

The environmental footprint of plastic piping systems within the built environment

An assessment based on Life Cycle Assessment

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Outline



About TEPPFA

Our goal

What is a Life Cycle Assessment - LCA

What is an Environmental Product Declaration - EPD

Development of EPDs

Indicators

Plastic pipe systems applications

Some results

Conclusions

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About TEPPFA

- TEPPFA is The European Plastic Pipes and Fittings Association representing the key manufacturers of plastic pipe systems and national associations in Europe
- TEPPFA is actively involved in the promotion and acceptance of plastic pipe systems for all applications
- TEPPFA members decided on voluntary basis to develop EPDs for their main products



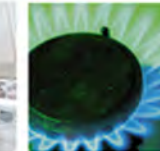
National Associations



Company Members



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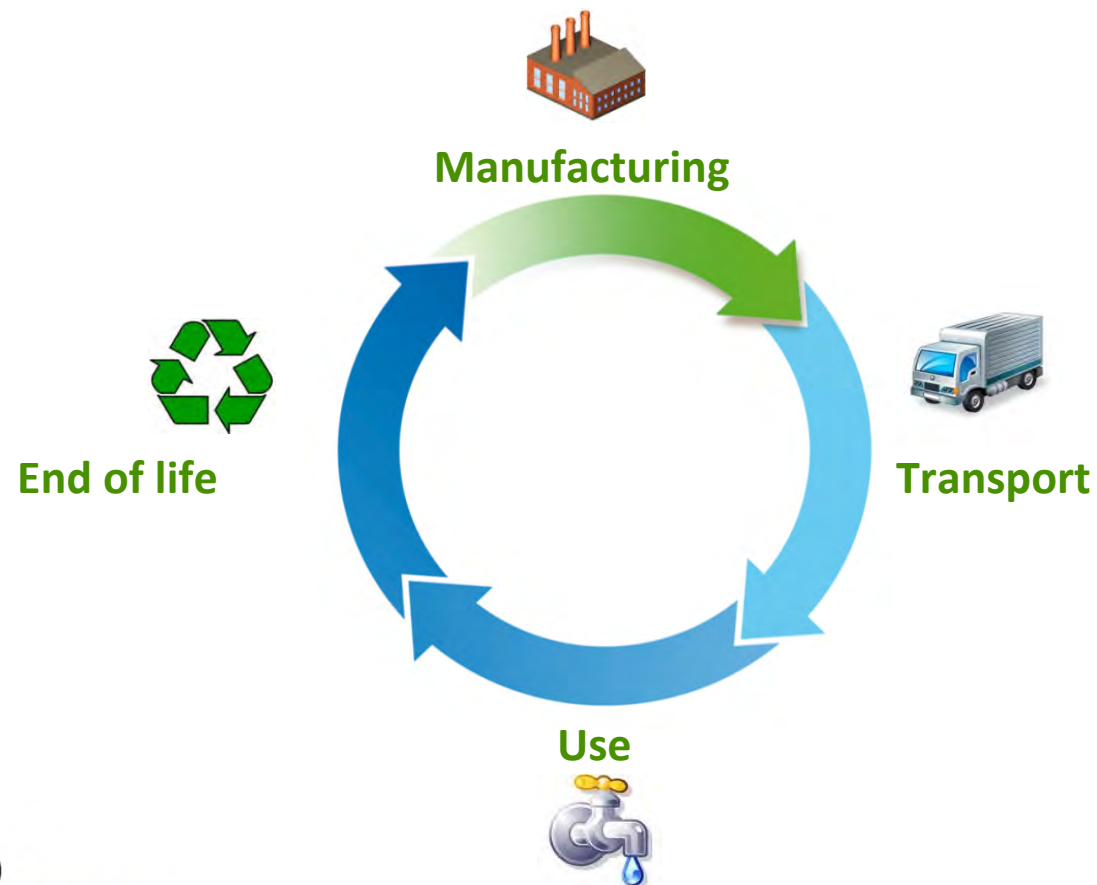
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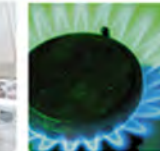
Our goal



This initiative aims to measure the environmental impact of plastic pipe systems throughout their entire life cycle



