

PARIS PROOF EMBODIED CARBON

CALCULATION PROTOCOL



Dutch
Green Building
Council

experts in
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nibe



Colophon

Paris Proof Embodied Carbon
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01 INTRODUCTION

This document defines how embodied CO₂-eq. can be calculated to demonstrate compliance with the Paris Proof limit values.

The Paris Proof embodied CO₂-eq. method is described in a background report (1) and is part of the Whole Life Carbon approach of the Dutch Green Building Council.

To perform the calculation, recognized MPG calculation tools should be used. Information about the MPG and the calculation tools can be found at www.milieudatabase.nl



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02 GLOSSARY AND ABBREVIATIONS

Determination method	The determination method sets out how the life cycle analysis for building materials and products is conducted in the Netherlands and which environmental impacts are calculated.
EPD	Environmental Product Declaration. A presentable and concise representation of an LCA with results such as the environmental impacts and ECI.
GWP	Global Warming Potential. See 'Climate impact'.
kg CO₂-eq.	The unit in which climate change is expressed: kilograms of CO ₂ equivalents. This unit allows the impact of different greenhouse gases to be expressed as one number. For example, the effect of 1 kg of methane is equal to 25 kg of CO ₂ -eq.
Climate impact	The environmental impact of greenhouse gases, expressed in CO ₂ -eq.
LCA	Life Cycle Analysis. A LCA calculates the environmental impact of all the processes and raw materials required to apply a product, over the life of the product. The life cycle is defined by life stages, designated by classification A1 through D. A1-A3 refers to the production stage, B to the use stage, C1-4 to the demolition and waste stage and D the recovery stage.
Environmental impact	A change in the environment as a result of an activity. There are multiple environmental impacts, such as: climate impact, acidification and toxicity. Each describes a different effect with its own unit.
ECI	Environmental Cost Indicator. A life cycle analysis calculates the environmental impact of a material, product, or structure. These environmental impacts (multiple numbers with different units) can be converted into one integral number: the environmental cost, in euros.
MPG	MilieuPrestatie Gebouw. [Environmental Performance of Buildings calculation] A sum of the shadow costs of all products and materials used in the building divided by the period covered and the gross floor area.
NMD	Nationale MilieuDatabase. [National Environmental Database] The database used to calculate the environmental performance of buildings and/or building products. The database contains a large number of profiles of materials and products commonly found in construction with their associated environmental impacts and shadow costs.

03 CALCULATION METHOD

The basis for the embodied CO₂-eq calculation is an MPG calculation. An MPG (environmental performance building calculation) is a calculation at the building level and is described in the Determination Method for the Environmental Performance of Construction Works, Section 3, and the Environmental Performance Calculations guide.

The calculation must be carried out in one of the calculation tools recognized by the National Environmental Database (NMD) Foundation (www.milieudatabase.nl). When preparing the calculation, the most recent version of the National Environmental Database should be used and the results should indicate the preparation date of the calculation.

In the calculation, building life should be set to 30 years and the environmental impact of climate change is added together over modules [A1-A3]+[A4-A5].

The software does not support this at this time. The user must do this manually. A printout of the MPG calculation must be enclosed for substantiation. (see example in Annex 1).

The result is obtained in kg CO₂-eq. The target value is determined in kg CO₂-eq. per m² and for this purpose the sum over modules A1-A5 should be divided by the gross floor area (GFA), as used in the MPG calculation.

The MPG calculation, which serves as the basis for determining embodied CO₂-eq., should include all components of the structure, as the building was realized (at completion) or designed (at design), including all means of energy generation and insulation materials.



04 LIMIT VALUES

In order to comply with Paris Proof embodied CO₂-eq., the building must have an embodied CO₂-eq. value per m² GFA that is lower than or equal to the limit values indicated in Table 1 applicable to new buildings and Table 2 applicable to renovations for the year in question.

Limit values for new construction

Table 1. Limit values for Paris Proof structures. Limit value is indicated in embodied carbon per m² of structure

Paris Proof limit values	embodied carbon kg CO ₂ -eq. per m ²			
	2021	2030	2040	2050
Residence (single-family home)	200	126	75	45
Residence (multi-family home)	220	139	83	50
Office	250	158	94	56
Retail real estate	260	164	98	59
Industry ⁵	240	151	91	54

Limit values for renovation

Table 2. Limit values for Paris Proof structures. Limit value is indicated in embodied carbon per m² of structure.

