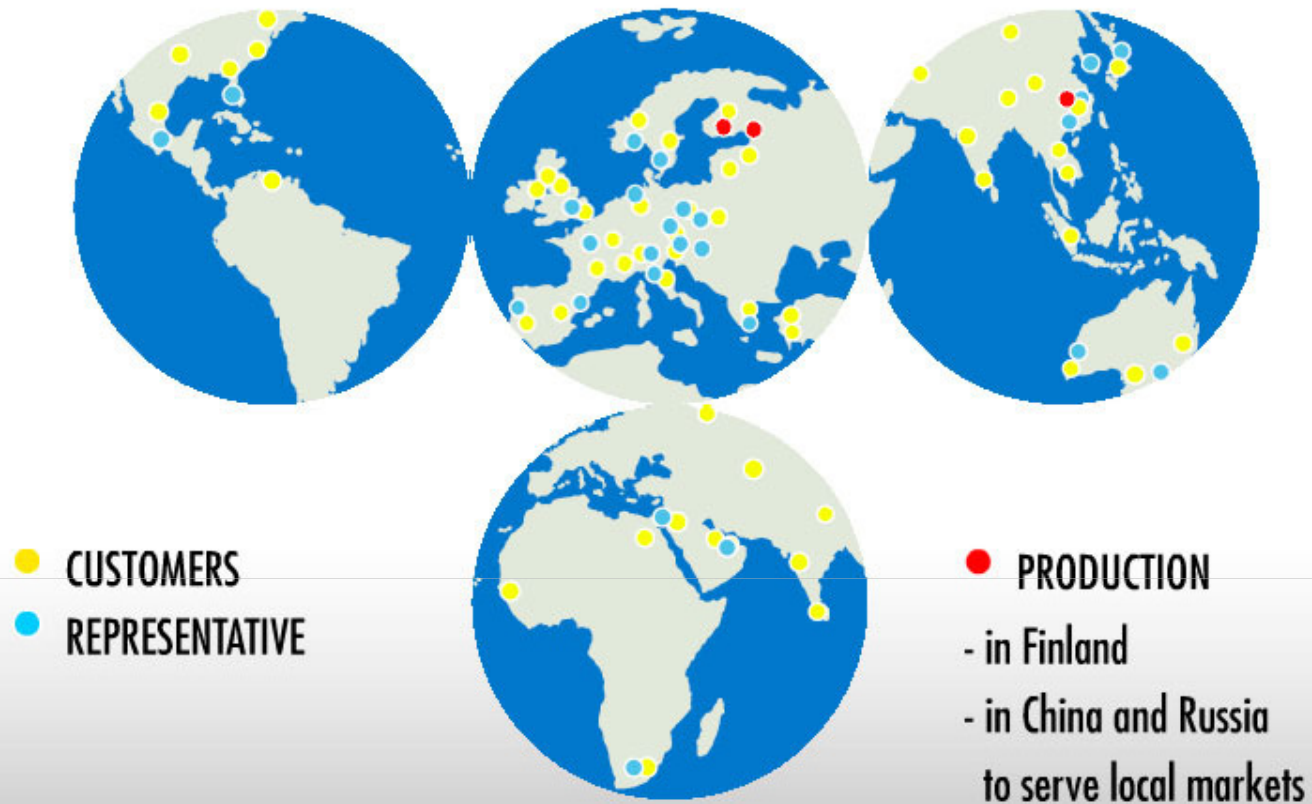




Emergency lighting technology



Teknoware is located in Lahti, a city in Finland, the land of the thousand lakes.



Worldwide activities.

