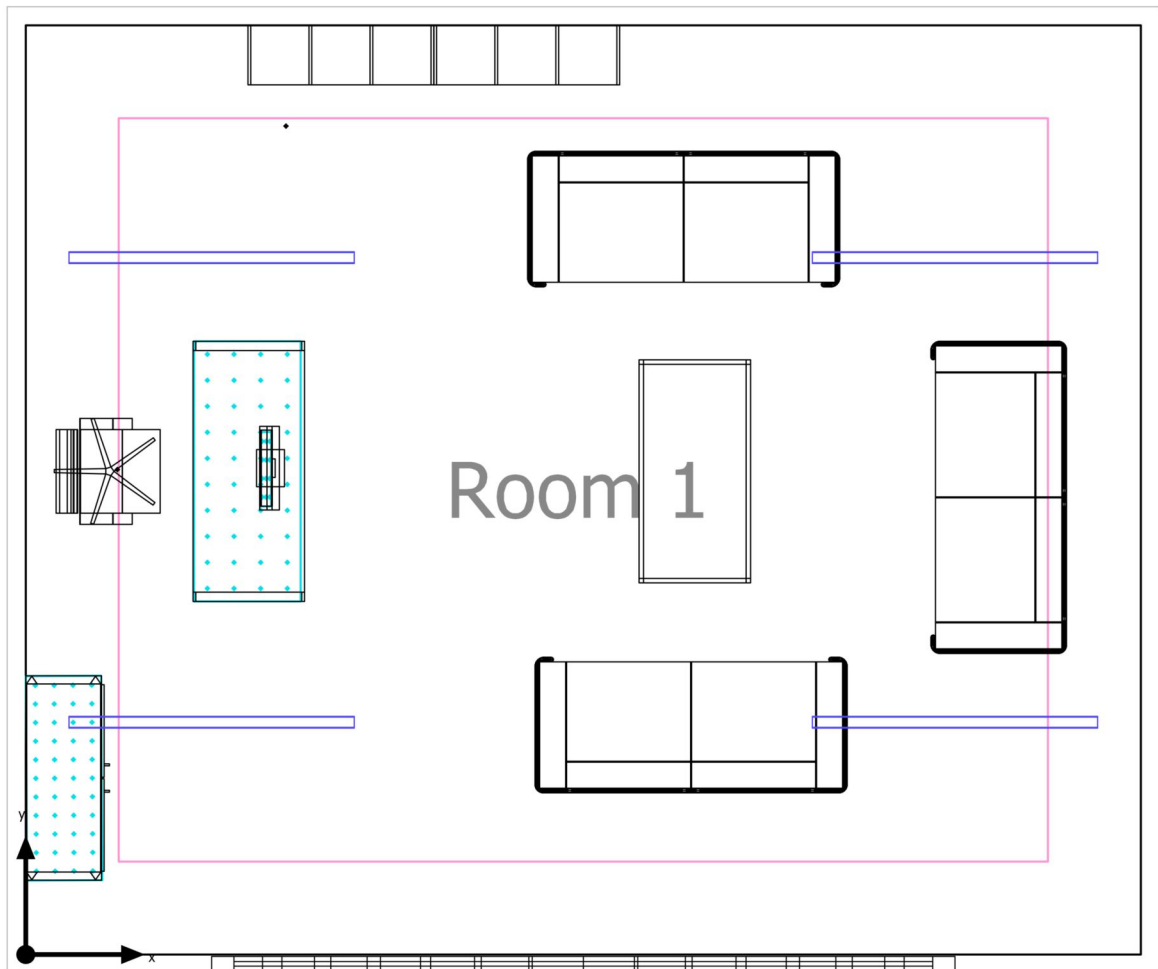


Daily schedule

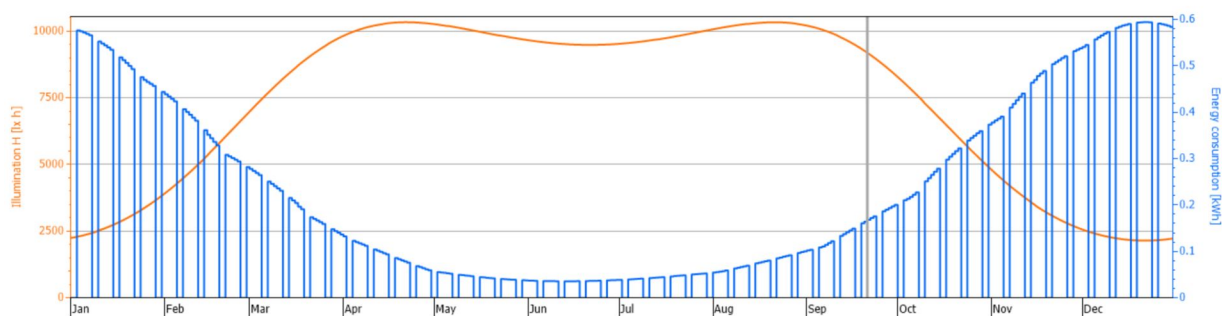
Point in time viewing: 12:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	1474 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 15:00)

