



BREEAM LCCA

Ghelamco Diegem - Design phase LCCA

10/07/2019

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General project information

Subject	Design phase stage 2 LCCA
Date	10/07/2019
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Goal	Obtaining insight into the costing of the building throughout its lifecycle.

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1. INTRODUCTION

BM engineering is pursuing a BREEAM very good certification level for their office building at Culliganlaan 5, Machelen. To achieve this level the team choose to pursue the MAN 02 credit which contains a LCCA (life cycle costing assessment). For this credit 4 points can be achieved. This report describes the elemental LCCA analyses and its results. Next to achieving building certification the purpose of this study is to calculate the total cost of the building throughout the different stages of its lifecycle. This study shows the design phase LCCA results for the NC (new construction) project at stage 2 considering the costing of: construction, major replacements, maintenance and operation. It is intended that this appraisal meets the requirements of BREEAM NC 2016 Man 2 assessment criteria for the first two credits. The life-cycle costing is carried out with One Click LCA, a life-cycle performance cloud software, in compliancy with ISO 15686-5 standard while following the structure of EN 16627 standard.

2. DESCRIPTION OF THE BUILDING

The building is a free standing 13 story office building with a basement floor. The total floor area is 31.000m². A 22.000m²(with more than 3600 m² terrace) part shall be used as headquarters for one company with a high-quality, international image. C.a. 8.000m² shall be used as a co-working space ("Meet District"), also related to the airport as an image-related activity.

Summary	
Building type	office building
Construction year	2019
Building area	31.000m ²
Building function(s) and service(s): Office and meeting rooms with a cafeteria	Office and meeting rooms.
Extent of use	The project has an above-ground gross floor area from approx. 30.000m ² ,
Relevant technical and functional requirements	Office / co-working space
Required service life	60 years (BREEAM requirement)

3. BREEAM CRITERIA MAN 2 (2 CREDITS) – ELEMENTAL LIFE CYCLE COST

1. An outline, entire asset elemental LCC plan has been carried out at the Concept Design stage together with any design option appraisals in line with 'Buildings and constructed assets – Service life planning – Part 5: Life cycle costing ISO 15686-5:2008 (4).
2. The outline LCC plan:
 - a. Provides an indication of future replacement costs over a period of analysis as required by the client (e.g. 20, 30, 50 or 60 years)
 - b. Includes service life, maintenance and operation cost estimates.
3. Demonstrate, using appropriate examples provided by the design team, how the elemental LCC plan has been used to influence building and systems design, and specification to minimise life cycle costs and maximise critical value.

4. LIFE CYCLE COSTING ASSESSMENT RESULT SUMMARY

The Life cycle costing assessment was calculated using One Click LCA. The results represent the total life cycle costing during 60 year service life. The service life of 60 years is a chosen as it is also used for the MAT01 calculations and is required for BREEAM.

I	Sector	Life-cycle cost, discounted (€)	LCC, nominal (undiscounted, includes inflation) (€)
A0-A5	Construction	34.241.032	34.241.032
B4-B5	Replacement/refurbishment	1.302.436	3.552.199
B6	Operational energy use	13.936.062	36.591.535
B7	Operational water use	2.157.842	5.665.786
C1-C4	End of life	471.199	2.876.884
I	Total	52.108.571	82.927.436

Table 1: Total costing results

5. THE LIFE CYCLE COSTING ASSESSMENT SCOPE AND SYSTEM BOUNDARIES.

In the assessment following life cycle stages according to EN 15804:2012 were included:

Product Stage			Construction Process Stage		Use Stage							End-of-Life Stage			
Raw material supply	Transport	Manufacturing	Transport to building site	Installation into building	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
	X		X	X			X			X	X			X	

Table 2: Included lifecycles

As seen above the LCCA takes several life cycle stages into consideration. Description of each the life cycle stages and analysis scope are provided in the table below:

