Circular HVAC – What ‘R’ we doing?!

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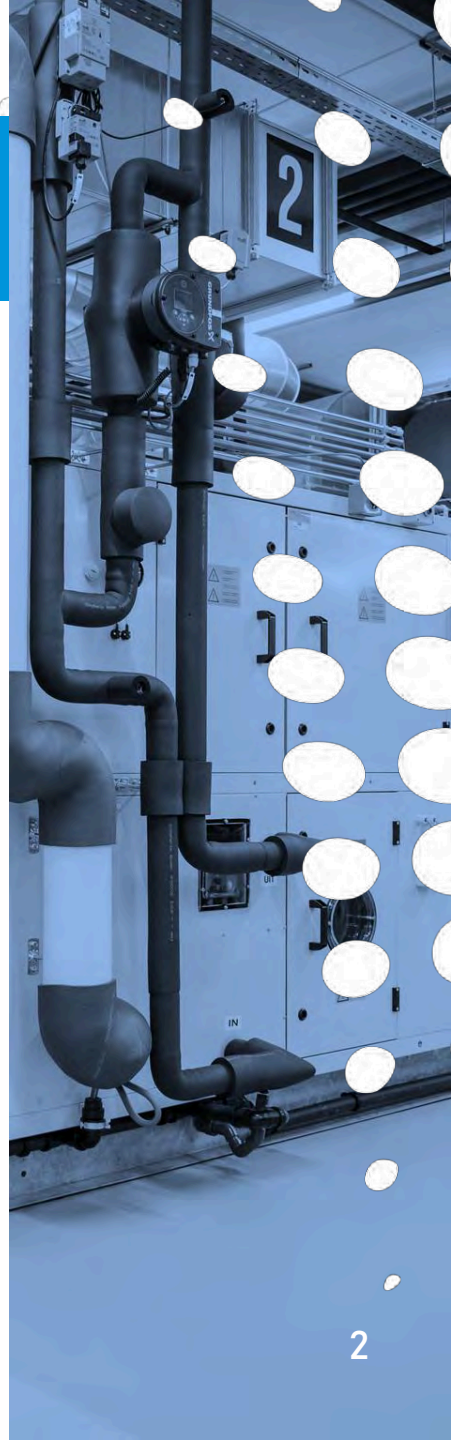
Introduction

Binnenklimaat Nederland is an ambitious and active association committed to achieving a healthy indoor climate in buildings. The (60+) affiliated members are manufacturers, suppliers and service organizations in the field of ventilation, air handling, heating and airconditioning.

Together we are committed to a healthy indoor climate everywhere, always and for everyone.



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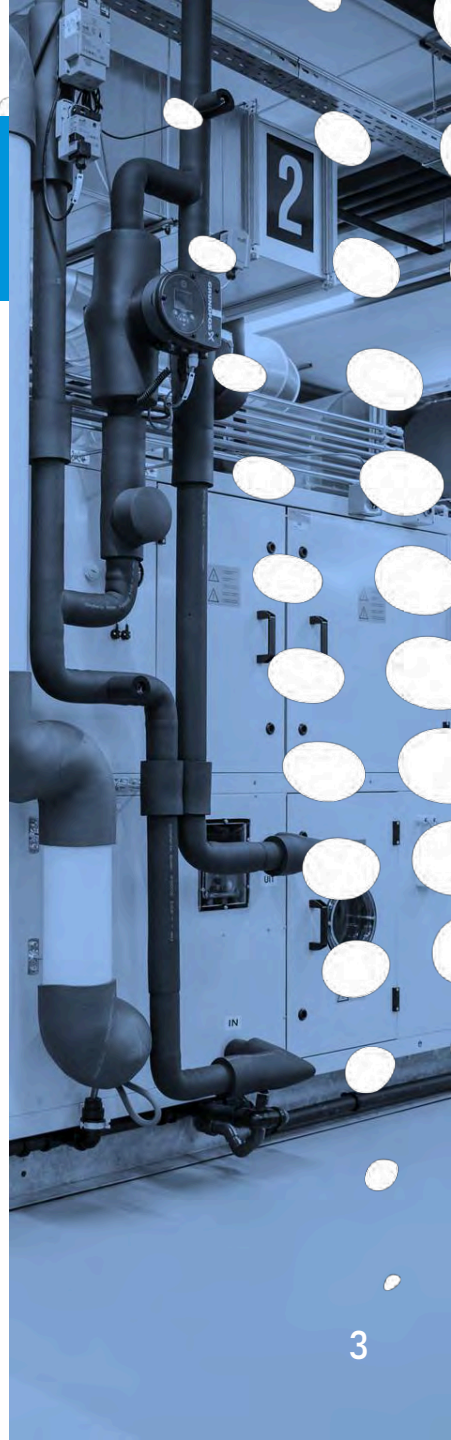
Introduction

- The Environmental Performance of Buildings has been part of the Dutch Buildings Codes and there is increasing attention for circularity
- The Dutch experience: pioneering ambition… but also fragmentation and uncertainty.
- For manufacturers, the reality is a maze of rules, tools, and definitions.