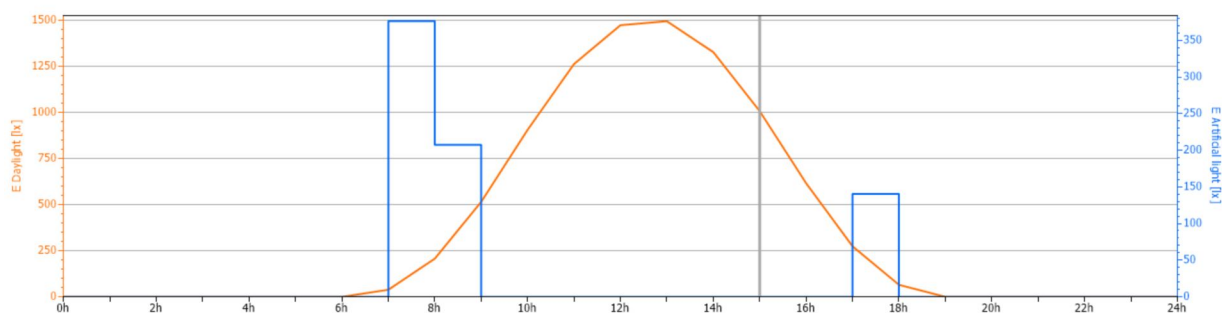
Building 1 · Storey 1 · Room 1

Energy evaluation day (9/21/2022 15:00)

Annual energy consumption

Daily viewing: 9/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.89 kWh
Controlled	0.17 kWh	Costs	0.27 RIA
		CO ₂	0.36 kg