MANUFACTURING
TECHNOLOGY

Electronics factory

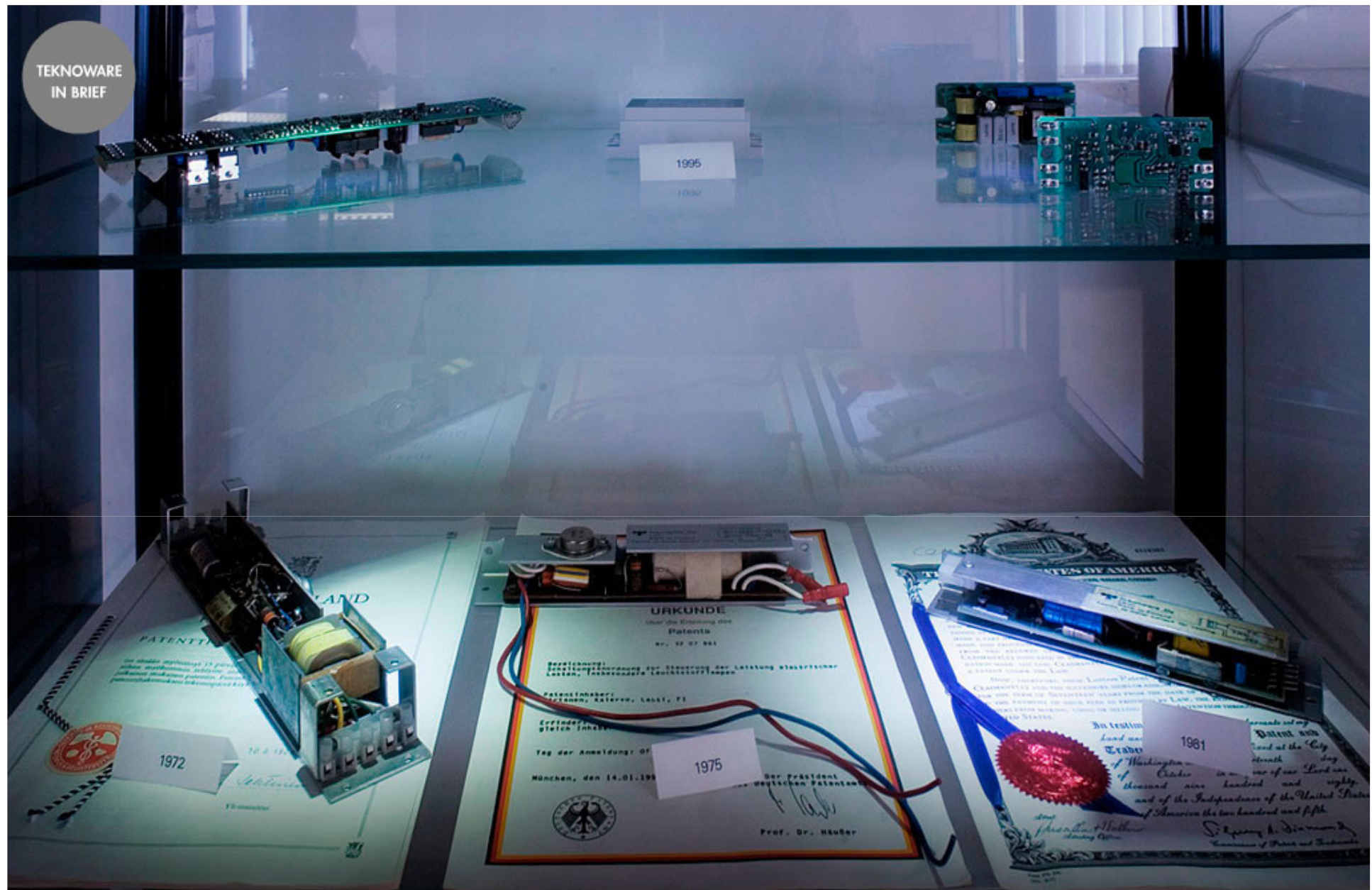
Electronics factory

Lighting factory

Teknoware's production facilities.

L I G H T I N G T E C H N O L O G Y

TEKNOWARE
IN BRIEF



Our core competence lies on over 35 years of experience and over 15 million manufactured inverters.

L I G H T I N G T E C H N O L O G Y

TEKNOWARE
IN BRIEF



We are a global provider of interior lighting systems for vehicles.

L I G H T I N G T E C H N O L O G Y



TEKNOWARE
IN BRIEF



We also specialize in emergency lighting systems for...

TEKNOWARE
IN BRIEF

...public premises...

TEKNOWARE
IN BRIEF



...passenger ships and luxury cruise liners.

L I G H T I N G T E C H N O L O G Y



Emergency lighting technology

- **Standards and certifications**
 - All main Teknoware emergency lighting product types are tested and certified by SGS Fimko.
 - In the certification tests there are European standards used:
 - EN 60598-2-22
 - Luminaires -- Part 2-22: Particular requirements - Luminaires for emergency lighting
 - EN 50171
 - Central power supply systems



Emergency lighting technology

- **European standards**
 - **Aim for harmonization in all European Union countries**
 - **Aim for free movement of goods – no national exceptions**
 - **For emergency lighting equipment apply the following product standards:**
 - **Luminaires: EN 60598-2-22**
 - **Central battery systems: EN 50171**



Emergency lighting technology

- **EN 60598-2-22**
 - **Luminaires -- Part 2-22: Particular requirements - Luminaires for emergency lighting**
 - In Germany:
DIN EN 60598-2-22 (VDE 0711-2-22):2003-06
 - In UK:
BS EN 60598-2-22:1999



Emergency lighting technology

- **EN 50171**
 - **Central power supply systems**
 - In Germany:
DIN EN 50171 (VDE 0558-508):2001-11
 - In UK:
BS EN 50171:2001



Emergency lighting technology

- **US Standards**
 - For emergency lighting apply the following standards:
 - NFPA 101, Life Safety Code
 - NFPA 111,



Emergency lighting technology

- **US Standards**

- Basic requirements of NFPA 111:
 - Egress paths shall have an average illumination level of 10.8 lx, minimum 1.1 lx at floor level.
 - Battery mode duration: 1½ h



Emergency lighting technology

- **Basic technologies of the Teknoware emergency lighting systems**
 - **Central battery systems**
 - Generally used in larger buildings
 - Energy back-up from a centrally located battery
 - LED or fluorescent lamp as a light source
 - Addressable testing and central monitoring via LON or BACnet as an option
 - **Self-contained luminaires with NiCd or NiMh batteries**
 - Generally used in smaller buildings
 - Each luminaire has its own battery
 - LED or fluorescent lamp as a light source
 - Self testing or wireless central monitoring as an option.
 - **Self-contained luminaires with Teknoware ESCAP –technology**
 - For both small and large buildings
 - Batteries replaced by Supercapacitors. No need for replacement
 - LED as a light source.
 - Self testing or wireless central monitoring as an option.