Life cycle module	Analysis scope
A0-A5 Pre-construction and before use stage	Costs of purchase or rental costs (costs of the site); costs of building products; costs related to the transport between factory and site; project feasibility, planning, design, engineering and construction costs, incl. permissions, commissioning and handover; site clearance and landscaping (e.g. lawn, trees, and similar within the curtilage and other external works costs; subsidies and incentives (e.g. incomes related to renewable energy).
B1-B3 Operation and maintenance costs	Building-related facility management costs (e.g. regular cleaning, insurance, security, fire inspection, and similar costs); repair costs; ground maintenance; redecoration.
B4-B5 Replacement / refurbishment	Planned adaptation or refurbishment (incl. infrastructure, fitting out and commissioning, validation and handover); replacement of major systems and components (incl. associated design and project management).
B6 Operational energy use	Energy costs (incl. fuel and electricity for heating, cooling, power, domestic hot water, and lighting, as per EPBD).
B7 Operational water use	Water-related costs (e.g. rates, local charges, environmental taxes)
C1-C4 Deconstruction	Demolition costs; transport costs associated with deconstruction and disposal; fees & taxes (e.g. landfilling); waste processing costs

Table 3: Description of life cycle stages

6. ANALYSIS MATERIAL SCOPE

The LCCA analysis included following building elements:

Element	Included	Comments
SUPERSTRUCTURE		
Frame	<i>Yes</i>	
Upper floors	<i>Yes</i>	
Roof	<i>Yes</i>	
Stairs	<i>Yes</i>	
External Walls	<i>Yes</i>	
Windows & External doors	<i>Yes</i>	
Internal Walls and Partitions	<i>Yes</i>	
Internal Doors	<i>Yes</i>	
INTERNAL FINISHES		
Wall Finishes	<i>No</i>	Not in LCCA scope
Floor Finishes	<i>No</i>	in LCCA scope
Ceiling Finishes	<i>No</i>	in LCCA scope
BUILDING FITTINGS & FURNISHINGS		
Fixed fittings and equipment	<i>No</i>	Not in LCCA scope
SERVICES		
Sanitary Fittings	<i>No</i>	Not in LCCA scope
Services Equipment	<i>No</i>	Not in LCCA scope
Disposal Installations	<i>No</i>	Not in LCCA scope
Water Installations	<i>No</i>	Not in LCCA scope
Heat Source	<i>No</i>	in LCCA scope
Space Heating and Air Treatment	<i>No</i>	Not in LCCA scope
Ventilation Systems	<i>No</i>	Not in LCCA scope
Electrical Installations	<i>No</i>	Not in LCCA scope
Gas Installations	<i>No</i>	Not in LCCA scope
Lift Installations	<i>No</i>	Not in LCCA scope
Protective Installations, inc. internal CCTV	<i>No</i>	Not in LCCA scope
Communication Installations	<i>No</i>	Not in LCCA scope
Specialist Installations	<i>No</i>	Not in LCCA scope
EXTERNAL WORKS		
Site works	<i>No</i>	Not in LCCA scope
Drainage	<i>No</i>	Not in LCCA scope
External services	<i>No</i>	Not in LCCA scope

Table 4: Material scope

7. ENVIRONMENTAL DATA SOURCES

The One Click LCA LCC-tool was used in the assessment. The tool uses data bases to calculate the LCC. All of the datasets in the tool follow ISO 15686-5 & EN 16627 standard.

8. PROJECT DATA SOURCES AND ASSUMPTIONS

The proposed building was calculated in One Click LCA based on design data from:

- "18158BMS_Ruwbouw_samenv_meetst_190702 (2).pdf"
- "ruwbouw meetstaat architect 190702.pdf"
- "01-04-251 - Gevel opbouw_Schedule Curtain panels (1).pdf"
- "Culligan Gevel_Meetstaat ARCH_190604.pdf"

The following table contains the calculation methods for each area of analysis:

Area of analysis	Data sources
Material quantities (A1-A3)	"18158BMS_Ruwbouw_samenv_meetst_190702 (2).pdf", "ruwbouw meetstaat architect 190702.pdf", "01-04-251 - Gevel opbouw_Schedule Curtain panels (1).pdf", "Culligan Gevel_Meetstaat ARCH_190604.pdf"
Building material transport distances (A4)	Transport distances were estimated based on typical average transport distances based on material type provided by calculation tool.
Construction and installation process (A5)	Calculation tool average construction process emissions based on project size were used in the analysis.
Material service life (B1-B5)	values from One Click LCA database were used.
Building use phase energy consumption (B6)	Energy consumption was estimated based on average energy use for offices: 250kwh/m ² .
Building use phase energy consumption (B7)	Water consumption was estimated

