

# The Dutch environmental benchmark system for buildings: it's goals and effects

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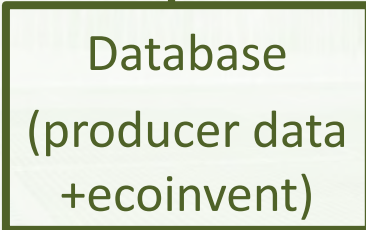
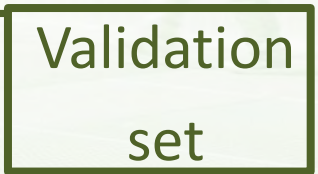
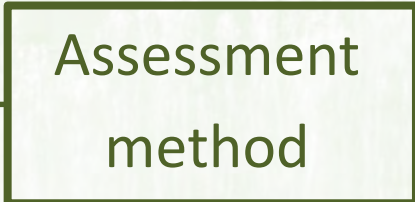
# Context & history

- Evaluation according to **national standardized methodology**  
=> MPG method
- A national LCA database of building products has been developed
- Method in line with European standards (EN 15804, EN 15978)
- Method exists since 2012 => development since more than 10 years with building industry, designers, national government, software developers...
- MPG calculation is **compulsory** for new houses and offices > 100 m<sup>2</sup> since 2013.
- Since 2018 limit of 1.



# How the MPG method works

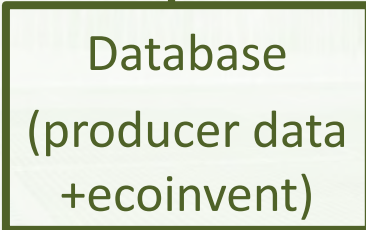
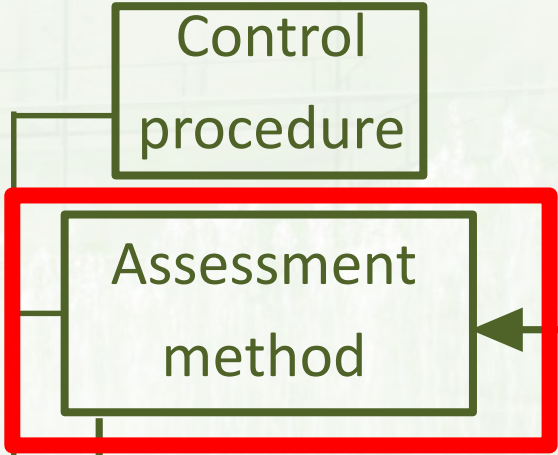
TC350





# How the MPG method works

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# Impact assessment method

## Bepalingsmethode Milieuprestatie Gebouwen en GWW-werken



Berekeningswijze voor het bepalen van de milieuprestatie van gebouwen en GWW-werken gedurende hun gehele levensduur, gebaseerd op de levenscyclusanalyse methode (LCA-CML2).



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# Impact assessment method

- Impact assessment method: Adapted version of **CML IA method** with 11 impact categories
- Impact weighting factors, based on prevention cost
- Default values for building life time (50/75 yr)
- **Operational energy use is not included in MPG**



# 11 impact categories

- Exhaustion raw materials
- Emissions
  - Greenhouse effect
  - Acidification
  - Eutrophication
  - Ozone layer depletion
  - Human toxicity
  - Eco toxicity
  - Smog formation
- Energy use
- Water use
- Waste



**Environmental effects**

**First:**  
€/m<sup>2</sup> GFA/jaar  
**Now:**  
dimensionless

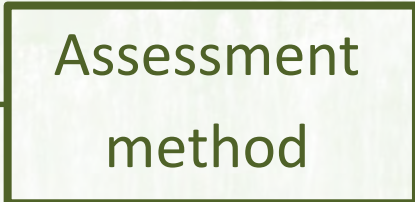
**Additional indicators**





# How the MPG method works

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# NMD product data categories

- 1. Producer-specific, validated by third party**
  - From individual producer





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  - Preferably representative for Dutch market
  - Often based onecoinvent data records
  - 30% 'penalty' is added to all impacts