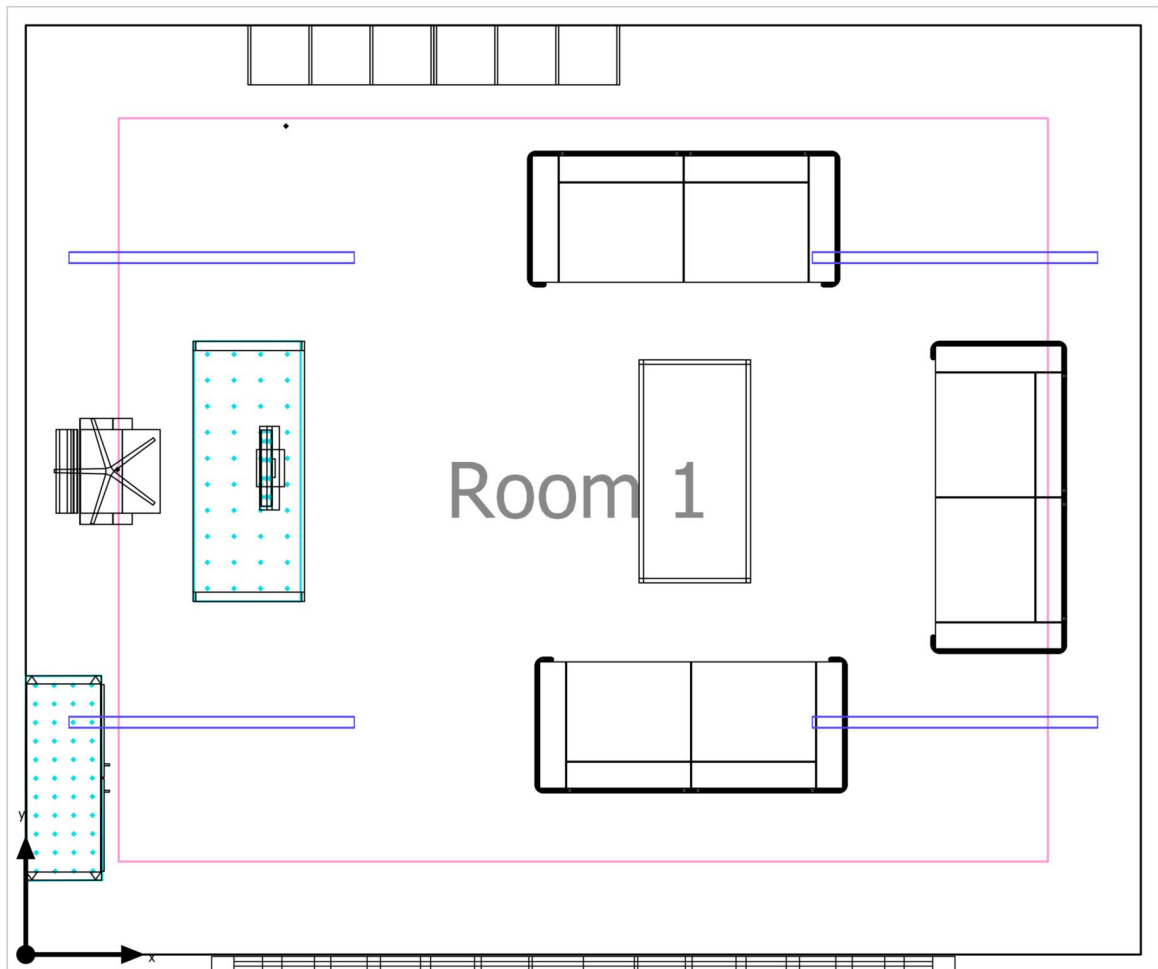


Daily schedule

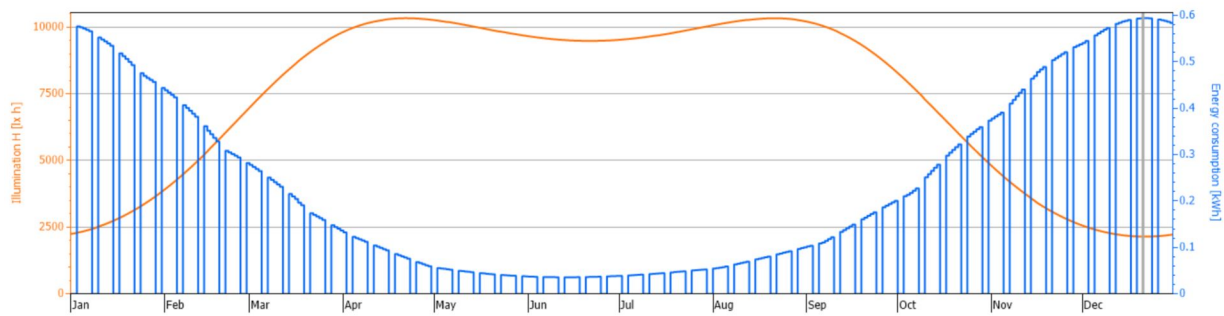
Point in time viewing: 15:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	1008 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 09:00)

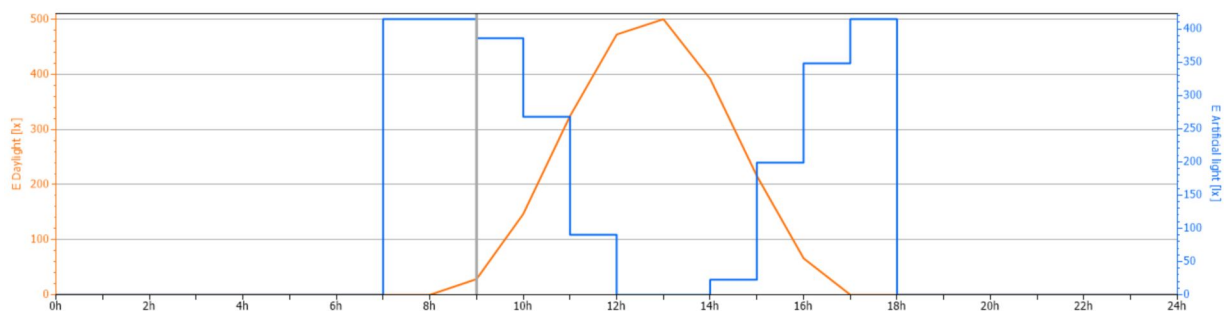
Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 09:00)

Annual energy consumption

Daily viewing: 12/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.47 kWh
Controlled	0.59 kWh	Costs	0.14 RIA
		CO ₂	0.19 kg