Emergency lighting technology

- **Light sources of the emergency luminaires**
 - **Fluorescent lamp**
 - Have been the most common for the last 30 years
 - Replaced the incandescent lamp, as it has a better efficiency and life time
 - Life time approx. 3000 – 6000 hours, still requiring frequent replacement in maintained use
 - **Light Emitting Diode (LED)**
 - Today replacing the fluorescent lamp, especially in exit signs
 - Lower energy consumption
 - Small size
 - Life time even up to 10 years in maintained use, when correctly designed
 - Requires though careful component selection and thermal design

Teknoware central battery systems

**3 basic product families
for larger premises:**

1. TKT65xxCx
2. TKT66xxCx
3. TKT67xxCx



Total power up to 19,6 kVA

- Max 56 output circuits
- Automatic addressable testing of the complete system
- Constant monitoring of the luminaires and complete system
- Self-learning – very quick and easy commissioning without complicated programming
- Central monitoring
- Optional LON and BACnet interfaces for building management system



Teknoware central battery systems

Battery types:

As standard the battery chargers of the panels are set for stationary valve regulated lead acid batteries.

**When set for the stationary Nickel Cadmium batteries, the panel shall be of a type code ending with –N. For example:
TKT6732CN**

Teknoware emergency luminaires for centrally supplied systems

- **Wide range of designs for various applications**
- **Available with LED or fluorescent lamp as a light source**
- **LEDs are always of high output and long life surface mounted type. Lifetime more than 10 years**
- **Constant power electronics**
- **High power factor**



Teknoware central monitoring for central battery systems

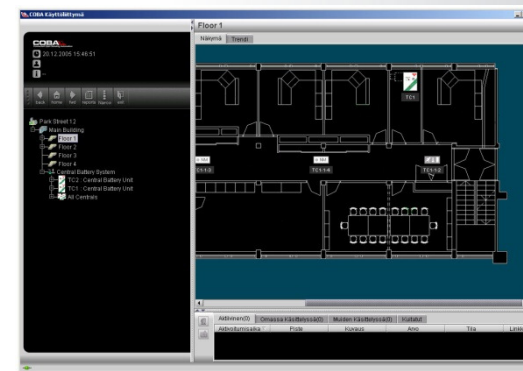
1. Basic Central Monitoring (BCM)

- Provides a simple solution, which gives the basic information of the status of the central battery units
- Purpose-built 3-wire network



2. Central Monitoring using COBA software

- Provides full addressable map-based information of both the central battery units and each luminaire
- Uses LON –network
- Full integration to the building management system



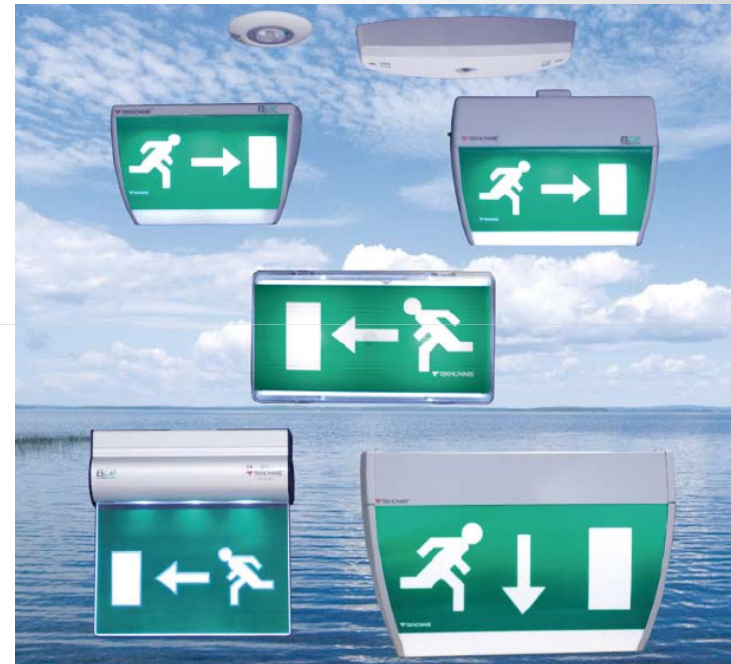
3. BACnet interface

Teknoware self-contained luminaires

Escap –technology

The latest development in the self-contained luminaires is the Escap-technology by Teknoware. Escap luminaires have a long life LEDs as a light source, and the batteries have been replaced by supercapacitors. The main advantages are:

- No need for lamp replacements
- No need for battery replacements
- The maintenance-free life time is over 10 years in continuous use
- Low energy consumption
- No hazardous substances, which are typical to batteries
- Can be recycled as normal electronics waste, no special treatment required



BUILDING
EMERGENCY
LIGHTING

ESCAP

The ESC logo symbol consists of a horizontal line with two short vertical bars in the center, resembling a stylized 'E' or a battery symbol.

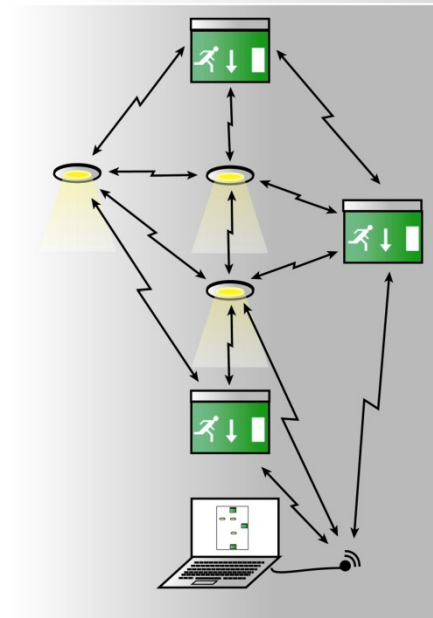
Teknoware grants a ten-year warranty scheme to the light source and backup energy source of the ESCAP lighting, if the ambient temperature is between -25°C and $+30^{\circ}\text{C}$.