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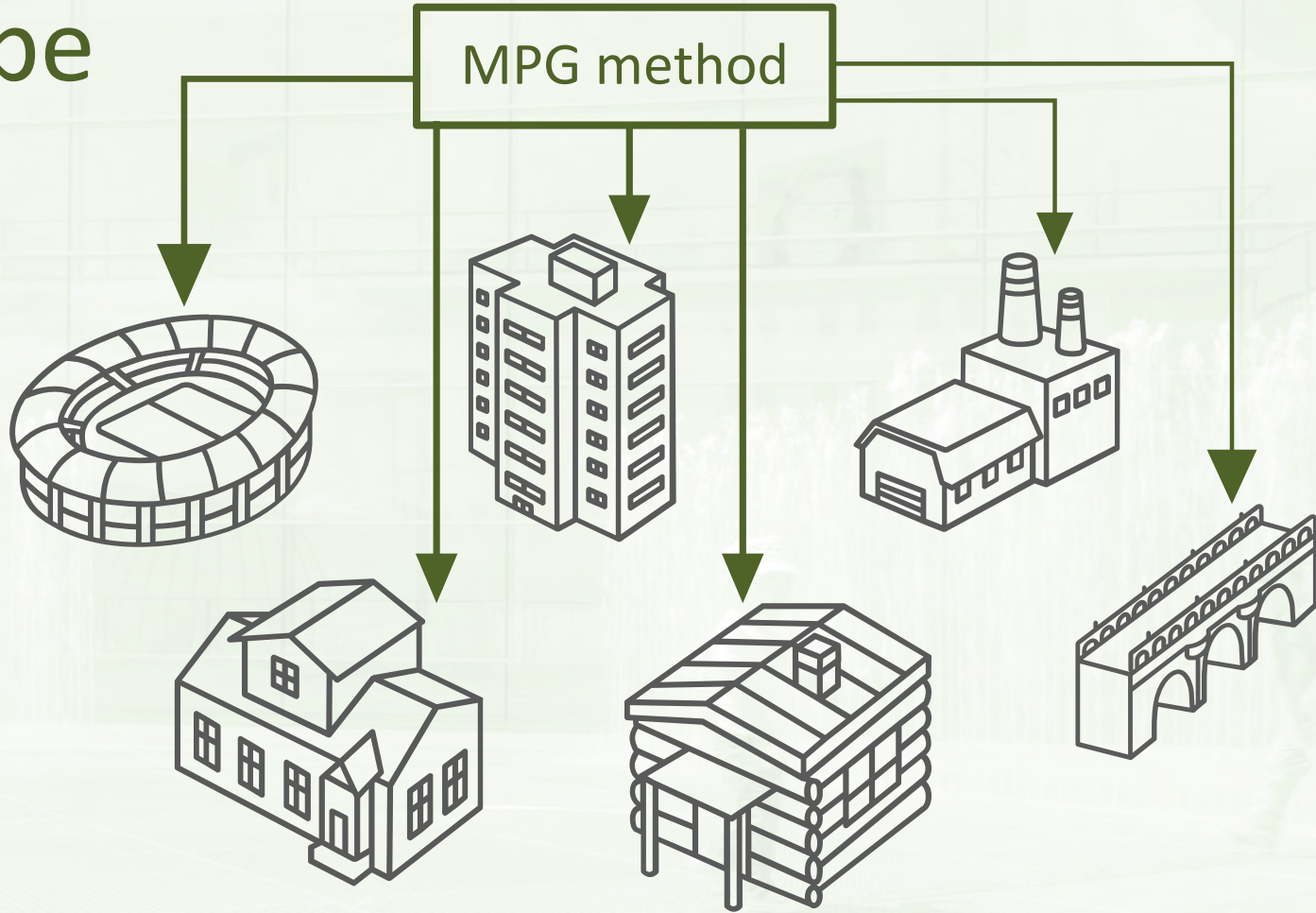
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