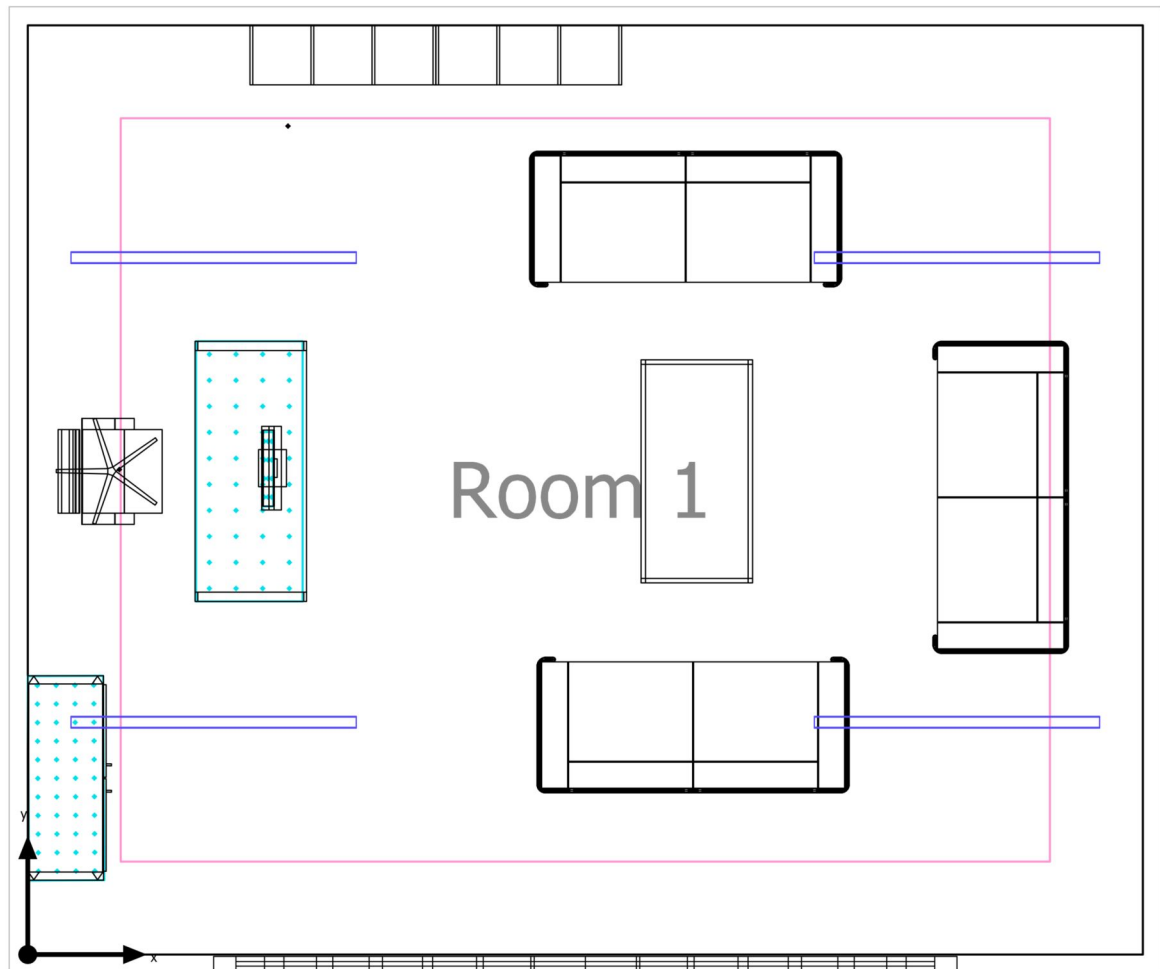


Daily schedule

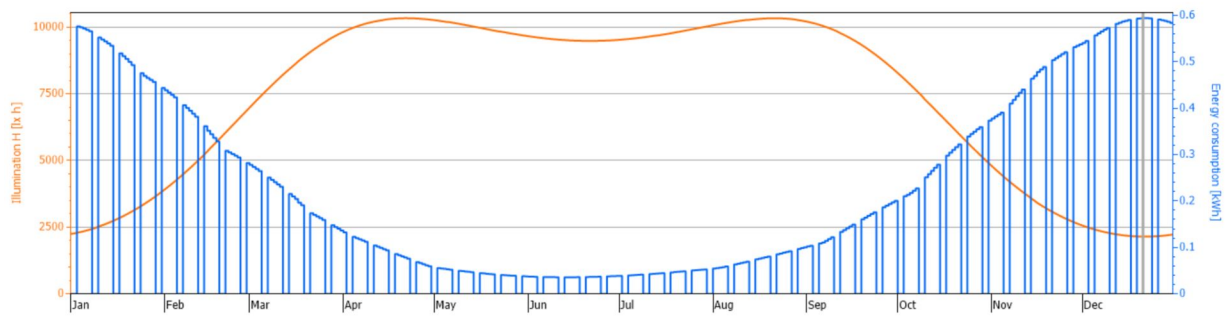
Point in time viewing: 09:00

Illuminance / Power consumption		Saving	
E Artificial light	386 lx	P	6.64 W
E Daylight	28.6 lx		
P	89.7 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 12:00)