Teknoware central monitoring for self contained luminaires

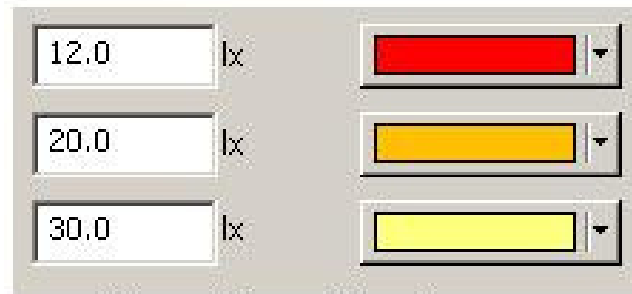
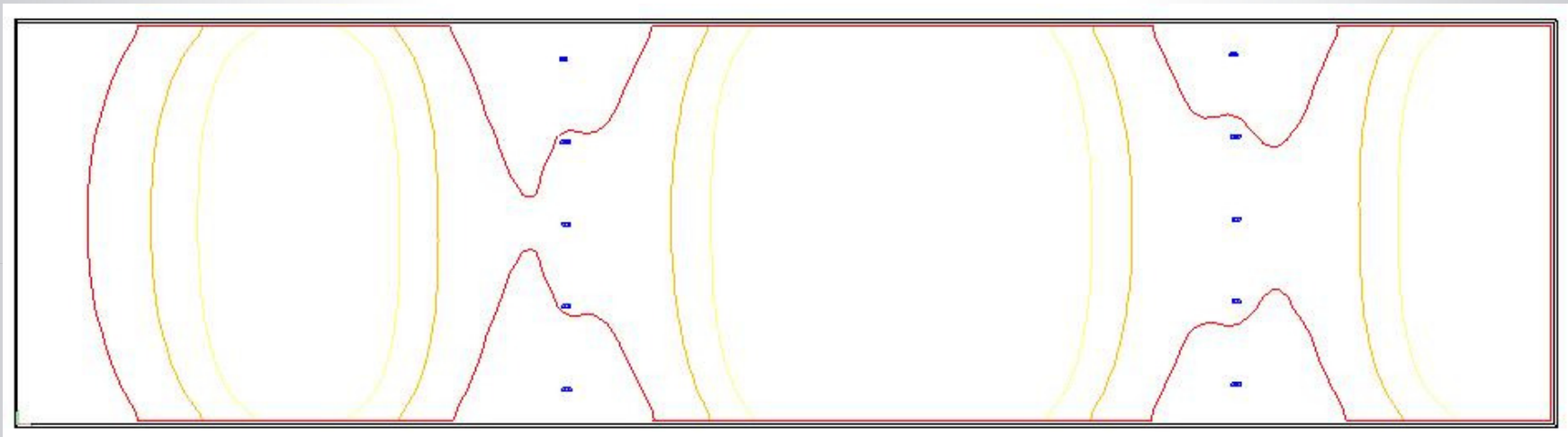
Aalto Control provides wireless central monitoring for Teknoware Self-contained luminaires.

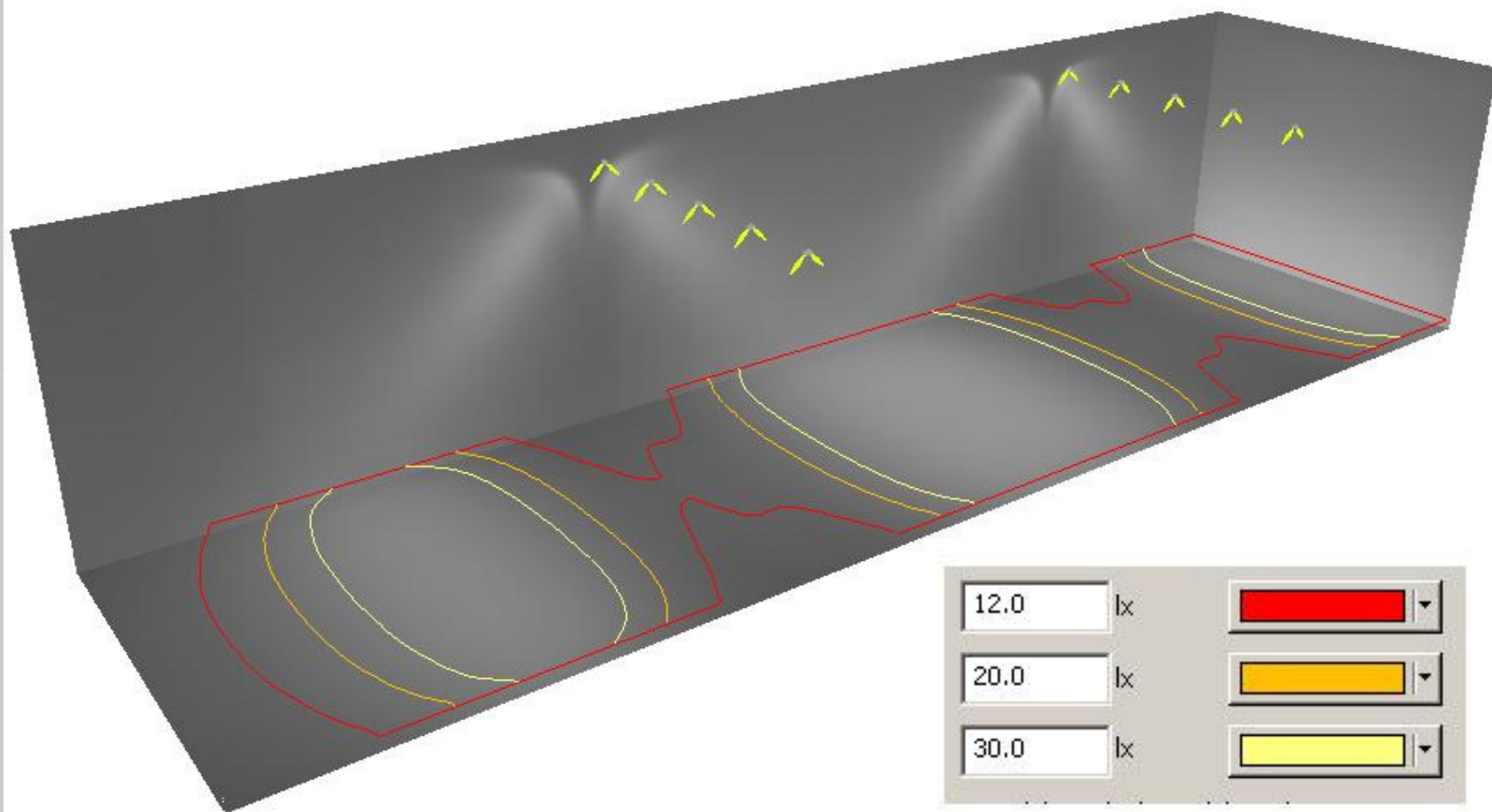
- No cabling needed between luminaires
- Self-arranging network between the luminaires and user interface
- Map-based software available for easy location information of the luminaires