Paris Proof limit values	embodied carbon kg CO ₂ -eq. per m ²			
	2021	2030	2040	2050
Residence (single-family home)	100	63	38	23
Residence (multi-family home)	100	63	38	23
Office	125	79	47	28
Retail real estate	125	79	47	28
Industry	100	63	38	23

5) Based on a distribution centre.

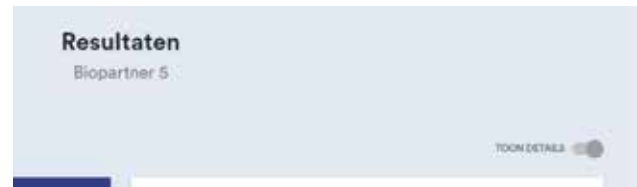
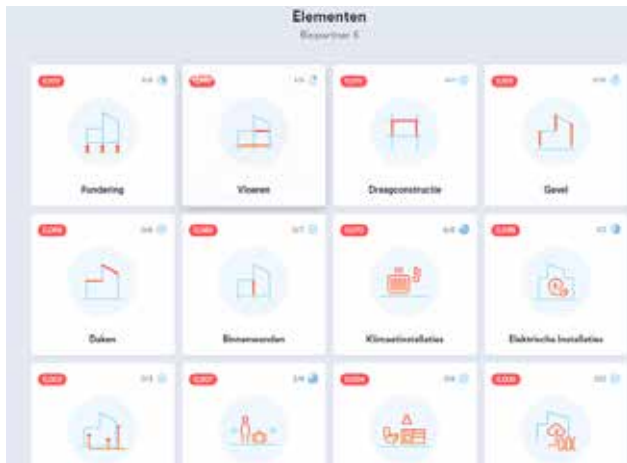
05 REFERENCES

1. NIBE. Background report Paris Proof. sl : NIBE, 2021.
2. NMD. Foundation. Guide to environmental performance calculations. sl : NMD Foundation, July 2020.
3. DGBC. Paris Proof operational energy use. Sl: DGBC, 2021.

ANNEX 1. EXAMPLE OF A CALCULATION

Firstly, the MPG calculation is built into a recognized calculation tool, here for example into GPR Materiaal:

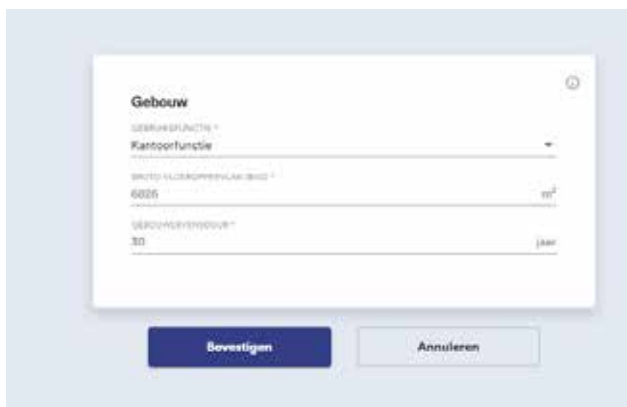
When showing the results, the option “TOON DETAILS” [“SHOW DETAILS”] is selected:



Then “klimaatverandering-GWP 100 jaar” [“climate change GWP 100 years”] is read for modules A1-A3 + A4-A5:

The building life is set to 30 years:

Milieu-impactcategorieën (omgeving)	A1-A3 (kg CO2-eq)	A4-A5 (kg CO2-eq)	TOTAAL (kg CO2-eq)
Uitvoering chemische grondstoffen (gemiddeld) - GWP	1,23e+6	6,95e+4	1,299e+6
Uitvoering fysieke grondstoffen - GWP	0,00e+0	0,00e+0	0,00e+0
Klimaatverandering - GWP 100 jaar	1,28e+6	6,95e+4	1,349e+6



These values are added together, the total of which is $1.38e+6 + 6.95e+4 = 1,449,500$ kg CO₂-eq.

If we divide this total by the GFA of 6826 m², we obtain the embodied CO₂-eq. value of 212.35 per m².



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