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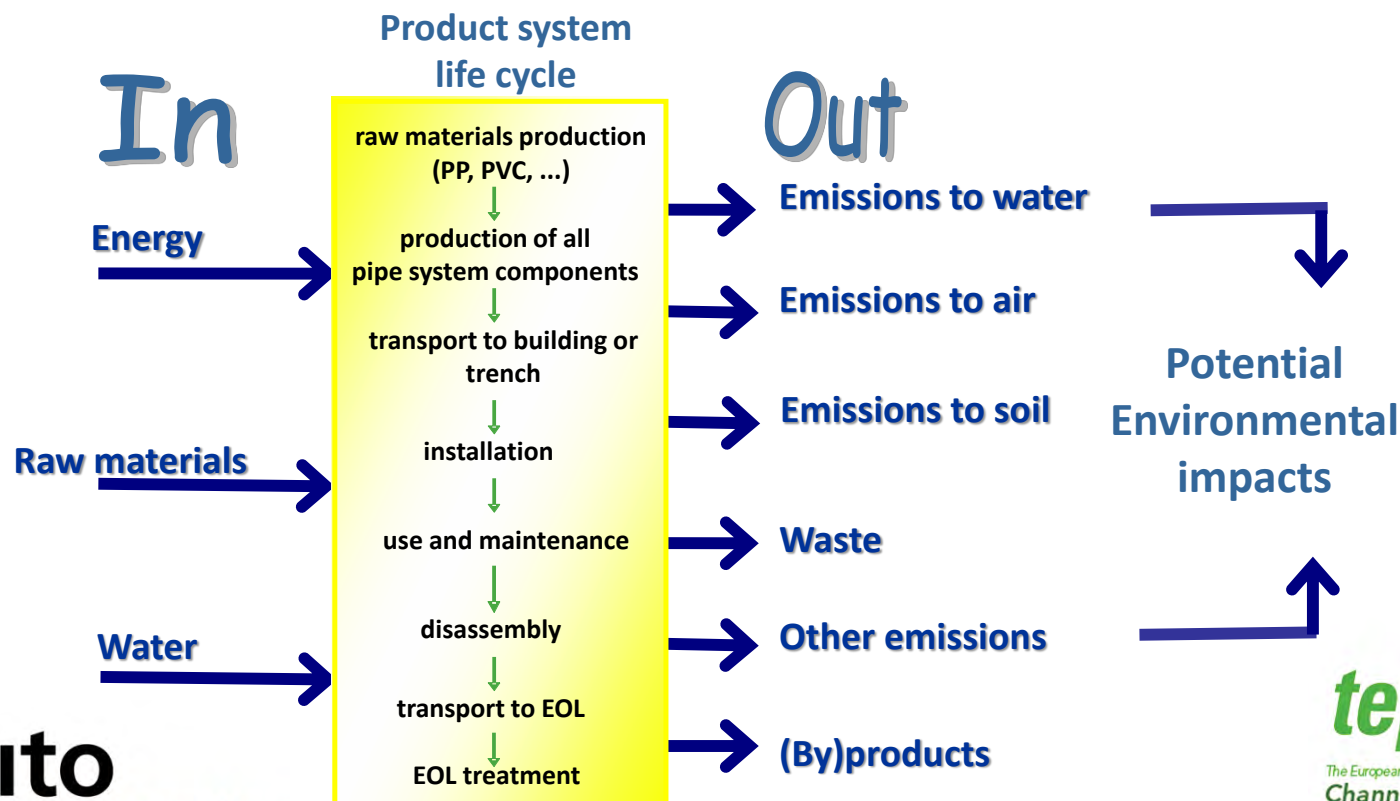
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What is a life cycle assessment?



- A Life Cycle Assessment (LCA) is a standardized tool that analyses the **environmental impacts of products throughout their entire life cycle**
- It is the most recognised method to quantify environmental impacts of products, processes and/or systems