Illuminance level simulations





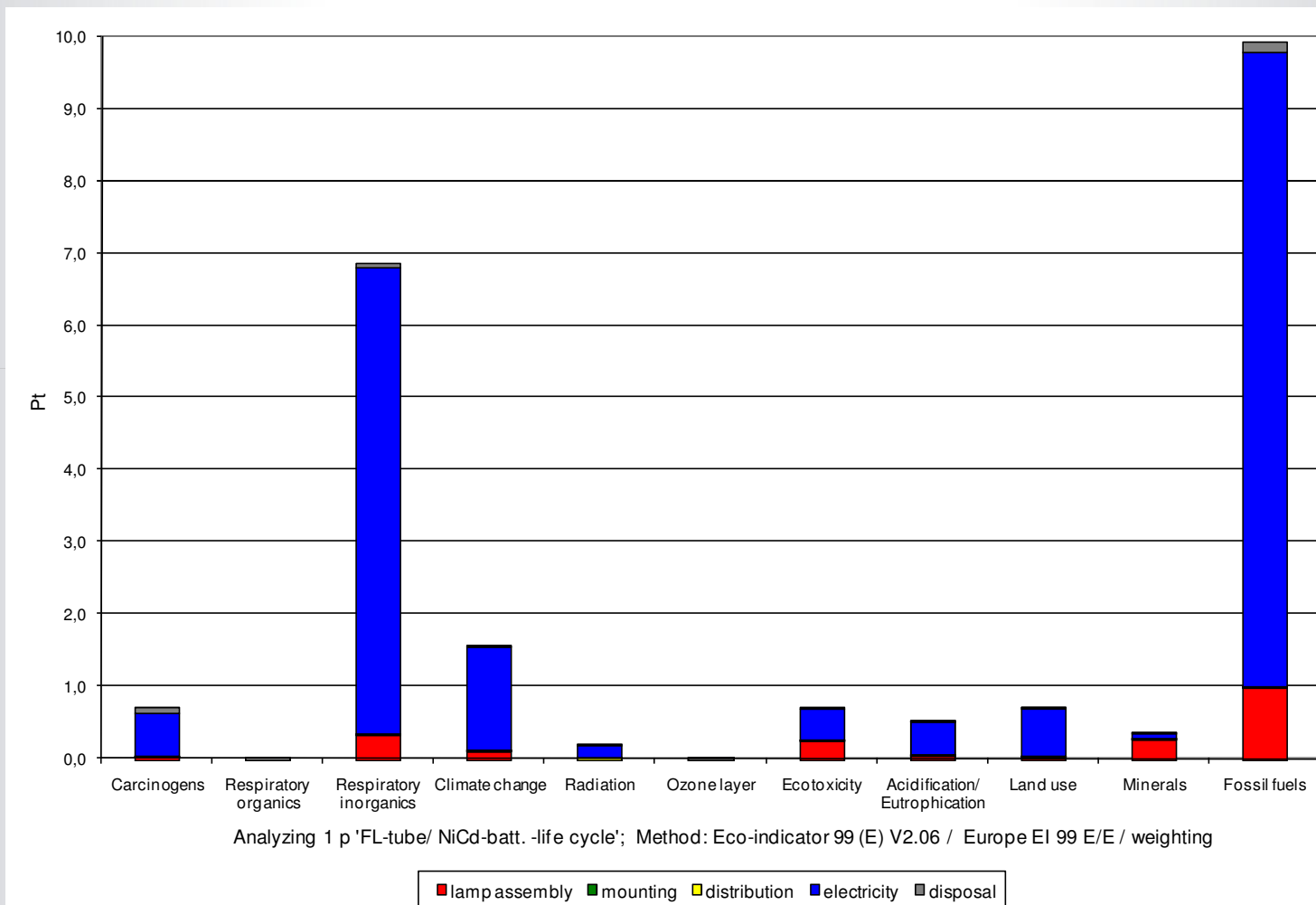
Environmental impact assesment study

As the environmental issues are increasingly important, Teknoware has made also special study for the self-contained emergency luminaires