What can we learn from the Dutch experience and what we need at European level?



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Dutch Building Codes

- Energy Performance of Building (Near Zero Energy)
- ‘MPG’: Environmental Performance of Buildings

(Sum of the environmental costs of all building materials.)

  - The MPG was introduced in the building codes in 2013, with a numeric value in 2018.
  - The current requirement is MPG≤0.8

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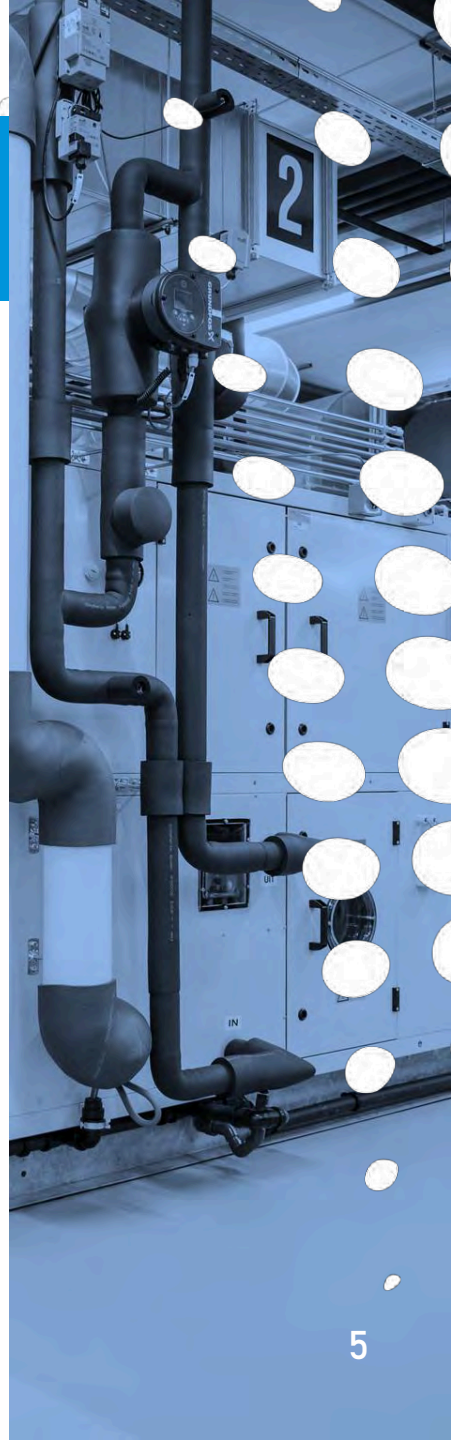
‘MPG’: Environmental Performance of Buildings

- Sum of the environmental costs of all building materials, expressed in ‘shadow costs’: €0,80 per m² gross floor area per year.
- Data source: National Environment Database with ‘Environmental Profiles’ for buildings materials and products, in three categories:
  - CAT3: Generic profile
  - CAT2: Association aggregate profile (LCA Required)
  - CAT1: Manufacturer specific profile (LCA Required)

+30%

The CAT3 profile values are imported from a background database (EcoInvent), with a 30% additional penalty.



‘MPG’: Environmental Performance of Buildings

- Based on EN15804
- Basically: Methodology for Building level Environmental Performance and Product/Material Level NL-EPD
- Meeting value of MPG≤0.8 is possible with only generic data, no incentive to develop an NL-EPD and get rid of 30% penalty.

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NL-EPD's | Assessment Method for Environmental Performance of Construction Works