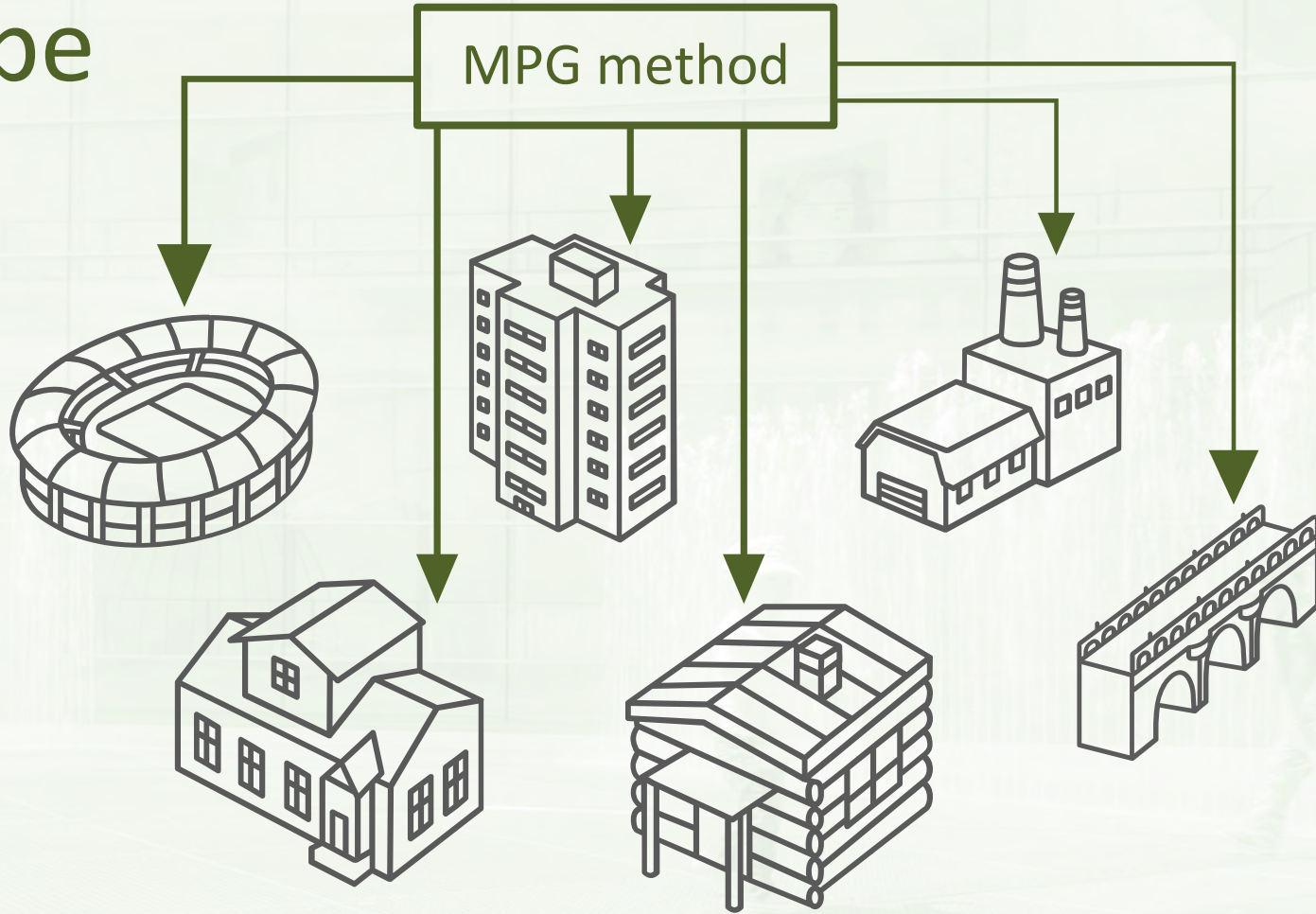
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# Scope