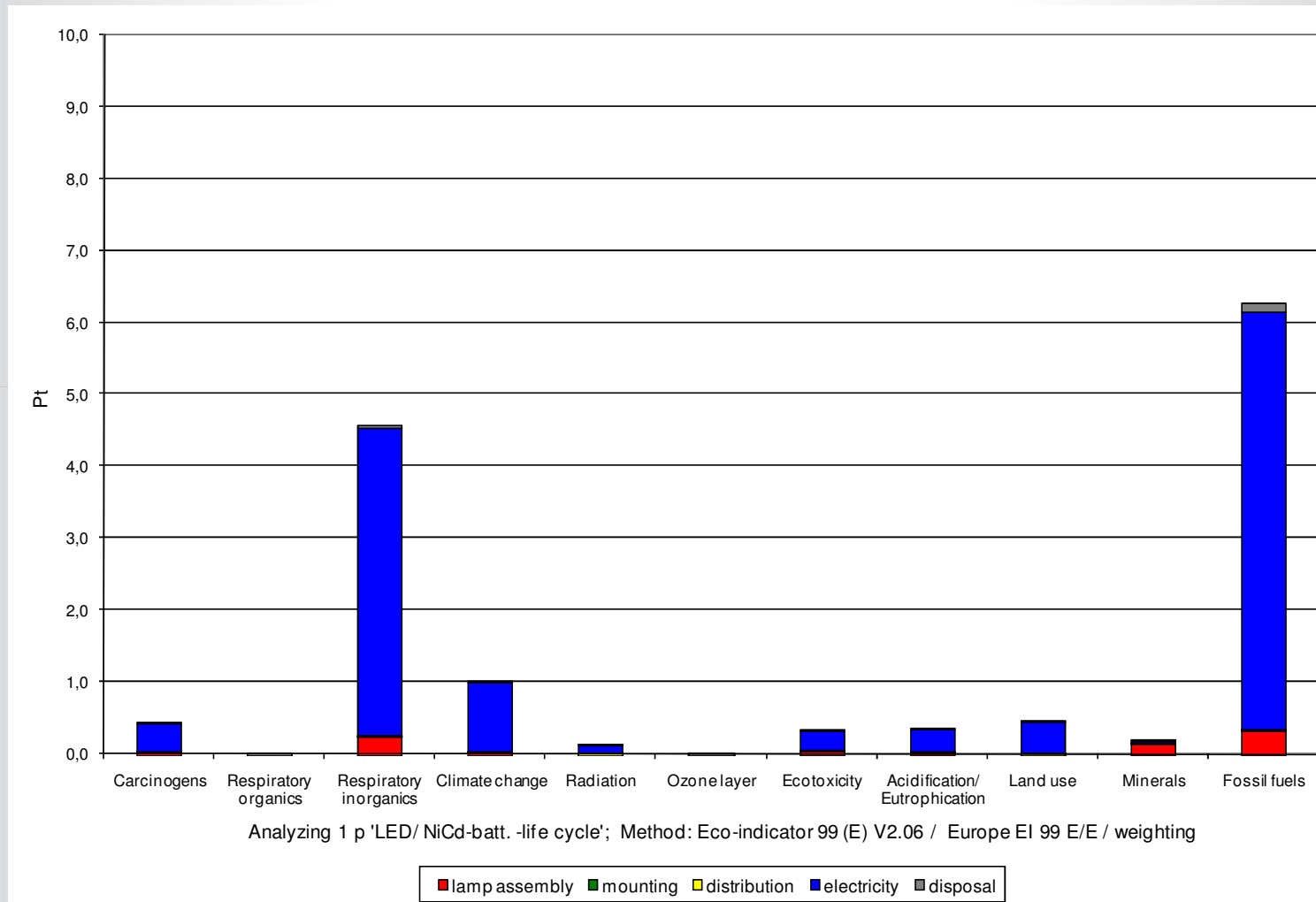
The following method has been used:

- Applied standard: ISO 14044**
- Method used: The Eco-indicator 99 is a impact assessment method developed for life cycle assessments**
 - **The impact assessment method links the inventory data to different environmental impact categories, e.g. CO₂ emissions affects the concentration of greenhouse gases in the atmosphere and is directed to the impact category "climate change".**
 - **Eco-indicator also includes a method for weighting different impact categories with each other.**
 - **After weighting different impact categories with each other the total environmental impact of the product can be presented in one single score (Pt).**
 - **NOTE. The weighting procedures are constantly debated and are done on scientific assumptions, they do not represent absolute environmental effects.**