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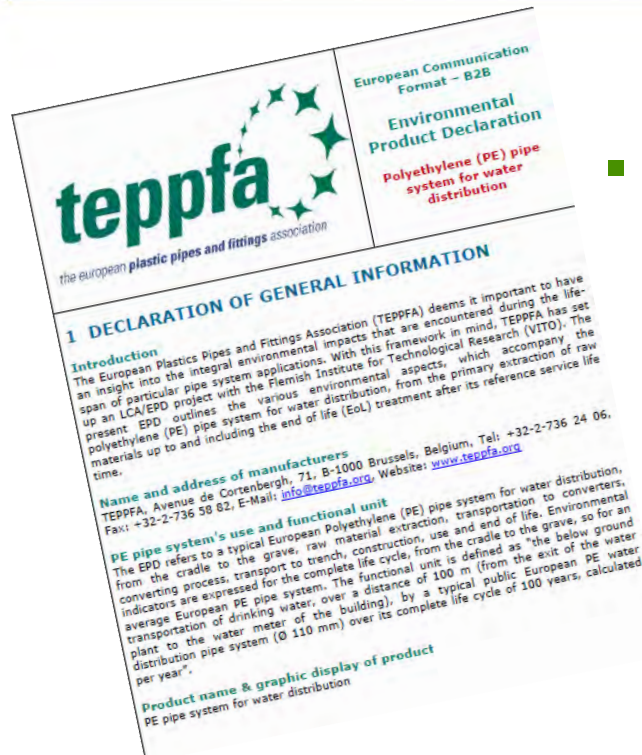
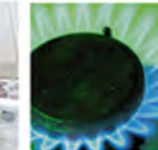
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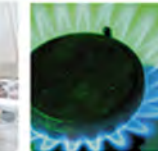
What is an Environmental Product Declaration (EPD)?



- The EPD provides LCA-based information to assess the environmental performance of plastic pipes over their entire life cycle, from cradle to grave

- EPD provides a standard way for communicating the output of LCAs for piping systems
- EPD allows to make the assessment at the whole building level

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Creator of framework



Companies provided data



Life Cycle Assessment



Critical Review



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The Life Cycle Impact on the environment is divided into the following categories:



Abiotic depletion: exhaustion of natural resources



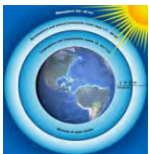
Acidification potential: emissions from manufacturing processes resulting in acid rain



Eutrophication: over-fertilisation of water and soil



Global warming: insulating effect of greenhouse gases, such as CO₂ and methane



Ozone layer depletion: depletion of the ozone layer in the atmosphere caused by emissions of pollutants



Photochemical oxidation: photochemical reaction of sunlight with primary air pollutants, that leads to chemical smog

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Applications of plastic pipe systems

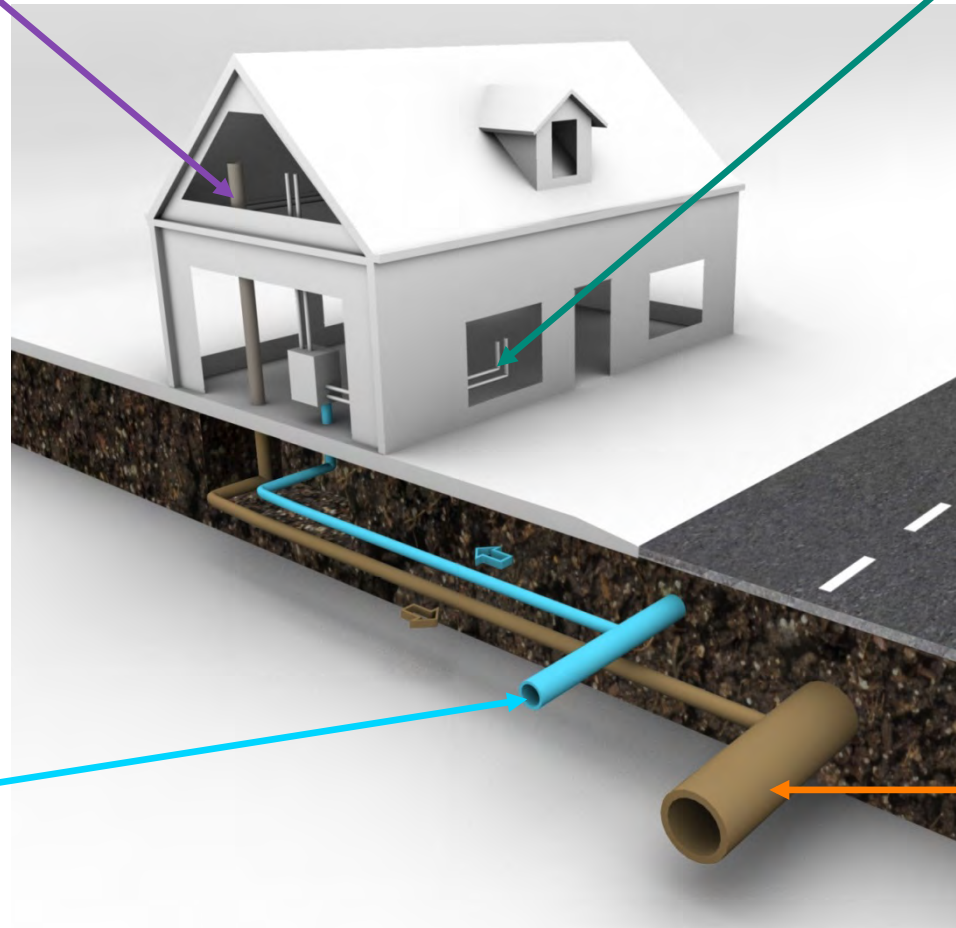


Soil, waste

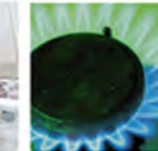
Plumbing,
Hot & Cold water

Water distribution
pressure

Drainage, sewage



Detailed environmental impact assessments (18)