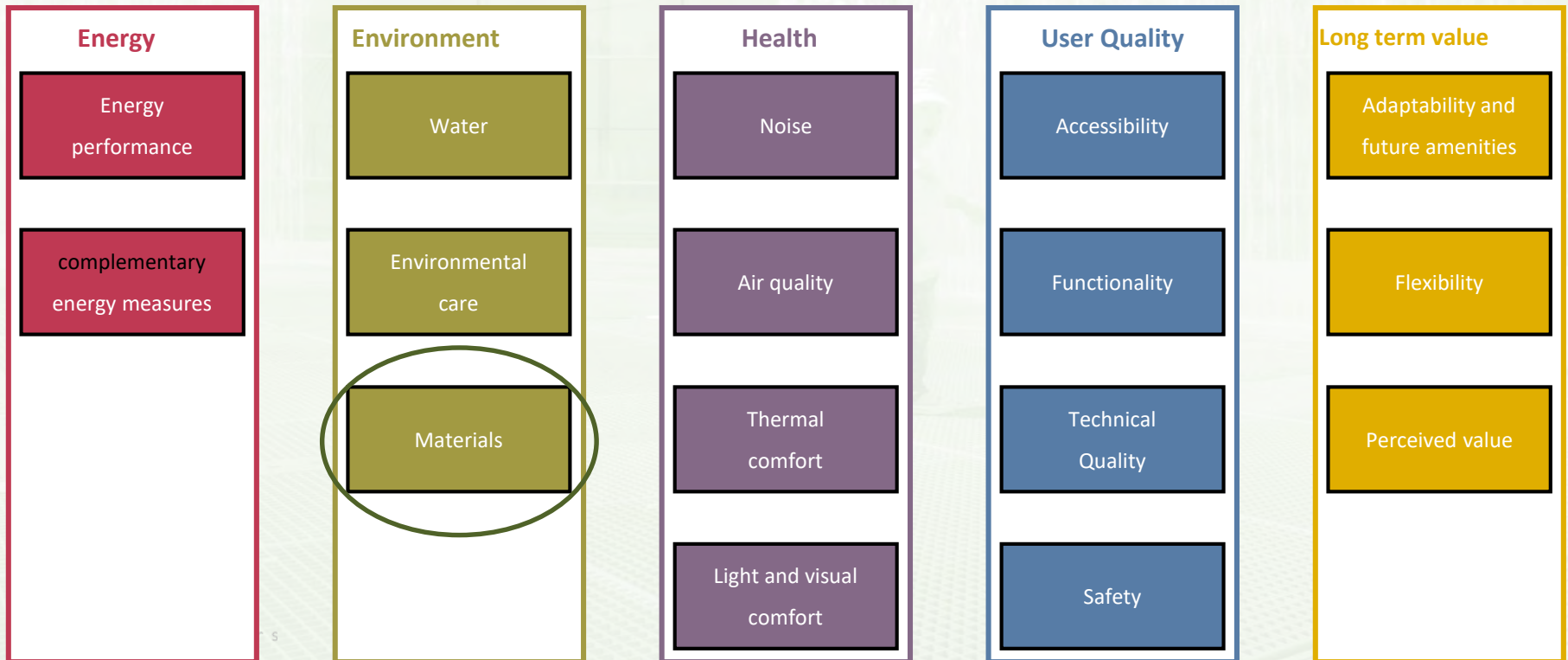
# Scope



# Operation – validated software assessment tools



## GPR Building v.4





# MPG calculation with GPR Building

- Validated assessment tool
- New and renovated buildings can be calculated: also MPG
- Building elements can be selected from database, and amount specified (m<sup>2</sup>, m or pc)
- MPG results shown as numerical values and visually

## RESULTATEN

MPG-KENGETALLEN

MILIEU-EFFECTEN

MPG ELEMENTEN

UITGANGSPUNTEN

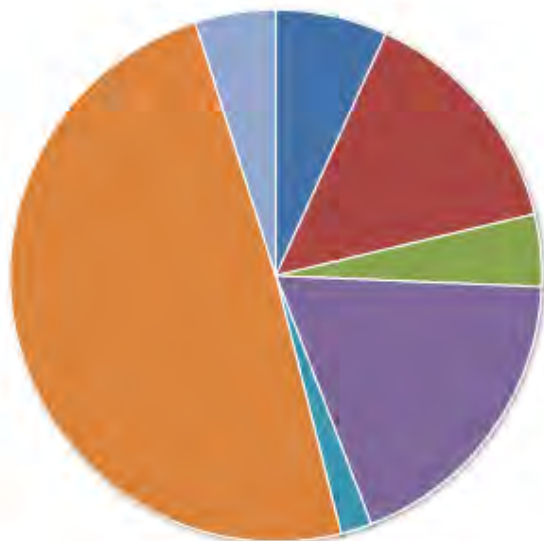
## Gewogen milieueffecten

Milieukengetal	€ / m2 BVO*jaar
Grondstoffen	0.006
Emissies	0.760
MPG (schaduwprijs)	0.766