- CAT3: Generic profile
- CAT2: Association aggregate profile (LCA Required)
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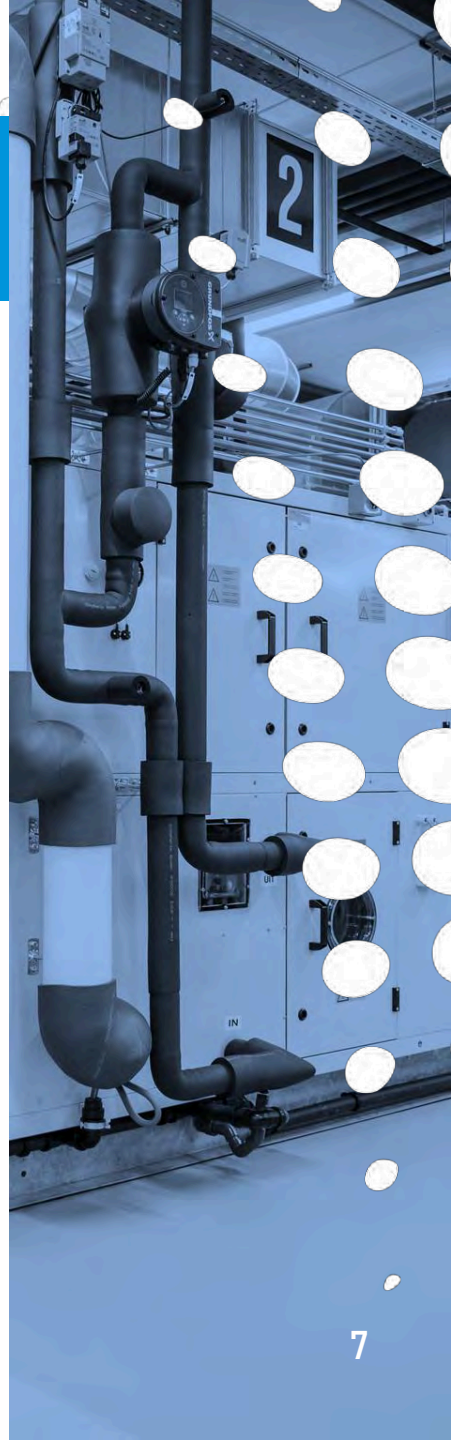
Generic EPD (Ecoinvent)

At least 30% benefit

Manufacturer Specific NL-EPD

LCA by Dutch Assessment Method (EN15804) based



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NL-EPD's | Assessment Method for Environmental Performance of Construction Works: Problem 1

- CAT3: Generic profile
- CAT2: Association aggregate profile (LCA Required)
- CAT1: Manufacturer specific profile (LCA Required)

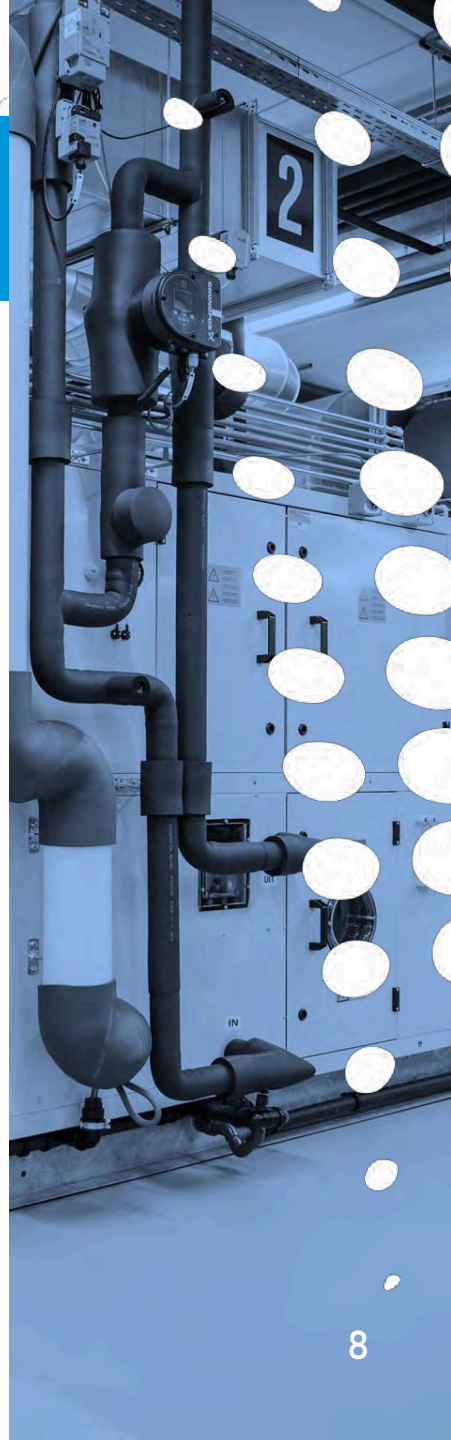
Generic A/W Heatpump

~~At least 30% benefit~~

Manufacturer Specific A/W Heatpump

11 times worse than generic EPD

LCA by Dutch Assessment Method (EN15804) based



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NL-EPD's | Assessment Method for Environmental Performance of Construction Works: Problem 2