Soil and waste applications

- > PP pipe systems
- > PVC pipe systems
- > PP low noise pipe systems
- > PVC low noise pipe systems

Water (gas) distribution applications (pressure)

- > PE water pipe systems
- > PVC – U pipe systems
- > PVC – O; MRS 31,5 MPa pipe systems
- > PVC – O; MRS 45 MPa pipe systems
- > PE gas pipe systems

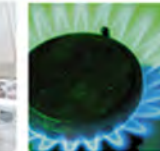
Sewage applications (non pressure)

- > PVC sewer solid wall
- > PVC multilayer foam
- > PVC multilayer foam + recyclates pipe system
- > PP structured (twin) wall
- > PP structured solid wall
- > PP monolayer solid wall

Plumbing, Hot & Cold applications

- > PEX solid wall pipe systems
- > Polymer/Al/Polymer ML pipe systems
- > PP-R solid wall pipe systems

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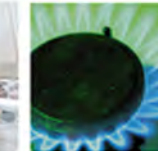
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Plumbing, Hot & Cold applications



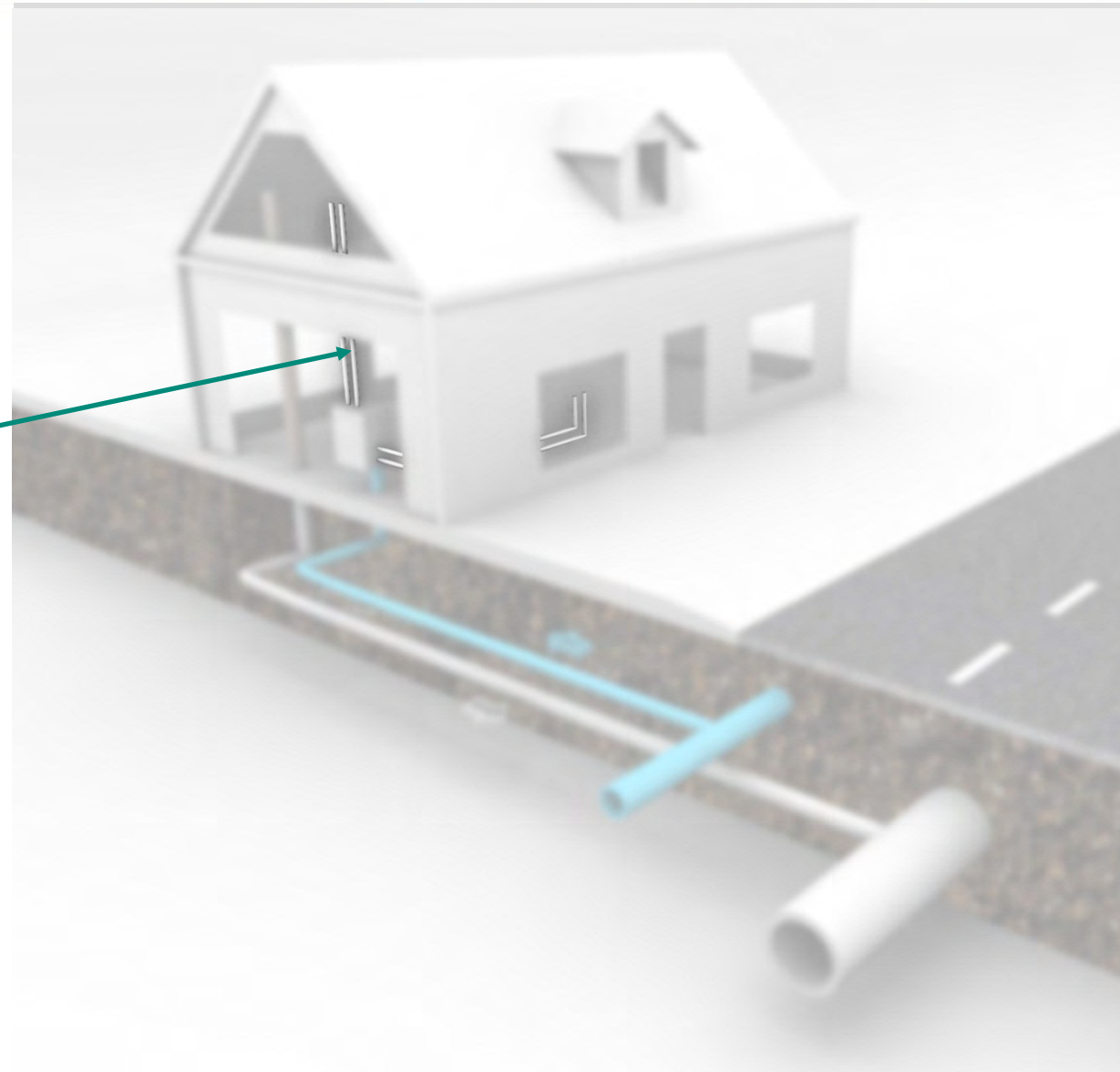
Pipe systems

PEX solid wall

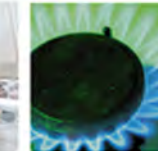
Polymer/Al/Polymer ML

PP-R solid wall

SUPPLY SIDE
(pressure)



PEX; Hot & Cold pipe systems – functional unit



Water distribution pressure pipe systems comprising pipes, fittings etc.

Function

- The pressure supply and transport of hot & cold drinking water from the entrance of a typical European apartment of 100 m² to the taps

Properties

Pipes

- A range of PEX pipes, EN 15875
- Solid wall, single layer

Fittings

- PPSU and Brass

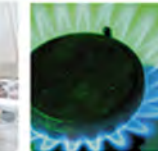
Design / Installation

- EN 806

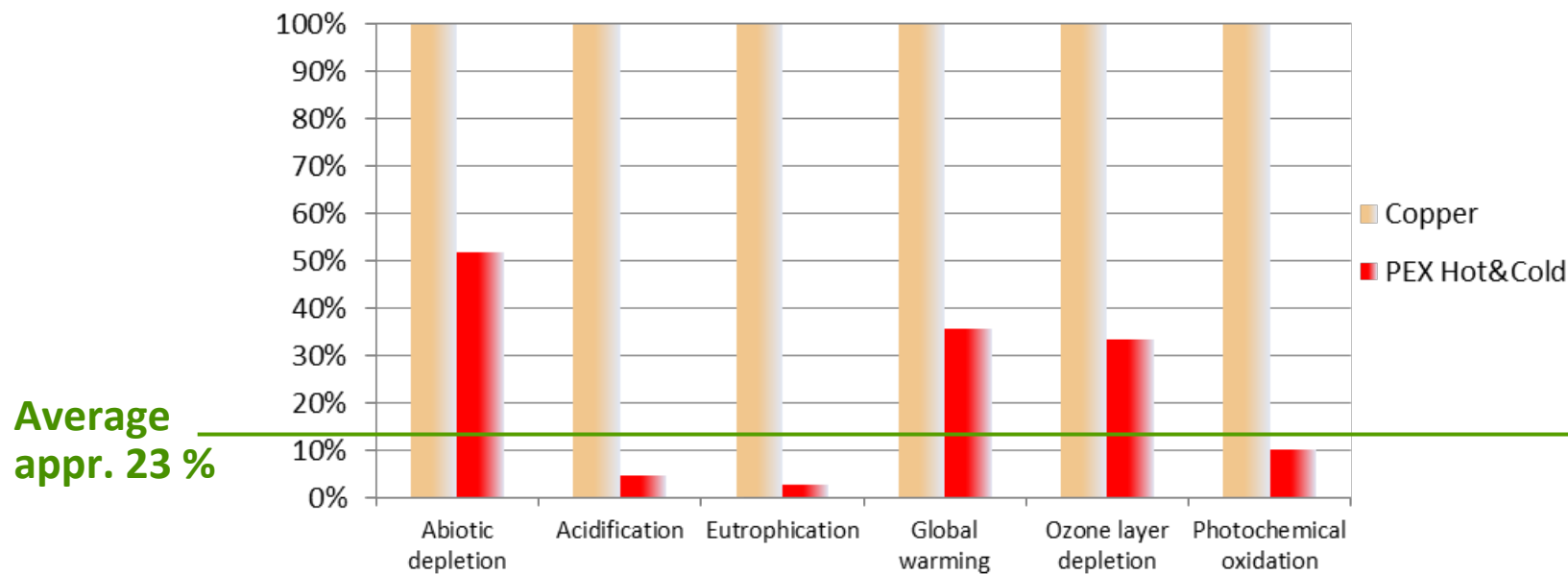
Service lifetime

- 50 years (aligned with the life time of the apartment)