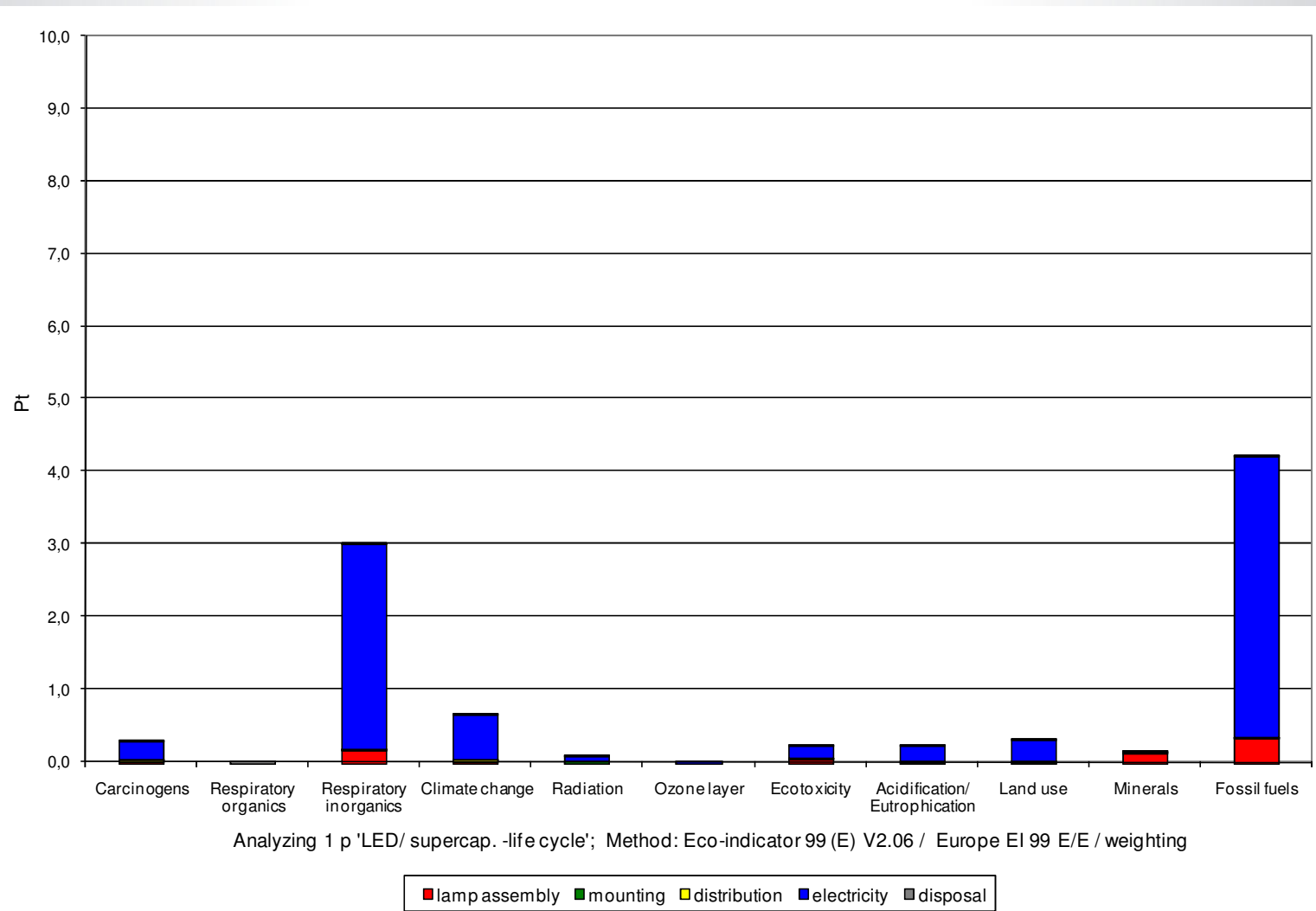
Impact assessment of a fluorescent tube / NiCd battery -assembly



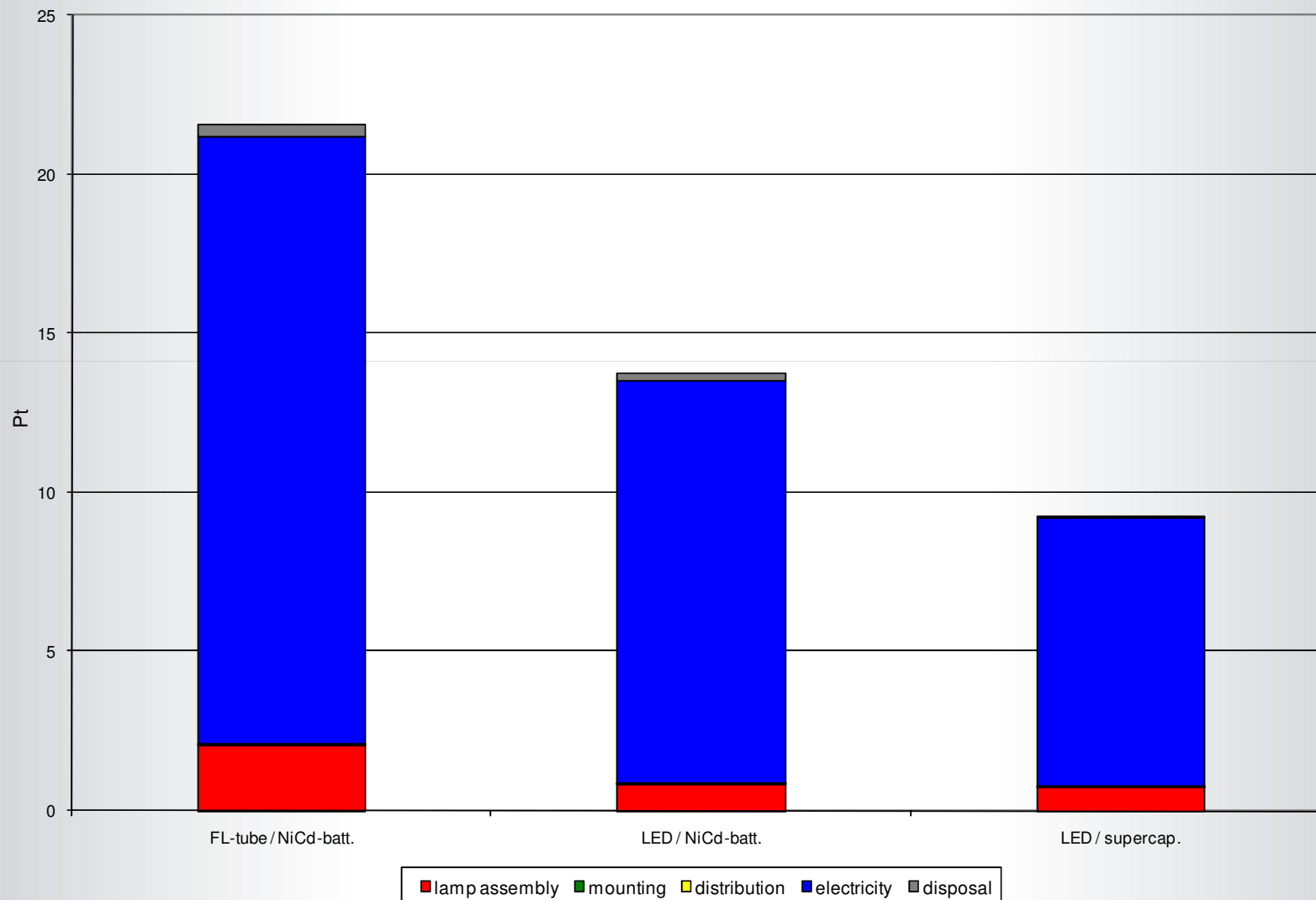
Impact assessment of LED / NiCd battery -assembly