Similar products

Product X has more than 2,5 better NL-EPD than Product Y

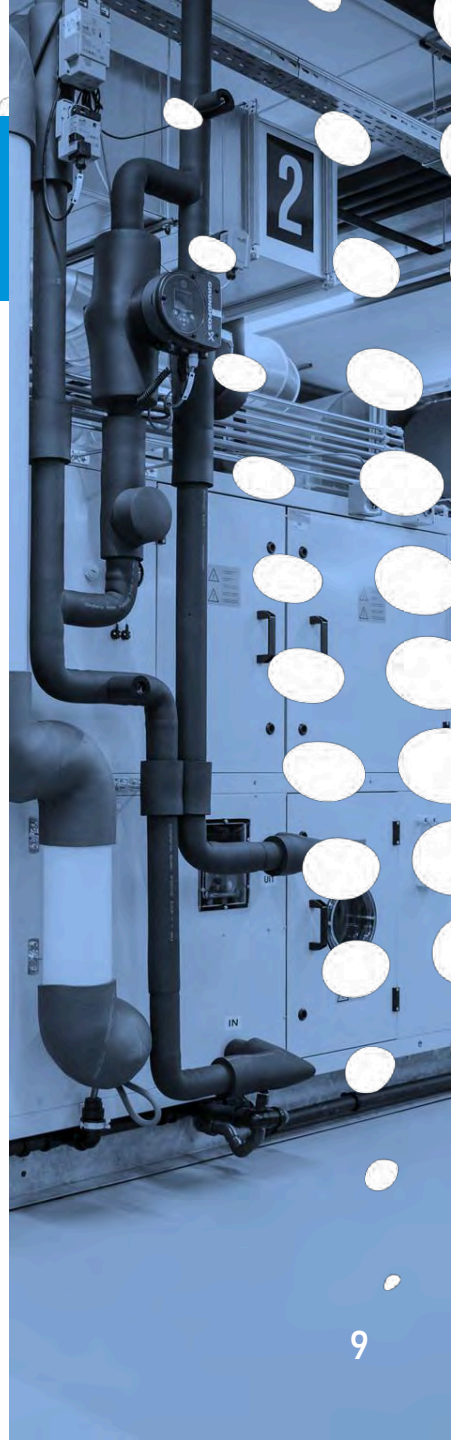
Product X
NL-EPD
Manufacturer X

Same components. Yet the impact of **Components 1 and 2 of Product Y** is higher than the impact of **entire Product X**

Product Y
NL-EPD
Manufacturer Y

- Component 1
- Component 2
- Component 3
- Component 4
- Component 5

- Component 1
- Component 2
- Component 3
- Component 4
- Component 5



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CIRCULAR

ECONOMY

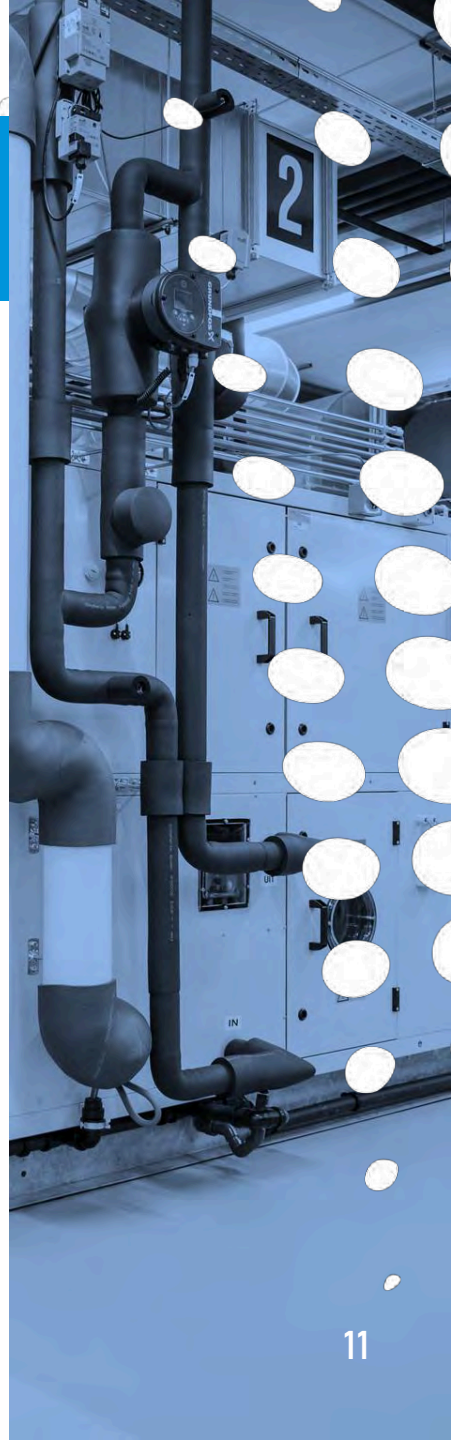
Circular Economy

- EU Circular Economy Action Plan (2020, part of the Green Deal)
- Renovation Wave (2020): strong focus on sustainable and circular renovation of the existing stock

- Dutch National Circular Economy Programme
  - 2050: Fully circular economy.
  - 2030: 50% reduction in the use of primary abiotic raw materials (minerals, metals, fossil).

From Zero Energy Buildings to Zero Emission Buildings

CSRD (Corporate Sustainability Reporting Directive)



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Circular Economy

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From Zero Enery Buildings to Zero Emission Buildings

CSRD (Corporate Sustainability Reporting Directive)

→ Circularity becoming requirement in procurement. Governmental and private.

