

# 4E

IEA Technology Collaboration Programme  
on Energy Efficient End-Use Equipment

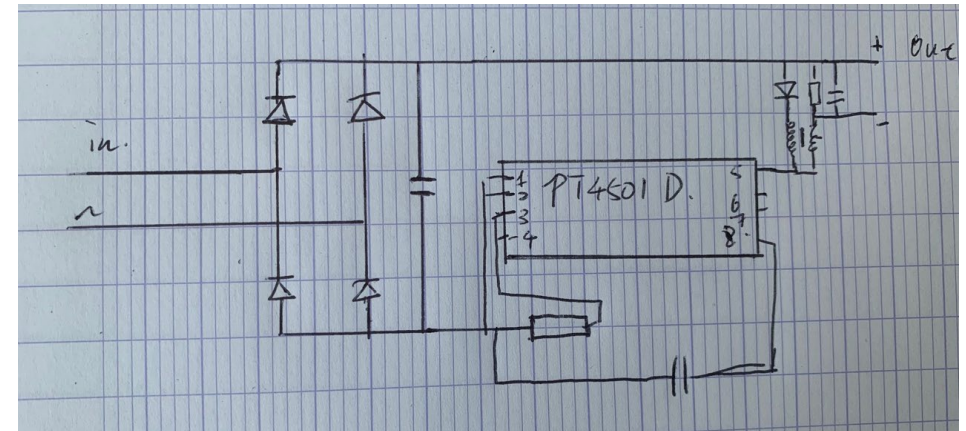
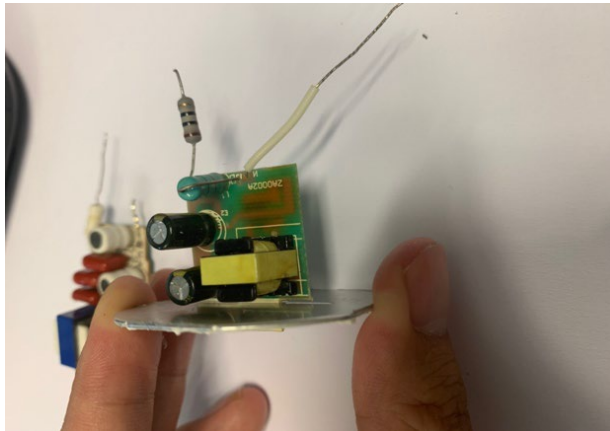
## Task 3 update

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[iea-4e.org](http://iea-4e.org)

# Tear-down of drivers of LED lamps & failure analysis

- Failure analysis of 2 types of LED lamps - Reference 163 and 150 (no name lamps)
  - 163-j and 163-g

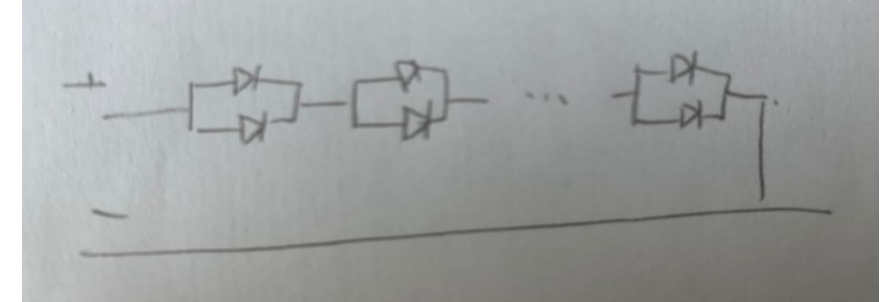
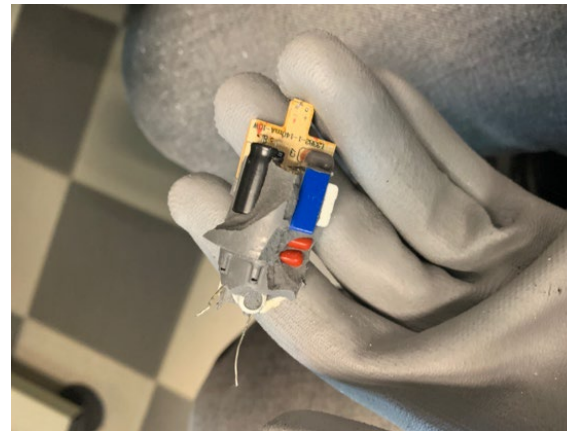
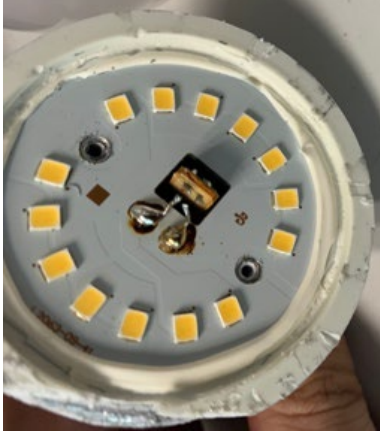