Table 5: Data sources

9. CALCULATION PARAMETERS

Parameters	Answer
Project country/region	Belgium
Applicable exchange rate	1.0
Currency symbol / shortform	€
Discount rate (cost of capital)	3
Energy inflation rate	2
EOL as % of capex	2.5
General inflation rate	2
Hourly labour rate of craftsman	45.0
Hourly labour rate of worker	33.4
Regional material cost index	0.8
Calculation period	60
Water inflation rate	2

Table 6: Calculation parameters

10. ASSESSMENT RESULTS

11. CONCLUSION

Several conclusions can be made from this analysis. The first one should be the big effect of the electricity use on the calculation. This can be explained for it is based on a assumption of 100kwh/m². Also the use of renewables is not taken into account. A clearer view on the electricity use can be obtained by performing a dynamic energy calculation. This way the performance can be estimated more exact. Energy monitoring could is also a good indication for the energy use. The impact of the technical systems is not taken into account for this analysis. The buildings main structural element is concrete which is not a very sustainable product. There is no good alternative for the size of this building. However for the internal partitions wood cement could be used. The use of Rockwool or PUR is also not very sustainable. Some alternatives could be wool, paper flakes, flexible wood wool, iso cork, glass foam, iso flax, cotton insulation or plant fibre.

Asustainable alternative for gypsum is gypsum fibre board.

Several extra items to take into consideration during the construction phase are:

- Monitoring of energy use
- Distance to and from companies to construction site
- Load capacity of trucks (try to combine transport runs to ensure fully loaded trucks)
- Use materials with a higher life expectance
- Use of natural materials for insulation : wool, paper flakes, flexible wood wool, iso cork, glass foam, iso flax, cotton insulation or plant fibre. instead of PU or foam materials.
- Use of sustainable alternatives for gypsum, wood panels or gypsum fibre board
- Implementation of renewable energy

The Rfo project is a class A project with C Co2 equivalent level between 440 and 580kg Co2e/m² as seen in the table below. This project scores 485 kg CO₂e/m²

Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO ₂ e/m ²
(< 300) A	
(300-440) B	
(440-580) C	485
(580-720) D	
(720-860) E	
(860-1000) F	
(> 1000) G	

Figure 1: Performance metric Carbon Heroes Benchmark (A1-A4, B4-B5, C1-C4) CH Q1 2019 EEU - office

12. DETAILED ASSESSMENT RESULTS

In the following table the detailed results for each category are shown.

Sector	Global warming kg CO2e ?	Acidification kg SO2e ?	Eutrophication kg PO4e ?	Ozone depletion potential kg CFC11e ?	Formation of ozone of lower atmosphere kg Ethenee ?	Non hazardous waste disposed kg	Biogenic carbon storage kg CO2e bio	
A1-A3 ? Construction Materials	1,33E7	2,81E4	5,25E3	9,92E-1	4,18E3	4,52E6	1,4E5	Details
A4 ? Transportation to site	5,31E5	1,11E3	2,33E2	9,28E-2	6,98E1	2,75E3		Details
A5 ? Construction/installation process	4,57E6	1,58E4	4,37E3	9,85E-1	8,02E2	3,71E5		Details
B1 ? Use Phase	-1,33E5	0E0	0E0	0E0	0E0	0E0		Details
B4-B5 Material replacement and refurbishment	6,62E5	1,76E3	4,16E2	2,61E-2	3,62E2	4,66E4		Details
B6 ? Energy use	5,31E7	1,79E5	3,1E4	1,26E1	9,97E3	1,64E6		Details
B7 Water use	1,26E6	8,72E3	2,5E4	1,26E-1	3,66E2	6,15E5	0E0	Details
C1-C4 Deconstruction	5,79E5	1,98E3	4,18E2	3,06E-2	1,55E2	2,79E5		Details
D External impacts (not included in totals)	-3,32E6	-8,34E3	-1,81E3	-5,13E-2	-6,63E2	-3,04E5		Details
Total	7,39E7	2,36E5	6,67E4	1,49E1	1,59E4	7,47E6	1,4E5	
	Show graph	Show graph	Show graph	Show graph	Show graph	Show graph	Show graph	
Results per denominator								
Gross Internal Floor Area (IPMS/RICS) 31000.0 m2	2,38E3	7,62E0	2,15E0	4,79E-4	5,13E-1	2,41E2	4,52E0	

Assessment period fixed to 60 years.