- While the Dutch Environmental Performance of Buildings indicator is not strict enough for incentivize manufacturers to draft NL-EPD's;
- Clients increasingly demand NL-EPD's as part of their sustainability efforts and circularity goals. This forces manufacturers to perform LCA's and draft NL-EPD's.

What is Circularity in HVAC?

How does the NL-EPD function?

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Circular Economy

What is Circularity in HVAC?

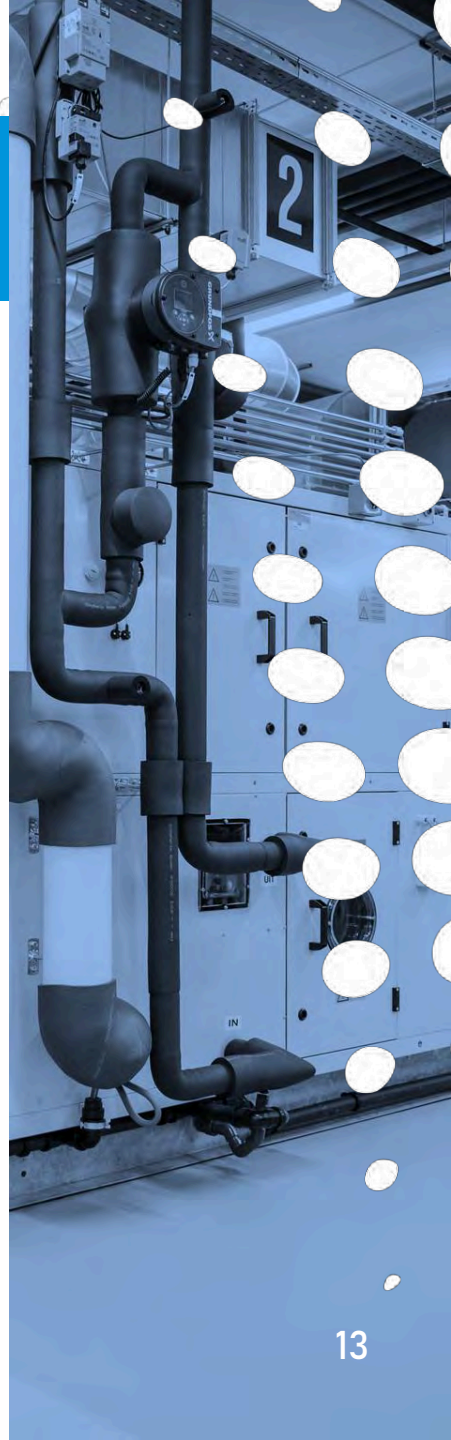
- No definition
- No agreement on scope

How does the NL-EPD function?

- High risk of manufacturer LCA's being worse than generic data
- Inexplicable difference in embodied carbon of different products with same components

- Mentioned in various policies, but not defined

- No harmonized and designated method for HVAC
- No reliable background database for HVAC



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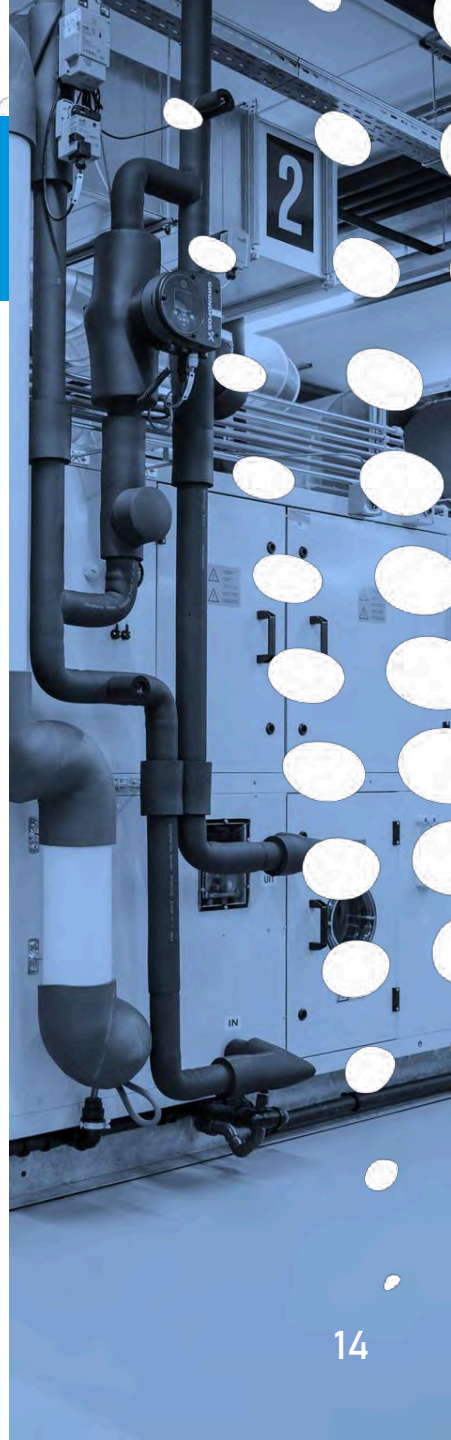
Circular Economy