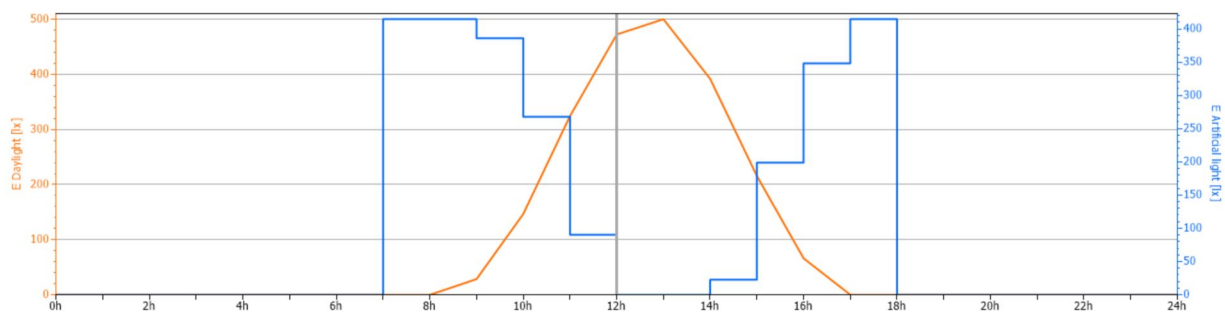
Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 12:00)

Annual energy consumption

Daily viewing: 12/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.47 kWh
Controlled	0.59 kWh	Costs	0.14 RIA
		CO ₂	0.19 kg