Table 7: Detailed assessment results

13. BREEAM SCORE

For BREEAM a total of 87% will be achieved following the mat01 calculator this is good for total of 5 points and the exemplary credit. See "BREEAM_2016_Mat01_calculator_9.0_ghelamco1.2.xlsx".

Percentage of Mat01 points achieved:		87,0%
Select building type:	All others	
Credits achieved	5 + Exemplary	

Figure 2: BREEAM credits results

14. DESCRIPTION OF ONE CLICK LCA CALCULATION TOOL

The calculations were performed with One Click LCA calculation tool. The software is fully compliant with EN 15978 standard. One Click LCA has been third party verified by ITB for compliancy with the following LCCA standards: EN 15978, ISO 21931-1 and ISO 21929, and data requirements of ISO 14040 and EN 15804. You can find the official letters of compliancy here: <https://www.oneclicklca.com/wp-content/uploads/2016/11/360optimi-verification-ITB-Certificate-scanned-1.pdf>.

ITB is a certification organization and a Notified Body (EC registration nr. 1488) to the European Commission designated for construction product certification. Polish Accreditation Board assures the independence and impartiality of ITB services (Accreditation Certificates are: AB 023, AC 020, AC 072, AP 113). ITB activities are conducted in accordance to the requirements of the following assurance standards: ISO 9001, ISO/IEC 27001, ISO/IEC 17025, EN 45011, and ISO/IEC 17021.

ATTACHMENT 1, SOURCES:

Sources

Resource name	Country	Product	Density	Date	Environment Data Source	Standard	EPD number	EPD program	Manufacturer	PCR	Notes about PCR	Technical specification	Upstream data base	Verification
Aluminium casement frame section, thermally separated, powder coated	[germany]		20	2016	Oekobau.dat	EN15804	-	OKOBAUDAT		EN15804	-	1.51 kg/m	GaBi	verified
Aluminium composite panels	[germany]		20	2018	EPD Aluminium composite panels	EN15804	EPDGDA-20130261-IBG1EN	IBU	Gesamtverband der Aluminiumindustrie	Products of aluminium and aluminium alloys, 10-2012	Only with EN15804	4mm, 7.04 kg/m ²	GaBi	Verified

Aluminium frame section, thermally separated, powder coated	[germany]		2016	Oekobau.dat 2017-I	EN15804	-	OKOB AUDAT		EN15804	-	1.43 kg/m	GaBi	verified	
Aluminium metal plate	[italy]	EDILFIBRO / Metaplastik	2700.0	2015	FDES	EN15804	4251	INIES	Esalex	EN15804	EN15804	1.2 mm, 2.327 kg/m2	ecoinvent	Verified
Autoclaved aerated concrete	[germany]	P8 0,80	884.0	2014	EPD Unbewehrte Porenbeton P8 0,80 H+H Deutschland GmbH	EN15804	EPDHHI-20140047-IAA1DE	IBU	H+H Deutschland	PCR Porenbeton, 08-2012	Only with EN15804	300-800 kg/m3	GaBi	Verified
Cement fiberboard	[france]	AQUAPANEL Outdoor	1200.0	2017	FDES	EN15804	6793	INIES	KNAUF	EN15804	-	ép. 12.5 mm, 15 kg/m2	ecoinvent	-

Concrete	[germany]	240	20	Beton der Druckfestigkeitsklasse C 35/45, Informations Zentrum Beton GmbH 2013	EN15804	EPD_IZB_2013441_D	IBU	IZB	Rechenregeln für die Ökobilanz und Anforderungen an den Hintergrundbericht, 09-2012. Betonbauteile aus Ort- und Lieferbeton, 07-2012. Betonfertigteile, 05-2011.	Only with EN15804	C35/45 (B35 M40) (ex rebar)	GaBi	Verified
Concrete (ex rebar)	[poland, germany, sweden]	235	20	Concrete and reinforced concrete prefabricates, Scanbet 2013	EN15804	N/A	ITB	Scanbet	PCR UN CPC 375	Only with EN15804	C35/45 (B35 M40)	-	Verified