PEX hot & cold pipe systems environmental performance

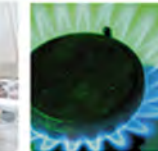


Data for Copper are based on publicly available figures

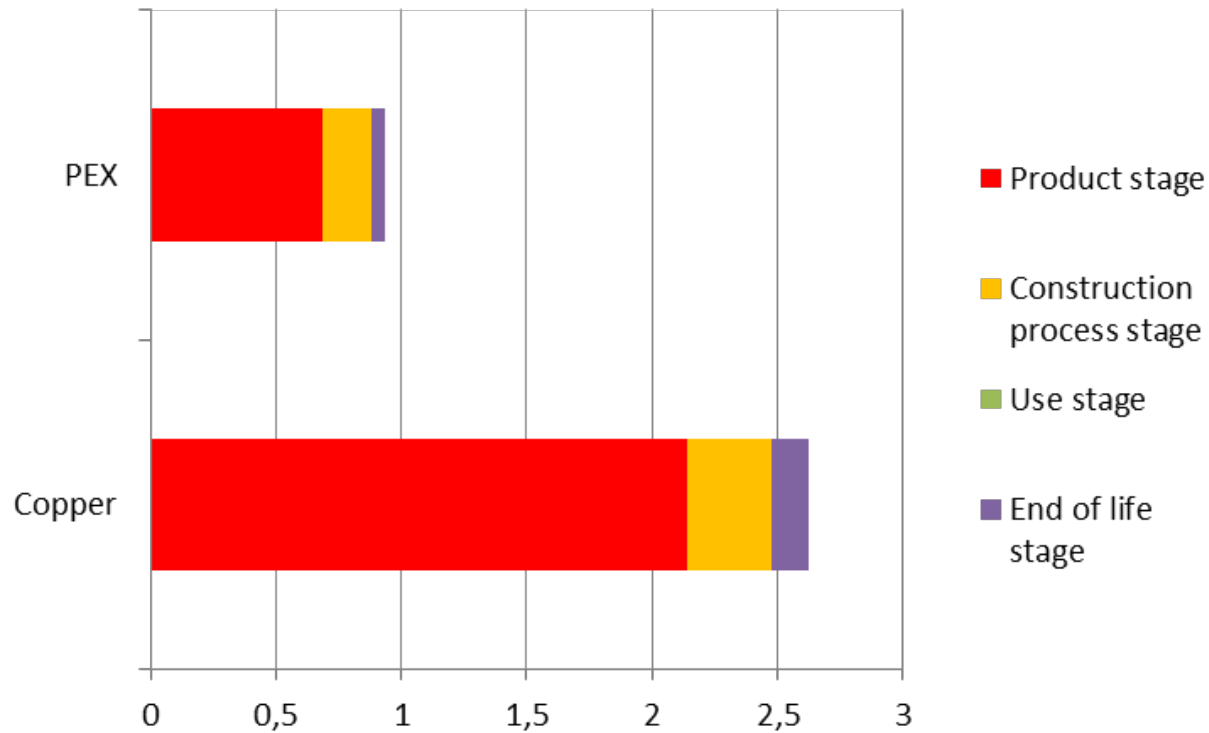


*Please note that any references to the average differences in environmental impact between plastics and alternative materials have been calculated by TEPPFA for illustrative purposes only and do not form part of the studies conducted by VITO and validated by Denkstatt
Comparison is based on the functional unit

PEX hot & cold pipe systems global warming comparison



Impact on global warming (in kg CO₂ equivalent)



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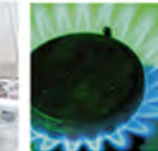
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- ✓ The development of EPDs allows a comprehensive assessment of the environmental impact of plastic pipe systems over their life cycle
- ✓ LCAs indicate that the impact of plastic pipe systems on the environment is smaller than traditional materials
- ✓ TEPPFA is committed to review the EPDs every 5 years according to ISO standards and EN 15804 requirements
- ✓ TEPPFA members are committed to further reduce the environmental impact of plastic pipe systems

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Thank you for your attention!