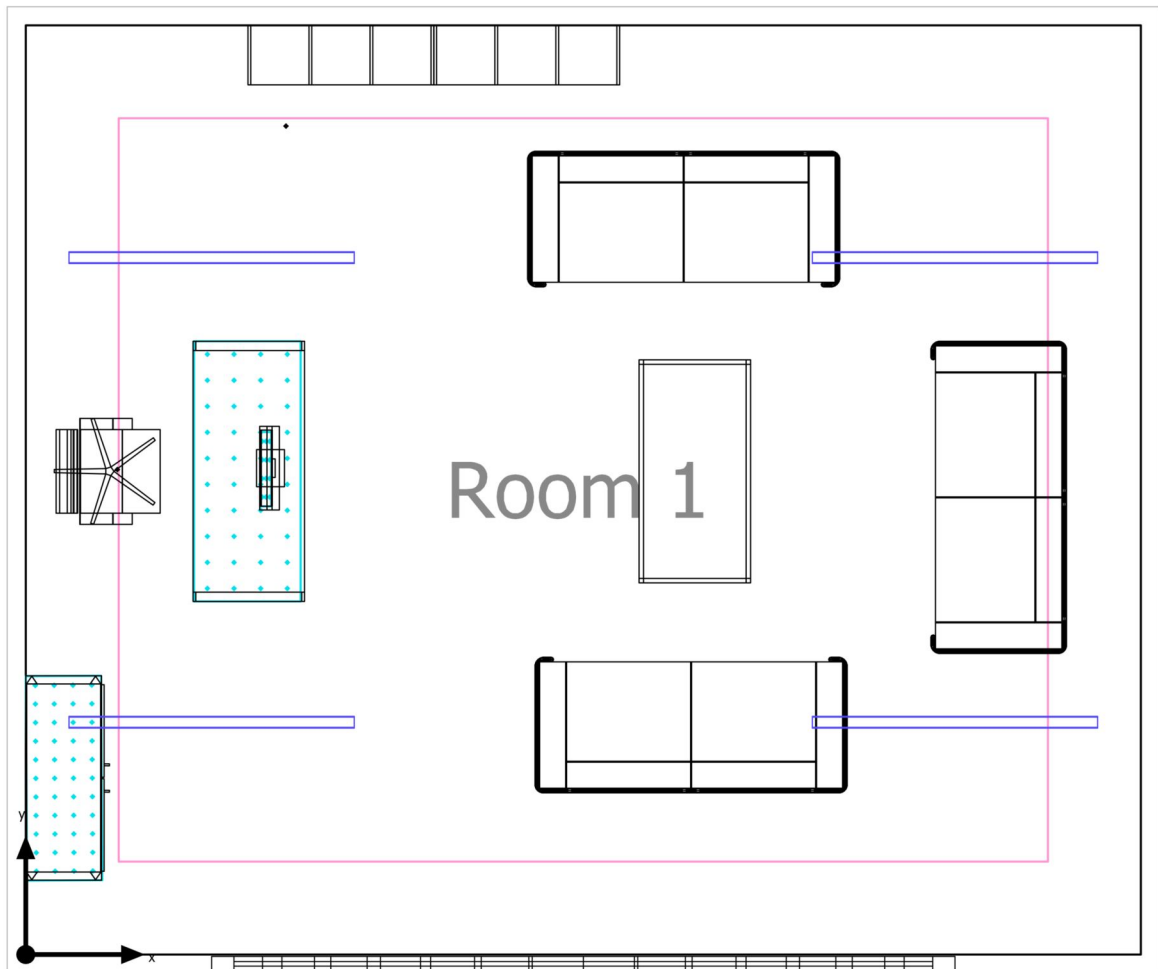


Daily schedule

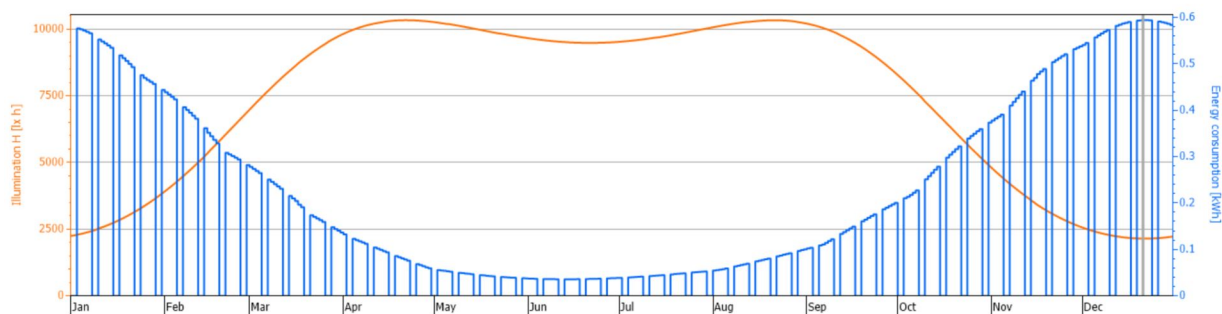
Point in time viewing: 12:00

Illuminance / Power consumption		Saving	
E Artificial light	0.00 lx	P	96.3 W
E Daylight	473 lx		
P	0.00 W	Shading	Open/None

Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 15:00)

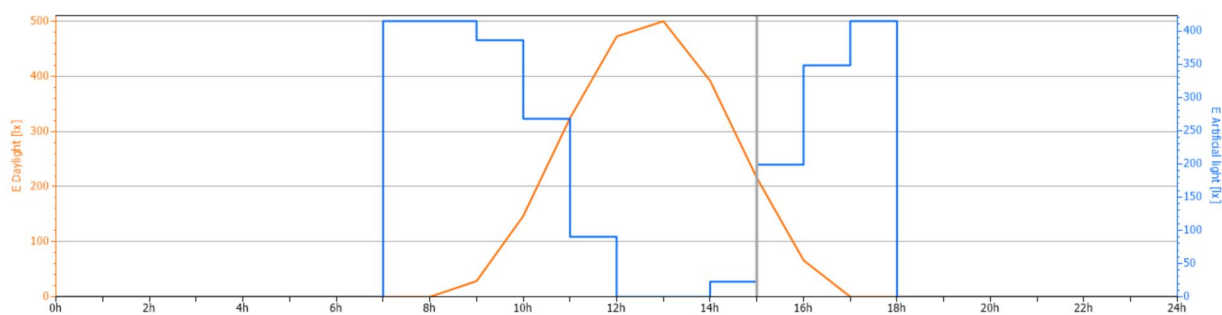
Building 1 · Storey 1 · Room 1

Energy evaluation day (12/21/2022 15:00)

Annual energy consumption

Daily viewing: 12/21/2022

Energy consumption		Saving	
Uncontrolled	1.06 kWh	Energy	0.47 kWh
Controlled	0.59 kWh	Costs	0.14 RIA
		CO ₂	0.19 kg



Daily schedule

Point in time viewing: 15:00

Illuminance / Power consumption		Saving	
E Artificial light	199 lx	P	50.1 W
E Daylight	216 lx		
P	46.2 W	Shading	Open/None

Glossary

A

A	Formula symbol for a surface in the geometry
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B

Background area	The background area borders the direct ambient area according to DIN EN 12464-1 and reaches up to the borders of the room. In larger rooms, the background area is at least 3 m wide. It is located horizontally at floor level.
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C