Concrete block, masonry	[france]	865.0	2017	FDES	EN15804	5985	INIES	CERIB	EN15804	EN15804	B40, 200x500x200/250 mm	ecoinvent	Verified
Concrete prefabricated elements, reinforced	[poland, germany, sweden]	2437.0	2013	Concrete and reinforced concrete prefabricates, Scanbet 2013	EN15804	N/A	ITB	Scanbet	PCR UN CPC 375	Only with EN15804	C35/45	-	Verified
Concrete slab foundation, incl. reinforcing, per m3 of slab	[europe]						One Click LCA				C35/45	Ecoinvent	

Curtain wall system with aluminium frame	[belgium]	Concept Wall® 50	20 16	EPD Concept Wall® 50 Reynaers	EN15 804	-	-	Reynaers	Product Category Rules (PCR) for Aluminium Building Products – version of 30 Jan 2013	Only with EN15804	double glazing 2 x 4 mm, 3.6 m x 7.2 m	GaBi	-
DPL laminate flooring	[europe]	### ### #	20 15	EPD Direct Pressure Laminate Floor Covering (DPL Floor Covering) European Producers of Laminate Flooring e.V.	EN15 804	EPDEPL-20150021-CBE1EN	IBU	EPLF	PCR Floor coverings, 07.2014	Only with EN15804	9 mm, 800-1200 kg/m3	GaBi	Verified

Fire-resistant glazing	[europe]	CONTR AFLAM 30-2 (5/4/5)	220 0.0	20 18	EPD CONTRAFLAM 30 30 (5/5) – 30 (6/6) – 30 (8/8) – 30 STADIP (5/44.2) – 30 PROTECT P4A – 30-2 (5/4/5) EI30 (Insulation): Fire resistant glazing with tested heat insulation of 30 minutes	EN15 804	S-P-01092	International EPD System	Vetrotech	PCR 2012:01 Construction products and construction services, version 2.1 / 2017-01-04	Only with EN1 5804	20 mm, 44 kg/m2	GaBi	Verified
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Fittings, rail anchoring system, for rebar	[germany]	HAC	785 0.0	20 13	Oekobau.dat 2017-I, EPD Ankerschienensystem HAC Hilti Aktiengesellschaft	EN15 804	EPDHIL-20130069-IBA2DE	IBU	Hilti	Dünnwandige Profile und Profiltafeln aus Metall, 02-2013	Only with EN15804		GaBi	Verified
Glass façade	[germany]	FWS 50		20 17	EPD	EN15 804	EPDSÜC-20170131-IBC1DE	IBU	Schüco	Vorhangfassaden	Only with EN15804	3050 x 3050 mm, 385.78 kg, 41.47 kg/m2	GaBi	Verified
Hollow core concrete slab + reinforcement	[norway]	L4	### ### #	20 13	Håldäck 320 Kynningsrud Prefab AB, NEPD 200N	ISO1 4040	NEPD 200 N	EPD Norge	Kynningsrud Prefab	NPCR 020 Precast Concrete Products, 2011	Only with EN15804	4-holes, 320 mm	-	Verified

Industrial sectional door from steel	[denmark]	LDI steel	2017	Oekobau.dat 2017-I, EPD sectional door LDI steel, LDC steel, LDP	EN15804	EPD-LD-GB-24.0	ift Rosenheim	Lindab A/S	PCR document „Türen und Tore“ – PCR-TT-1.1:2013	Only with EN15804	20.3 kg/m ²	GaBi	verified	
Insulation panel, PUR	[france]	Thane Sarking	33.0	2015	FDES	EN15804	4552	INIES	KNAUF	EN15804	EN15804	120 mm	ecoinvent	Verified
Insulation panel, PUR	[france]	Thane ET Se	33.0	2015	FDES	EN15804	4556	INIES	KNAUF	EN15804	EN15804	120 mm	ecoinvent	Verified
Luxury vinyl floor tiles	[unitedKingdom]	Signature	2018	EPD Amtico Signature	EN15804	BREG EN EPD 000183	BRE	Amtico	EN15804	-	2.5 mm, 3.141 kg/m ²	ecoinvent	Verified	