- All LED chips were tested one by one :
  - Cause of failure : one burden LED chip – no defect of the driver.
  - Structure : 9 Serial LED. If one LED is defective, the lamp stops working.
- The design of the driver has been reproduced
- The lamp assembly is not designed for disassembly, the bulb must have been completely cut out

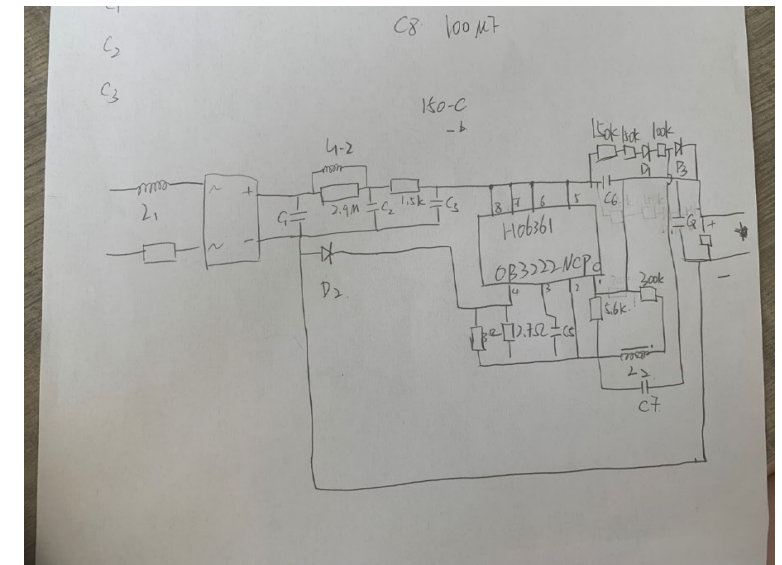


# Tear-down of drivers of LED lamps & failure analysis

- Failure analysis of 2 types of LED lamps - Reference 163 and 150 (no name lamps)
  - 150-b and 150-c



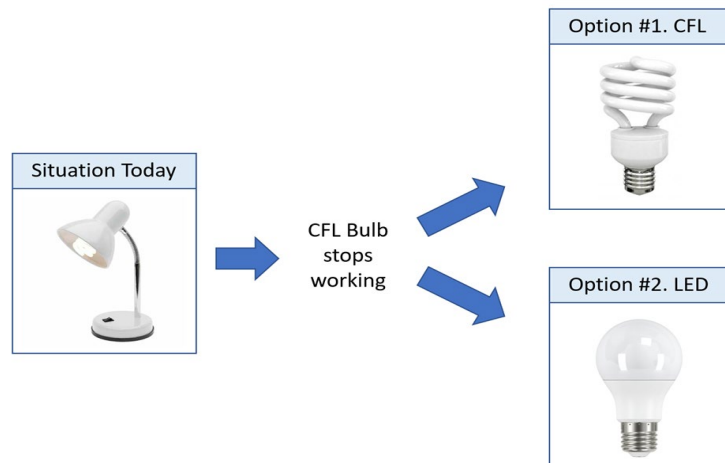
- All LED chips were tested one by one :
  - Cause of failure : two burden parallel LED chips – No defect of the driver
  - Structure : 14 Serial groups of two parallel LEDs.
    - If one LED is defective, the other in parallel takes too much power and burns. The lamp stops working
- The design of the driver has been reproduced
- The lamp assembly is not designed for disassembly : a part of the structural body of the lamp is completely fused with the driver components



# Teardown work with Clean Lighting Coalition / CLASP

- **Purpose** : to compare, from a LCA basis, the current environmental impacts associated with replacing mercury-containing fluorescent lamps in an existing luminaire and replacing those fluorescent lamps with LED alternatives
- 2 scenarios : domestic and commercial/professional
  - Scenario 1 : **Compact Fluorescent Lamp, integrally ballasted**

The baseline is an existing, mains-voltage, integrally-ballasted 15W compact fluorescent lamp (CFLi) which operates in a table lamp. This lamp fails and the consumer must decide whether to replace it with another 15W CFLi or to install a new LED lamp of equivalent light output. A few LED scenarios will be considered, of different levels of quality (e.g., shorter life, longer life, lower and higher efficacy).



