

A study by the Fraunhofer-Institut für Bauphysik IBP on behalf of the EnBW Energie Baden-Württemberg AG

Target of the study:

Determination of the ecological balance of the GLT TUBE in order to be able to use it in the overall economic efficiency calculation and implementation concepts of EnBW.
Analysis of comparable competitive products.



Result of the study / ecological balance:

- > Including the environmental impacts, the production and the end-of-life of the GLT TUBE 150, **the benefits in the impact category EF3.0 Climate Change** are already achieved within
 - 15 days compared to fluorescent tubes
 - 101 days compared to a similar LED-tube.
- > **Energy-efficient systems** are crucial for a successful energy transition. Even with an increase in the share of renewable energies in the German electricity mix, a changeover to the energy-efficient GLT TUBE is therefore worthwhile.
- > The **resource efficiency** of a product will be of decisive importance for its benefits in the future. This includes **durability and the reuse** of as many components as possible.



EnBW selects the GLT TUBE

Due to the outstanding economic and ecological balance of the GLT TUBE compared to the competition including a reusable system for all GLT TUBES and due to the **results of the Fraunhofer IBP**, EnBW has decided to replace fluorescent tubes for all areas of the company **with GLT TUBES.**

Comparison of the GLT TUBE 150 with 23 W-LED tubes and 58 W-flourescent tubes

Energy requirements of the different light sources

LED tubes:

- GLT TUBE 150 16,8 W
- LED tubes 150 23,0 W

Flourescent tubes:

- Flourescent tubes 150 58,0 W

	GLT TUBE 150	LED tubes	flourescent tubes
Energy requirements (W)	16,8	23,0	58,0
Lifetime(h)*	50.000	50.000	50.000
Production and EoL (kg CO ₂ eq.)	7,68	?**	?**

Note: *Observation period for comparison (lifetime of the GLT TUBE is actually > 100,000 h).
 **The CO₂ eq.-emissions during production and end of life of the 23 W and 58 W-luminaires are not known.

Comparison sustainability total GLT TUBE 150 to 23 W-LED tubes and 58 W-flourescent tubes

Assumption

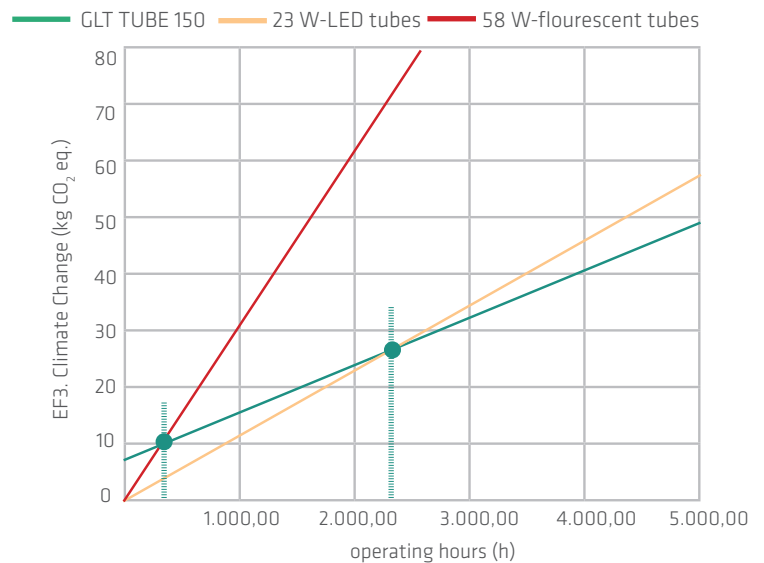
German (DE) electricity-mix

Climate change, total

GLT TUBE 434 kg CO₂ eq.
 23 W-LED tubes 584 kg CO₂ eq.
 58 W-flourescent tubes 1.473 kg CO₂ eq.

Break even after

23 W-LED tubes 2.439 operating hours
 (101,6 days)
 58 W-flourescent tubes 367 operating hours
 (15,3 days)



Result:

The benefit of the GLT TUBE is already achieved after 15 days compared to flourescent tubes and after 101 days compared to competitive LED tubes despite consideration of Co₂ eq. during production and end of life.

Influence of electricity supply according to the German (DE) electricity mix

Assumption

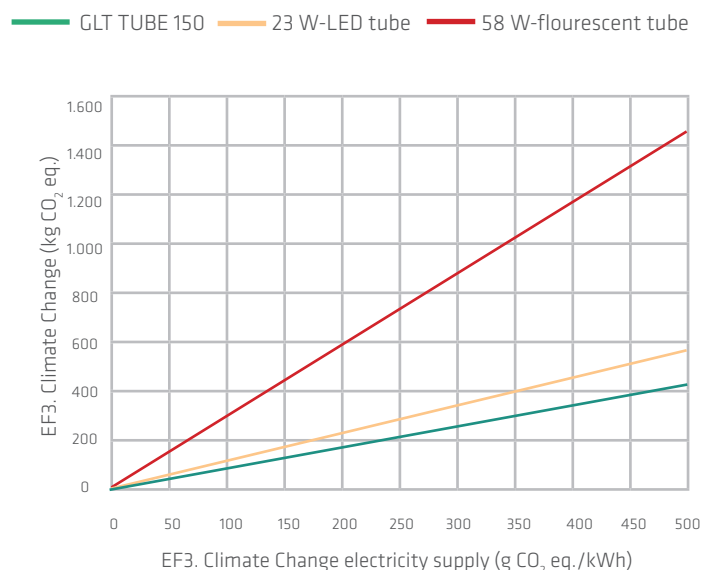
lifetime 50.000 h

Climate change, total

nuclear energy 4 g CO₂ eq./kWh
 water energy 6 g CO₂ eq./kWh
 wind energy 10 g CO₂ eq./kWh
 photovoltaik 69 g CO₂ eq./kWh
 gas 490 g CO₂ eq./kWh
 lignite coal 1.100 g CO₂ eq./kWh

Break even after

23 W-LED tube 25 g CO₂ eq./kWh
 58 W-flourescent tube 4 g CO₂ eq./kWh



Result:

The lower the kg CO₂ eq. during production and end of life, the faster the GLT TUBE compares favourably with other luminaires!