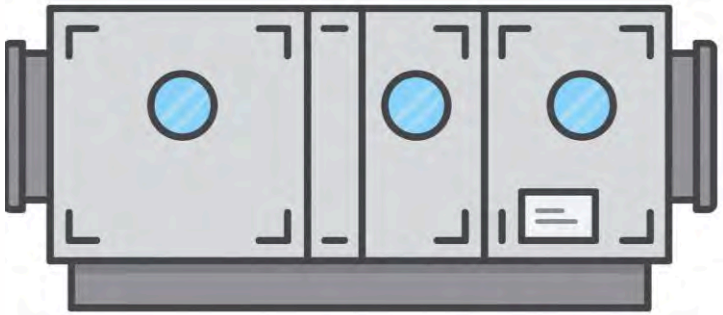
All the while:

- Whole-Life-Carbon Global Warming Potential (WLC-GWP) needs to be implemented in 2028
- Clients increasingly procure based on arbitrary circularity criteria
- Clients increasingly ask for EPD's and base their procurement decision on it
- Manufacturers are forced into uncertainty

WHAT 'R' WE DOING?!



Approaching EPD's in HVAC on EU-level



FUNCTION: Delivering healthy indoor climate

Efficient use of energy

Efficient use of materials

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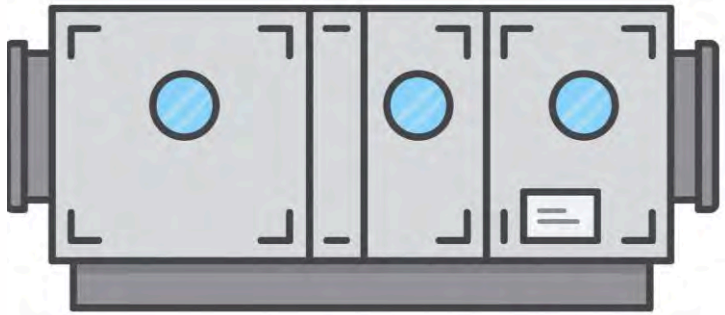
Approaching EPD's in HVAC on EU-level