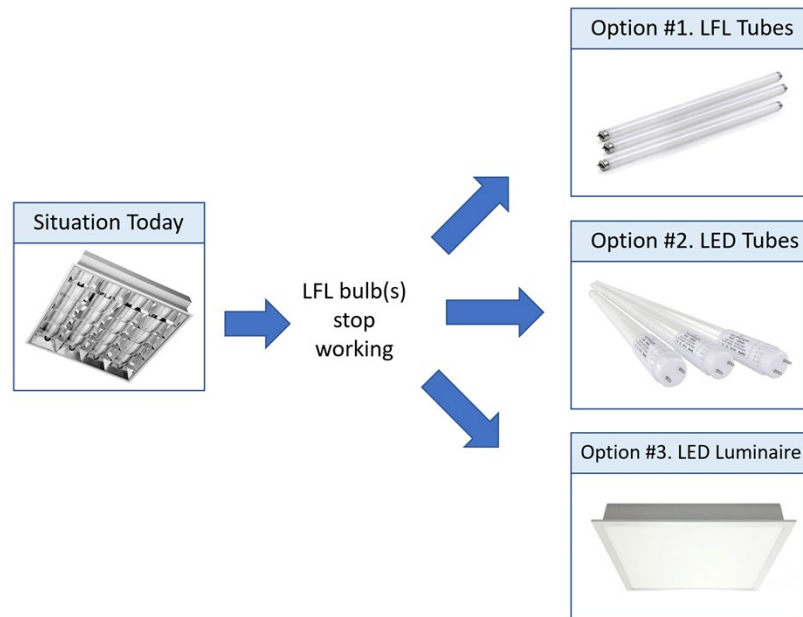
Rated lifetime	50,000 h
Rated luminous flux	840 lm
Rated power	4 W
Efficacy	210 lm/W

Last LED lamp from Philips : the most efficient on the market

# Contributing to Minamata agreement

## – Scenario 2 : *Linear Fluorescent Lamps in a Luminaire*

The baseline is an existing fluorescent fixture and four linear fluorescent lamps operating in this fixture. The lamp(s) fail, and the owner has a choice to make: either (a) replace the fluorescent tubes with new fluorescent tubes; (b) replace the fluorescent tubes with LED retrofit tubes; or (c) replace the luminaire with a new LED luminaire.



Lamp/Luminaire type	Models and Hyperlinks
<b>Linear Fluorescent Lamp</b>	<ul style="list-style-type: none"> <li><a href="#">Sylvania T8 Luxline Plus F18W 840   60cm - Cool White</a></li> </ul>
<b>LED Tube Options: Choose two</b>	<ul style="list-style-type: none"> <li><a href="#">Sylvania ToLEDo Superia HF T8 7.5W 840 60cm   Cool White</a></li> <li><a href="#">Philips LEDtube HF HO 8W 840 60cm (MASTER)   Cool White</a></li> <li><a href="#">Philips LEDtube EM HO 8W 840 60cm (MASTER)   Cool White incl. LED Starter</a></li> </ul>
<b>LED Luminaire Option</b>	<ul style="list-style-type: none"> <li><a href="#">Philips CoreLine RC120B LED Panel 60x60cm   Replaces 4x18W</a></li> </ul>

# Contributing to Minamata agreement

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- **Analysis** : Life cycle assessment
  - Functional unit : Megalumen.hours
  - Focus on products available on the market in 2021 (either good and bad quality)
  - Sensitivity analysis for 2025 potential products
  - **Purchase and tear down** will be done by Mike Scholand
  - **Impacts assessment** using Ecoinvent and Simapro will be done by Laplace Lab
- **Reports** will be done jointly by Mike Scholand and Laplace Lab (latest by early January 2022)
- Peer-review panel to be defined:
  - Morgan Pattison
  - Yoshi Ohno
  - Heather Dillon
  - Christofer Silfvenius
  - Mike Krames
  - Jim Brodrick
  - Jessica Richter
  - Leena Tähkämö
  - ??