Adjust the illumination level to actual requirements

How can you optimise a room's lighting – and at the same time save at least 30 per cent on electricity costs? Here are some suggestions and tips to shed some light on the matter.

Action

Adjust the light level to the room's utilisation. Install presence and motion sensors where applicable.

Requirement

Only dimmable lighting systems can be adjusted to the specific use of the room. Other ways of lowering consumption, such as switching off individual light fixtures, are in most cases a poor compromise.

Needs-based lighting adapted to usage will cut electricity costs by at least 30 per cent.

What to do

1. Determine the illumination level (setpoint value as per SN EN 12464-1)
Use the table to determine the right illumination level for the room.

2. Determine the electrical power (setpoint)
Using the SIA table, determine the recommended (maximum) electrical output (W/m^2) for the room.

3. Measure the current illumination level (actual value)
Measure the actual illumination level (lux) in the room. You need a lux meter to do this.

4. Calculate the current electrical power (actual value)
Based on the existing lighting (light fixtures, light sources), calculate the installed electrical power per square metre.

5. Compare the actual values to the setpoint values
If there is a discrepancy between the actual values and the setpoint values, adjust the lighting.

Costs – effort

Work involved: approx. 1 hour per room

Material costs:

- Lux meter, approx. CHF 100
- Motion sensor, approx. CHF 50 to CHF 100
- Presence sensor, approx. CHF 100 to CHF 150

Please note!

- If you replaced an old lighting system (e.g. FL tubes) with a new system (LED), a 1:1 replacement may result in the room being overlit because the luminous efficacy of LEDs is greater.
- Retrofittable light sources with integrated presence and daylight sensors are available; depending on the preset, these can dim the light or turn it off entirely.

Additional explanations

Determine the specific power

You can determine the currently installed electrical power per square metre (W/m²) as follows:

1. Calculate the total power of the lighting

- Count the light fixtures in the room.
- Determine the electrical power per light fixture. This includes the light sources (bulbs, etc.) and control devices.
- You can now calculate the total power of the lighting. Example: Six light fixtures, each with two 36W FL tubes = 432W
  Plus six 12W control devices = 504 W

2. Determine the room's area

Example: 8m (length) x 6m (width) = 48m²

3. Calculate the specific power (W/m²)

Example: 504 W/48m² = 10,5 W/m²

Assess the situation

A: The room is overlit.

The illumination level (lux) is currently too high.

- Dim the lights. If this is not possible, check whether other light sources can be used. However, this usually also changes the light distribution.

B: The room is underlit.

The illumination level (lux) is currently too low.

- Use more efficient light sources (e.g. LED instead of FL tubes). However, this usually also changes the light distribution. Consider adding to or replacing the lighting system.

C: The room is lit inefficiently.

The illumination level is correct but the specific power of the lighting (W/m²) is too high.

- Consider switching to a more efficient light source or replacing the light fixtures.
- Optimise the lighting control by using presence, motion or daylight sensors to ensure that the lighting operates only when people are present or when insufficient natural light is available.

Assessment

Standard SIA 387/4:2023: Electricity demand for lighting provides the basic principles for assessing the specific power consumption. This standard contains the maximum permitted specific power (in W/m²) and the value for an optimised lighting system.

Room usage	Illumination level, lux	Specific power, W/m²	Full-load hours, h/a
Reception	300	3,3–5,1	3150–4100
Individual/shared office	500	6,2–9,7	350–1400
Open-plan office	500	4,9–7,6	1100–1950
Classroom	500	5,5–8,6	400–1300
Lecture hall	500	4,9–7,6	850–1700
Gymnasium, sports hall	200–300	5,6–8,8	1100–2250
Locker room	200	2,8–4,4	150–850
Sales area	300	7,5–11,6	4000
Patient room	100	3,4–5,3	800–1550
Hospital ward	300	6,2–9,7	4550–5750
Laboratory	500	6,4–9,9	400–1350
Kitchen	500	6,2–9,7	1700–2500
Restaurant	not specified	2,9–4,6	1600–2650
Canteen	200	2,6–4,1	900–1500
Circulation area	100	1,8–2,7	250–1400
Staircase	100	1,8–2,7	250–1400
Carpark (not public)	75	0,6–0,7	480–1600
Warehouse/storage area	200–300	2,9–3,9	2000–4000

The full-load hours listed in the table can be taken as the basis for assessing the period for which the lighting is turned on.

Additional information

- Standard SIA 387/4: 2023, Electricity in buildings – Lighting: Calculation and requirements
- SN EN 12464-1 Light and lighting – Lighting of work places – Part 1: Indoor work places
- Technical book (de): Licht im Haus – Energieeffiziente Beleuchtung, www.faktor.ch
- Efficient lighting for small businesses

SwissEnergy
Federal Office of Energy (SFOE)
Pulverstrasse 13
CH-3063 Ittigen
Postal address: CH-3003 Bern

Infoline 0848 444 444
infoline.energieschweiz.ch
energieschweiz.ch
energieschweiz@bfe.admin.ch
twitter.com/energieschweiz

11.2021