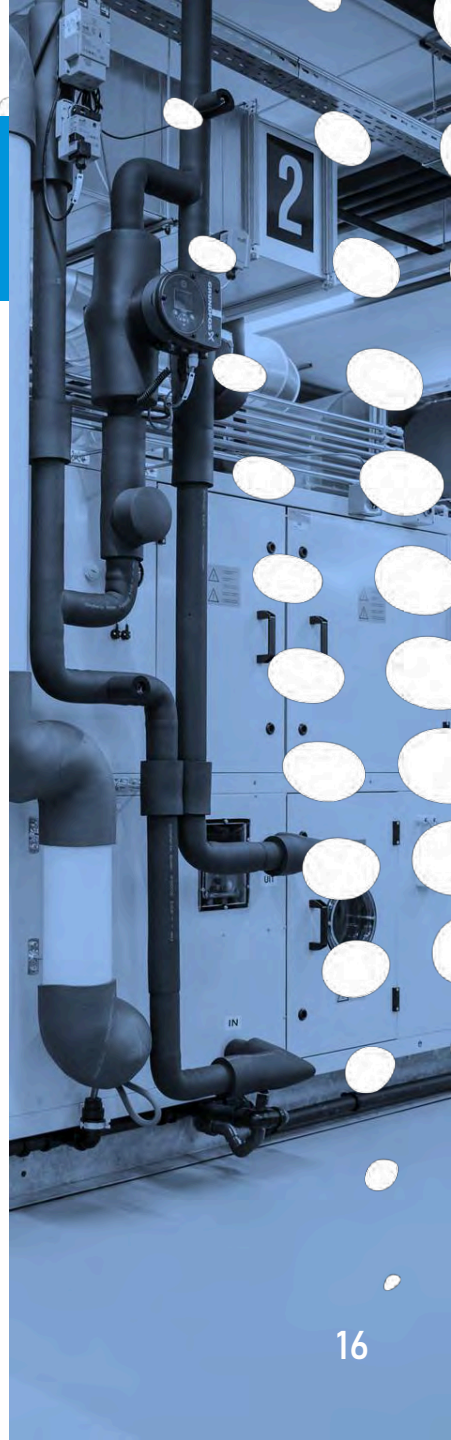


FUNCTION: Delivering healthy indoor climate

Efficient use of energy

EPD

Efficient use of materials



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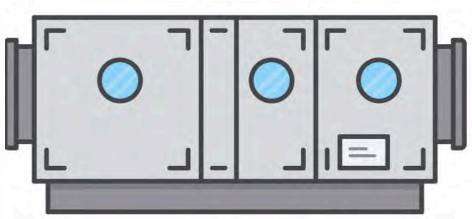
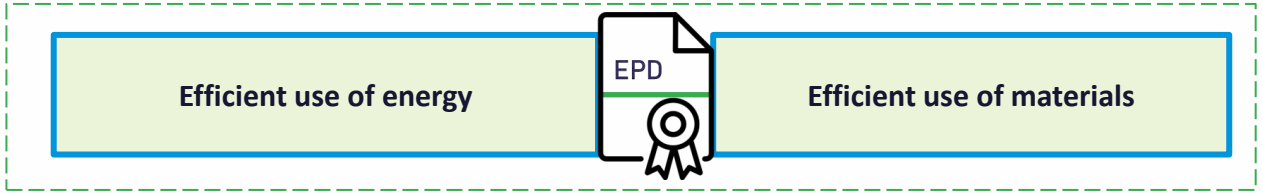
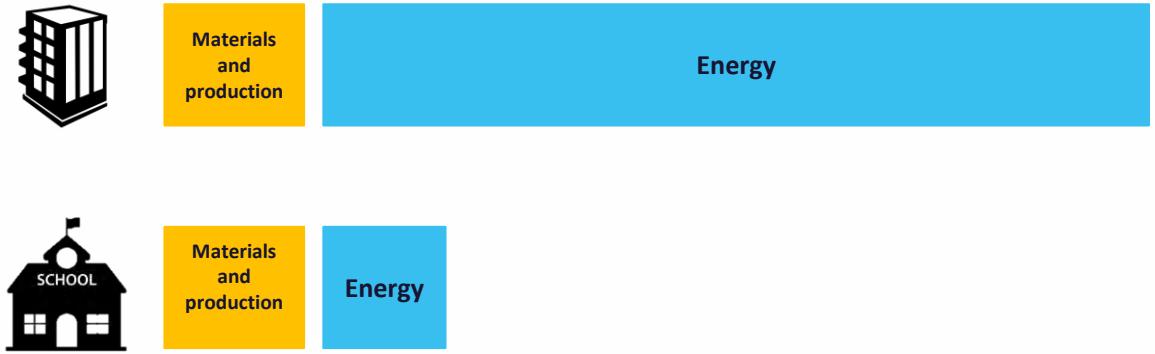
Approaching EPD's in HVAC on EU-level





- Same product, different emissions depending on building
- The higher the energy use, the higher impact of energy efficiency relative to material efficiency -> discourages embodied carbon emission improvements



It is illogical to include emissions a manufacturer has no control over (use-phase) into a single declaration with emissions that a manufacturer does have control over (the product). Keep the EPD pure with embodied carbon of material and production.

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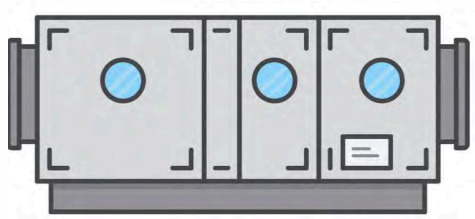
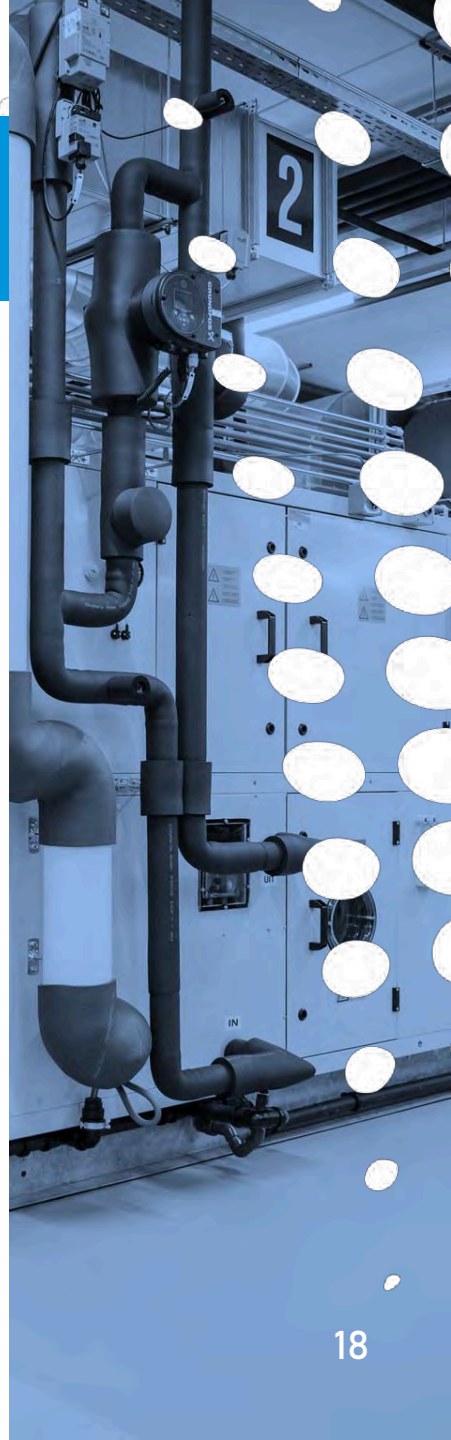
Approaching EPD's in HVAC on EU-level