Natural stone massive slabs	[europe]	270 0.0	20 12	Background Report for Environmental Product Declarations (EPD) LCCA of natural stone, European & International Federation of Natural Stone Industries EUROROC	ISO14040	-	-	EUROROC	-	-	-	-
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PUR rigid insulation panels, for concrete sandwich panels	[france]	Thane Mur B2i 140mm	### ### #	20 18	FDES	EN15804	7937	INIES	KNAUF	EN15804	EN15804	L= 0.022 W/mK, R= 6.50 m2k/W, 140 mm, 4.74 kg/m2, 33.85 kg/m3, Lambda= 0.022 W/(m.K)	ecoinvent	Verified
Precast concrete foundation footing, incl. reinforcement	[france]			20 17	FDES	EN15804	7903	INIES	SNBPE	EN15804	EN15804	Dimension: 30x40 cm, Béton/Cement: C25/30 XF1, CEM II/A-L	ecoinvent	-
Precast concrete part, staircase	[germany]			20 16	Oekobau.dat 2017-I	EN15804	-	OKOB AUDAT		EN15804	-	1,1 m wide, 9 steps each 16 cm, 1965 kg/unit	GaBi	verified

Ready-mix concrete	[germany]	240	20	EPD Beton der Druckfestigkeitsklasse C 35/45 Informations Zentrum Beton GmbH	EN15804	EPDIZB-20180098-IBG1DE	IBU	Information Zentrum Beton GmbH	Betonbauteile aus Ort- oder Lieferbeton.pdf	Only with EN15806	C 35/45, 2400 kg/m ³ , 1.15 - 1.65W/(mK)	GaBi	Verifiziert
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Ready-mix concrete, low-strength, generic	[LOCAL]	220	20	One Click LCA	EN15804	-	One Click LCA		EN15804	-	C12/15 (1700/2200 PSI), 10% (typical) recycled binders in cement (220kg/m ³)	ecoinvent	-
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Ready-mix concrete, normal-strength, generic	[LOCAL]	220	20	One Click LCA	EN15804	-	One Click LCA		EN15804	-	C20/25 (2900/3600 PSI), 0% recycled binders in cement (240 kg/m ³)	ecoinvent	-
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Ready-mix concrete, normal-strength, generic	[LOCAL]		240 0.0	20 18	One Click LCA	EN15 804	-	One Click LCA		EN15804	-	C30/37 (4400/5400 PSI), 0% recycled binders in cement (300kg/m ³)	ecoin vent	-
Ready-mix lightweight foam concrete	[norway]	FOAMIT 300	325. 0	20 19	EPD 1M3. FOAMIT 300 - Skumbeton g	EN15 804	NEPD- 1718-702- NO	EPD Norge	Velde Betong	NPCR 020 version 2.0, 2018	Only with EN1 5804	0.7-1.0 MPa, 300-350 kg/m ³	ecoin vent	Verifie d
Reinforcement steel (rebar), generic	[LOCAL]		785 0.0	20 18	One Click LCA	EN15 804	-	One Click LCA		EN15804	-	90% recycled content	ecoin vent	-
Reinforcement steel (rebar), generic	[LOCAL]		785 0.0	20 18	One Click LCA	EN15 804	-	One Click LCA		EN15804	-	80% recycled content	ecoin vent	-
Reinforcement steel (rebar), generic	[LOCAL]		785 0.0	20 18	One Click LCA	EN15 804	-	One Click LCA		EN15804	-	97% recycled content (typical)	ecoin vent	-