CCT	(Engl. correlated colour temperature) Body temperature of a thermal radiator which serves to describe its light colour. Unit: Kelvin [K]. The lesser the numerical value the redder; the greater the numerical value the bluer the light colour. The colour temperature of gas-discharge lamps and semi-conductors are termed "correlated colour temperature" in contrast to the colour temperature of thermal radiators. Allocation of the light colours to the colour temperature ranges acc. to EN 12464-1: Light colour - colour temperature [K] warm white (ww) < 3,300 K neutral white (nw) ≥ 3,300 – 5,300 K daylight white (dw) > 5,300 K
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Clearance height	The designation for the distance between upper edge of the floor and bottom edge of the ceiling (in the completely furnished status of room).
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Control group	A group of luminaires that are dimmed and controlled together. For each lighting scene, a control group provides its own dimming value. All luminaires within a control group share this dimming value. The control groups with their luminaires are automatically determined by DIALux on the basis of the created light scenes and their luminaire groups.
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CRI	(Engl. colour rendering index) Designation for the colour rendering index of a luminaire or a lamp acc. to DIN 6169: 1976 or CIE 13.3: 1995. The general colour rendering index Ra (or CRI) is a dimensionless figure that describes the quality of a white light source in regards to its similarity with the remission spectra of defined 8 test colours (see DIN 6169 or CIE 1974) to a reference light source.
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Glossary

D

Daylight autonomy	Describes what percentage of the daily working time the required illuminance is met by daylight. The nominal illuminance is used from the room profile, unlike described in EN 17037. The calculation is not done in the centre of the room but at the placed sensor measuring point. A room is considered sufficiently supplied with daylight if it achieves at least 50% daylight autonomy.
Daylight factor	Ratio of the illuminance achieved solely by daylight incidence at a point in the inside to the horizontal illuminance in the outer area under an unobstructed sky. Formula symbol: D (Engl. daylight factor) Unit: %
Daylight quotient effective area	A calculation surface within which the daylight quotient is calculated.

E

Energy evaluation	Based on an hourly calculation procedure for daylight in indoor spaces, considering the project geometry and any existing daylight control systems. Orientation and location of the project are also considered. The calculation uses the specified system power of the luminaires to determine the energy demand. A linear relationship between power and luminous flux in the dimmed state is assumed for daylight-controlled luminaires. Times of use and nominal illuminance are determined from the usage profiles of the spaces. Switched-on luminaires that are explicitly excluded from control also consider the specified times-of-use. The daylight control systems use a simplified control logic that closes them at an outdoor horizontal illuminance of 27,500lx. The calendar year 2022 is used as a reference only. It is not a simulation of this year. The reference year is only used to assign the days of the week to the calculated results. The changeover to summer time is not considered. The reference sky type used is the average sky described in CIE 110 without direct sunlight. The method was developed together with the Fraunhofer Institute for Building Physics and is available for review by the Joint Working Group 1 ISO TC 274 as an extension of the previous annual regression-based method.
Eta (η)	(light output ratio) The light output ratio describes what percentage of the luminous flux of a free radiating lamp (or LED module) is emitted by the luminaire when installed. Unit: %

Glossary

G

g_1	Often also U_o (Engl. overall uniformity) Designates the overall uniformity of the illuminance on a surface. It is the quotient from E_{min} to $\bar{E}$ and is required, for instance, in standards for illumination of workstations.
g_2	Actually it designates the "non-uniformity" of the illuminance on a surface. It is the quotient of E_{min} to E_{max} and is generally only relevant for certifying the emergency lighting acc. to EN 1838.

I

Illuminance	Describes the ratio of the luminous flux that strikes a certain surface to the size of this surface ($lm/m^2 = lx$). The illuminance is not tied to an object surface. It can be determined anywhere in space (inside or outside). The illuminance is not a product feature because it is a recipient value. Luxometers are used for measuring. Unit: Lux Abbreviation: lx Formula symbol: E
Illuminance, adaptive	For the determining of the middle adaptive illuminance on a surface, this is rastered "adaptively". In the area of large illuminance differences within the surface, the raster is subdivided finer; within lesser differences, a rougher classification is made.
Illuminance, horizontal	Illuminance that is calculated or measured on a horizontal (level) surface (this can be for example a table top or the floor). The horizontal illuminance is usually identified by the formula letter E_h .
Illuminance, perpendicular	Illuminance that is calculated or measured plumb-vertical to a surface. This needs to be taken into account for tilted surfaces. If the surface is horizontal or vertical, then there is no difference between the perpendicular and the horizontal or vertical illuminance.
Illuminance, vertical	Illuminance that is calculated or measured on a vertical surface (this can be for example the front of some shelves). The vertical illuminance is usually identified by the formula letter E_v .