Impact assessment of LED / supercapacitor -assembly



Summary of the analysis



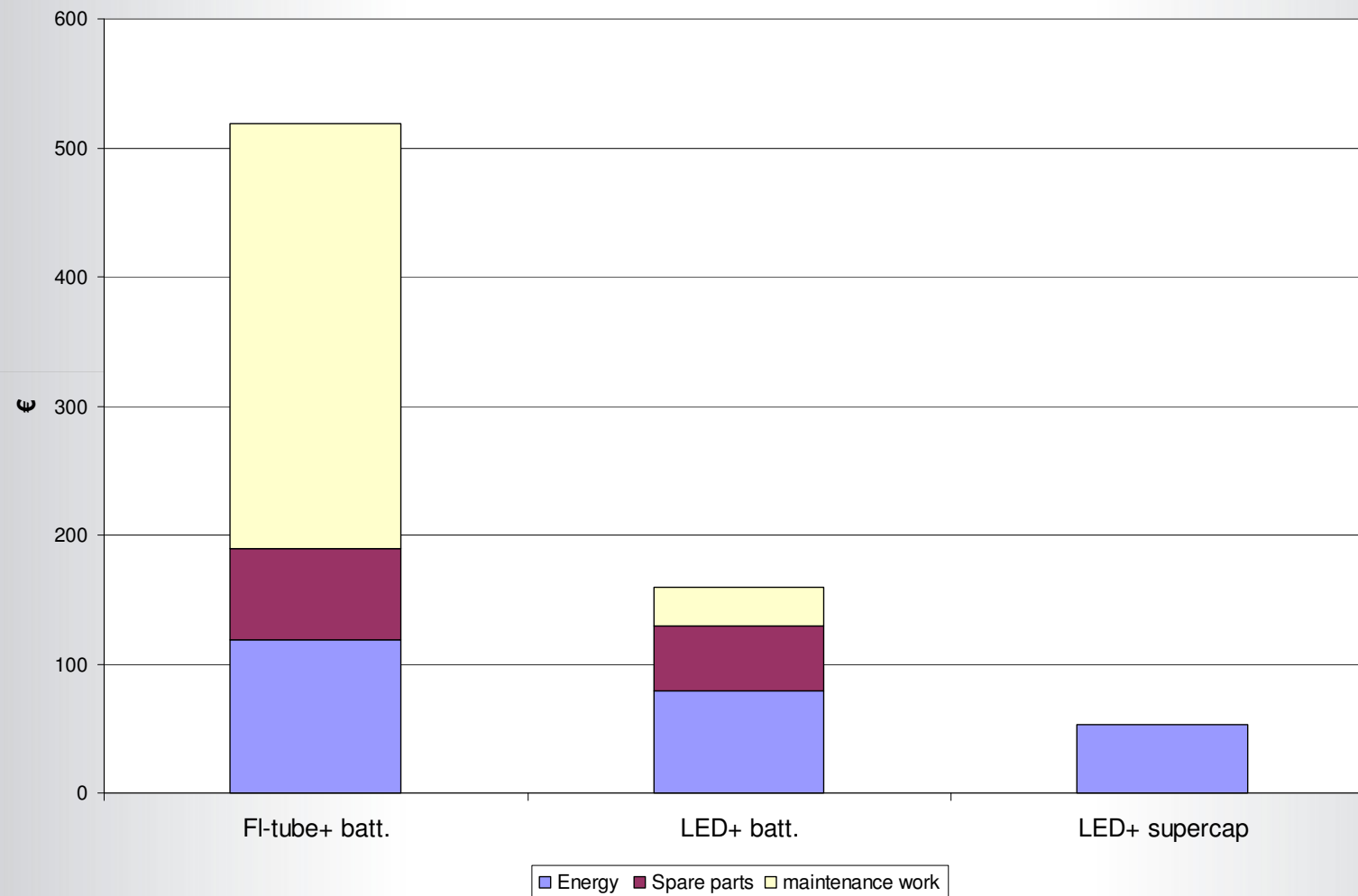
Life cycle cost comparison

Teknoware has also made comparison of the life cycle costs of different self contained luminaire types.

The following page shows the result, when calculated using typical energy and labour costs in northern Europe.

The period used in the calculation is 10 years

Life cycle costs of different self contained luminaire types



Thank you for your interest. Don't hesitate to contact us.