Rock wool insulation, in slabs	[belgium, france]	Mineral Wool 034-035	19.5	20 16	EPD Mineral Wool 034-035 Slabs MW 35, Mineral Wool 35, Mineral Wool KP 035, Mineral Wool KP 034 with ECOSE Technology	EN15 804	EPDKNI-20160050-CBB1EN	IBU	KNAUF	PCR Mineral insulating materials, 07.2014	Only with EN15804	L = 0.034 W/mK (034), 0.035 W/mK (035), 40-240 mm, 18-21 kg/m3	GaBi	Verified
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Sand	[germany]		150 0.0	20 16	Oekobau.dat 2017-I	EN15 804	-	OKOB AUDAT		EN15804	-	grain size: 0/2 (0-2mm), 2640 kg/m3	GaBi	verified
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Screeds and screed mortars, German average	[germany]	110 0.0	20 13	Oekobau.dat 2017-I, EPD Estrichmörtel und Estriche auf Polyurethan basis, ungefüllt/lösungsmittelfrei, polyolfrei Deutsche Bauchemie e.V. (DBC) Industrieverband Klebstoffe e.V. (IVK) Verband der deutschen Lack- und Druckfarbenindustrie e.V. (VdL)	EN15804	EPDDBC-20130040-IBG1DE	IBU	DBC/IVK/VdL	Reaktionsharzprodukte, 102012	Only with EN15804	PU-based, solvent-free, polyol free, 1100 kg/m3, EPD coverage: 0.85 - 1.25 kg/m3	GaBi	Verified
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Steel hot rolled, I, H, U, L, T and wide flats	[europe]	785 0.0	20 13	Oekobau.dat 2017-I, Structural Steel: Sections and Plated - bauforumstahl e.V.	EN15 804	EPDBFS-20130094-IBG1EN	IBU	bauforumstahl	Structural steels, 07-2012	Only with EN15804	S235-S960	GaBi	Verified	
Structural steel beam	[france]	785 0.0	20 16	FDES	EN15 804	6546	INIES	CTICM	EN15804	-	m.Y = 210 Gpa, S235, S275 et S355	ecoinvent	-	
Woven vinyl tiles flooring	[belgium]		20 18	Lustre, New basic, Cracked earth, Stripes, Seamless tiles	EPD Woven vinyl tiles	EN15 804	BREG EN EPD 000168	BRE	2tec2	EN15804	-	4 kg/m2	ecoinvent	Verified

15. WHO IS ENCON?

ENCON PROVIDES TOTAL SOLUTIONS IN SEARCH OF PERSONALISED ENERGY ADVICE

Rising energy prices and stricter environmental standards are forcing your company to consume energy more efficiently or to produce alternative energy. Encon offers a total solution from the initial study right through to completion

Business and environmental stewardship go hand in hand nowadays. Spiralling energy bills are forcing you to seek cost-saving solutions for your company. In order to achieve this, you need a reliable partner; a firm with expertise that is able to provide a concrete overview of costs, savings and revenues. That partner is Encon. Encon searches for personalised energy solutions for your company, whilst also prioritising cost-efficiency, integrity and transparency.

EFFICIENT ENERGY SAVINGS

Let's be honest, many engineering firms specialise in energy savings. But whilst Encon is not alone, it is unique. Our pragmatic approach and experience as a project manager result in better studies and better engineering. We don't just conduct studies, we actually put them into practice too.

- **Savings plan:** Our approach starts with an analysis of how you can save money and how much you can save, which results in a concrete action plan. As an experienced firm, Encon also immediately identifies costs and benefits, giving you a clear overview of your return on investment.
- **Implementation:** Once the savings have been identified, our engineers conduct detailed measuring campaigns and develop concrete solutions. As an objective firm, Encon compares the products of various suppliers during this initial phase. In doing so, an emphasis is placed on avoiding costs, maximising efficiency and creating added value.
- **Realisation:** In this phase, you can call on the help of Encon's project leaders. Installers are continually monitored and supervised. Everything revolves around achieving concrete results, on time and within budget.

PRODUCING ENERGY WISELY

Are you sure that it is financially wise to invest in sustainable energy? Are you making the right choice in working with a specific partner and are you paying the right price for this? Will your investment also give the best return in the long term?

- **Investment plan:** We have developed a specific approach to sustainable energy projects in order to address such questions. This includes drawing up an investment plan for you and basing our solutions on four objectives:
 1. Saving costs through negotiations and market knowledge.
 2. Increasing revenue through a specific installation design.
 3. Reducing risks through the introduction of guarantees and conditions in contracts with installers.
 4. Saving time through adopting a total approach backed up by project management.

ONE PROJECT, ONE PARTNER

This enables Encon to implement a total solution, which provides a number of significant advantages. If you contract different parties to carry out the individual phases, you increase the risk of communication breakdowns. Encon's total solution also allows you to monitor quality and cost-savings right through to the final target.

Encon's personalised approach is also ideally suited if you only want advice or a design. Regardless of whether you are an SME or a large company, we always think along with you throughout the entire project. We work out cost-efficient solutions as though we are dealing with our own investments. In doing so, we strive to create clear added value for your company. After all, your success is our starting point.