- Keep EPD focused on materials and production, exclude operational energy use
- Pick a methodology suitable for assembly products that use energy. Make a choice!
- Harmonize EPD's across member states.
- Develop and maintain reliable and representative material databases
- Concider separate material databases for different product groups (i.e., separate databases for construction products and technical building systems)



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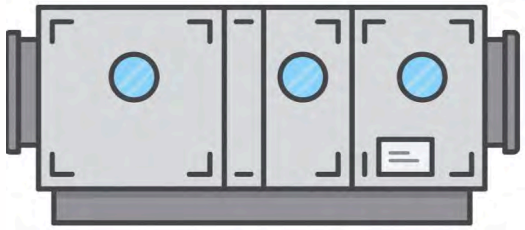
Approaching Circularity in HVAC on EU-level



While there is discussion and differences in definition of circularity, there seems to be acceptance on the concepts that support circularity: an R-ladder.

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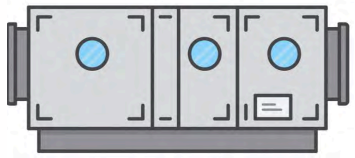
Approaching Circularity in HVAC on EU-level



Step 1: Pick common R-ladder

- R0 Refuse
- R1 Reduce
- R3 Redesign
- R4 Re-use
- R5 Repair
- R6 Remanufacture
- R7 Repurpose
- R8 Recycle

Step 2: Map R's to product phases

A. Pre-use:
R&D and Product Design

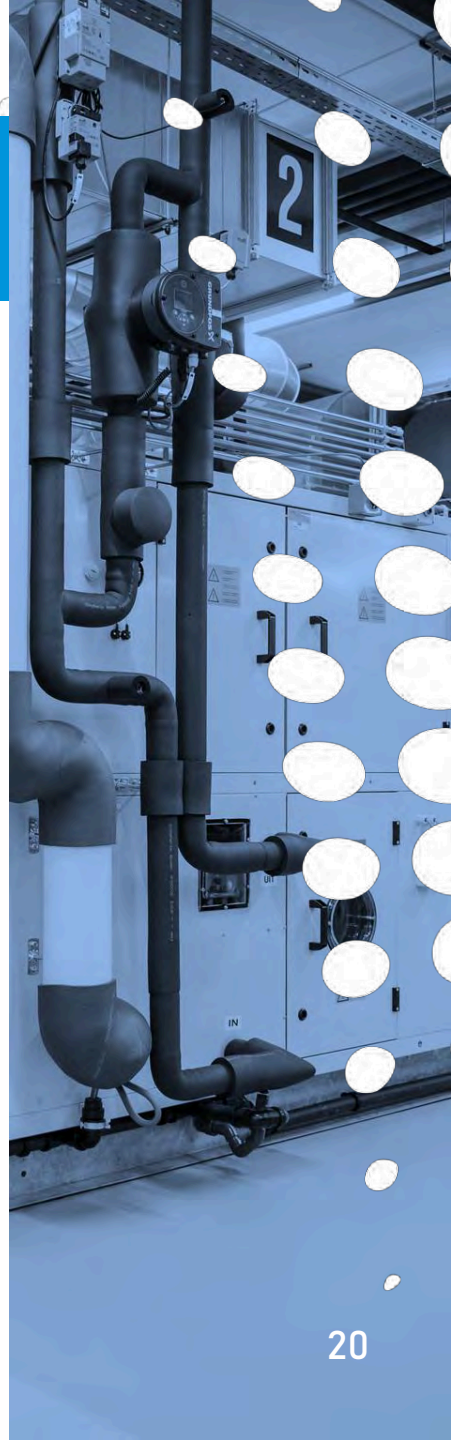
B. In-use:
Service strategies in-use to extend lifecycle

C. Post-use:
End-of-life strategies to minimize environmental footprint

Step 3: Develop framework

Develop a framework of methods and design principles (A) that facilitate life cycle extension (B) strategies and minimized waste in end-of-life (C).

The goal of this is to make products comparable on design and the degree to which they are "fit for circularity".



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Thank you for your attention!

Eurovent Summit 2025