## Bijdrage gebouwonderdelen aan MPG

Gebouw

Alle bouwdelen



- Foundation, 7%
- Floors, 16 %
- Load bearing construction, 2%
- Facades, 19%
- Roofs, 7%
- Installations, 35%
- Interior, 13%



# Future outlook

- **Calculate circular performance through MPG**
  - In the future national method for circular performance calculation
  - Composition of product in kg (biobased/secondary material)
  - By means of end-of-life scenario's like reuse (credits)
  - Only if conditions are met: disassembly – also effect on MPG
  - More options for longer/different lifetime of product/building: better protected product/building
  - Possibility to assign credit for reused products from start
  - MPG method version 3.0 and database version 3.0 (due July 2019)
- **Lower limit value (less than 1) (2021 and 2050 circularity)**
- **Broader sustainability integration, energy use**

# THANK YOU FOR YOUR ATTENTION

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**W/E adviseurs** is een enthousiast en creatief adviesbureau voor duurzaamheid in bouw, vastgoed en gebiedsontwikkeling. Al ruim 3 decennia. Wij bieden klanten maatwerk in praktisch projectadvies over energie, bouwfysica en duurzaam bouwen & renoveren.

Organisaties ondersteunen we van visievorming tot handelen in de dagelijkse praktijk. We ontwikkelen kennis en software die duurzaamheid inzichtelijk, eenvoudig meetbaar en bespreekbaar maakt. In cursussen delen wij onze kennis en inzichten met u. W/E werkt voor en met iedereen met ambitie.

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# ADDITIONAL MATERIAL

# MPG method – Impact categories & weighting factors

Environmental impact categories	Equivalent unit	Weighting factors [€ / kg equivalent]		
Depletion of abiotic resources (excluding fossil fuels) – ADP	Sb eq	€ 0.16	Raw materials	1-points score
Depletion fossil fuels – ADP	Sb eq <sup>6</sup>	€ 0.16		
Global warming – GWP 100 j.	CO <sub>2</sub> eq	€ 0.05		
Depletion ozone layer – ODP	CFK-11 eq	€ 30		
Photochemical oxidant creation – POCP	C <sub>2</sub> H <sub>4</sub> eq	€ 2		
Acidification – AP	SO <sub>2</sub> eq	€ 4	Emissions	
Eutrophication – EP	PO <sub>4</sub> eq	€ 9		
Human toxicity – HTP	1,4-DCB eq	€ 0.09		
Fresh water aquatic eco toxicity – FAETP	1,4-DCB eq	€ 0.03		
Marine aquatic eco toxicity - MAETP	1,4-DCB eq	€ 0.0001		
Terrestrial eco toxicity – TETP	1,4-DCB eq	€ 0.06		

Milieu-effect	Ehd / m2 BVO*jaar	Eenheid
Uitputting abiotische grondstoffen (excl. fossiel)	1.41E-004	kg Sb eq.
Uitputting fossiele energiedragers	3.63E-002	kg Sb eq.
Klimaatverandering (100 jaar)	6.22E+000	kg CO <sub>2</sub> eq.
Ozonlaagaantasting	5.09E-007	kg CFK-11 eq.
Fotochemische oxidantvorming (smog)	4.00E-003	kg C2H2 eq.
Verzuring	3.00E-002	kg SO2 eq.
Vermesting	6.25E-003	kg PO4 eq.
Humane toxiciteit	2.49E+000	kg 1,4-DCB eq.
Zoetwater aquatische ecotoxiciteit	7.74E-002	kg 1,4-DCB eq.
Maritieme aquatische ecotoxiciteit	3.24E+002	kg 1,4-DCB eq.
Terrestische aquatische ecotoxiciteit	1.05E-001	kg 1,4-DCB eq.

## Indicatoren

Indicator	Ehd / m2 BVO*jaar	Eenheid
Totaal vernieuwbare energie	23.5987	MJ
Totaal niet-vernieuwbare energie<	82.2656	MJ
Energie	105.8934	MJ
Waterverbruik	1.8931	m <sup>3</sup>



# GPR Building tool

- Easy user interface
- Full assessment in 1 -2 days
- Can be used in early design phase
- New and existing buildings (i.e.renovations)
- Widely used by architects, construction industry, local authorities
- > 10.000 users
- Ca. 500 license holders
- GPR certificate used by real estate investors to evaluate the sustainability score of their building portfolio