L

LENI	(Engl. lighting energy numeric indicator) Lighting energy numeric indicator acc. to EN 15193 Unit: $kWh/(m^2 \cdot a)$
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Glossary

LLMF	(Engl. lamp lumen maintenance factor)/acc. to CIE 97: 2005 Lamp flux maintenance factor that takes the luminous flux reduction into account of a luminaire or an LED module in the course of the operating time. The lamp flux maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no luminous flux reduction existing).
LMF	(Engl. luminaire maintenance factor)/acc. to CIE 97: 2005 Luminaire maintenance factor that takes the soiling into account of the luminaire in the course of the operating time. The luminaire maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).
LSF	(Engl. lamp survival factor)/acc. to CIE 97: 2005 Lamp survival factor that takes the total failure into account of a luminaire in the course of the operating time. The lamp survival factor is specified as a decimal digit and can have a maximum value of 1 (no failures existing within the time concerned or prompt replacement after the failure).
Luminance	Dimension for the "brightness impression" that the human eye has of a surface. The surface itself can emit light thereby or light striking it can be reflected (emitter value). It is the only photometric value that the human eye can perceive. Unit: Candela per square metre Abbreviation: cd/m² Formula symbol: L
Luminous efficacy	Ratio of the emitted luminous flux Φ [lm] to the absorbed electrical power P [W] Unit: lm/W. This ratio can be formed for the lamp or LED module (lamp or module light output), the lamp or module with control gear (system light output) and the complete luminaire (luminaire light output).
Luminous flux	Dimension for the total light output that is emitted from one light source in all directions. It is thus an "emitter value" that specifies the entire emitting output. The luminous flux of a light source can only be determined in a laboratory. A difference is made between the lamp or LED module luminous flux and the luminaire luminous flux. Unit: Lumen Abbreviation: lm Formula symbol: Φ
Luminous intensity	Describes the intensity of the light in a certain direction (emitter value). The luminous intensity is a matter of the luminous flux Φ that is emitted in a certain spherical angle Ω. The radiation characteristics of a light source are presented graphically in a light distribution curve (LDC). The luminous intensity is an SI base unit. Unit: Candela Abbreviation: cd Formula symbol: I

Glossary

M

Maintenance factor	See MF
MF	(Engl. maintenance factor)/acc. to CIE 97: 2005 Maintenance factor as decimal number between 0 and 1 that describes the ratio of the new value of a photometric planning parameter (e.g. of the illuminance) to a maintenance value after a certain time. The maintenance factor takes into account the soiling of luminaires and rooms as well as the luminous flux reduction and the failure of light sources. The maintenance factor is taken into account either overall or determined in detail acc. to CIE 97: 2005 by the formula $RMF \times LMF \times LLMF \times LSF$.

P

P	(Engl. power) Electric power consumption Unit: watt Abbreviation: W
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R

$R_{(UG)} \max$	Measure of the psychological glare in indoor spaces. In addition to the luminance of luminaires, the level of the $R_{(UG)}$ value also depends on the observer position, the viewing direction and the ambient luminance. The calculation is made according to the table method, see CIE 117. Among other things, EN 12464-1:2021 specifies maximum permissible $R_{(UG)}$- values $R_{(UGL)}$ for various indoor workplaces.
Reflection factor	The reflection factor of a surface describes how much of the striking light is reflected back. The reflection factor is defined by the colour of the surface.
RMF	(Engl. room maintenance factor)/acc. to CIE 97: 2005 Room maintenance factor that takes the soiling into account of the space encompassing surfaces in the course of the operating time. The room maintenance factor is specified as a decimal digit and can have a maximum value of 1 (no soiling existing).

S

Surrounding area	The ambient area directly borders the area of the visual task and should be planned with a width of at least 0.5 m according to DIN EN 12464-1. It is at the same height as the area of the visual task.
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Glossary

U

UGR (max)	(unified glare rating) Measure for the psychological glare effect in interiors. In addition to luminaire luminance, the UGR value also depends on the position of the observer, the viewing direction and the ambient luminance. Among other things, EN 12464-1 specifies maximum permissible UGR values for various indoor workplaces.
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UGR observer	Calculation point in the room, for the DIALux the UGR value is determined. The location and height of the calculation point should correspond to the typical observer position (position and eye level of the user).
--------------	--

V

Visual task area	The area that is needed for carrying out the visual task in accordance with DIN EN 12464 -1. The height corresponds with the height at which the visual task is executed.
------------------	---

W

Wall zone	Circumferential area between working plane and walls which is not taken into account for the calculation.
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Working plane	Virtual measuring or calculation surface at the height of the visual task that generally follows the room geometry. The working plane may also feature a wall zone.
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