

Knauf Academy

Bucuresti,  
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2017

# ECOSE® Technology for Sustainable Buildings

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- **Sustainability, what is at stake?**
- **Beyond traditional mineral wool: ECOSE Technology®**
- **Beyond regulations to voluntary Green Building Rating Systems**
- **Tools for use in Green Building Rating Systems:  
Life Cycle Analysis (LCA) – Environmental Product Declaration (EPD)**
- **Examples of Mineral Wool ECOSE Technology documentation for Green Building Rating Systems**
- **Conclusion: Impact of ECOSE Technology**

# Sustainability, what is at stake?

challenge.  
create.  
care.

## International report confirms Earth is hot and getting hotter

2015 topped 2014 as warmest year on record

- Global surface, and sea surface temperature, highest on record
- Greenhouse gases highest on record
- COP 21 Paris (meeting in Paris for the climate) had agreement from everybody and is combatting sceptics

Better construction and use of buildings in the EU would influence:

42% of our **final energy consumption**,  
35% of our **greenhouse gas emissions**  
and more than 50% of all **extracted materials**;



Energy savings is the biggest energy deposit of any country

**KNAUF**INSULATION

Energy savings

- Available in every building
- easy to extract
- Pay once
- Strategic independence



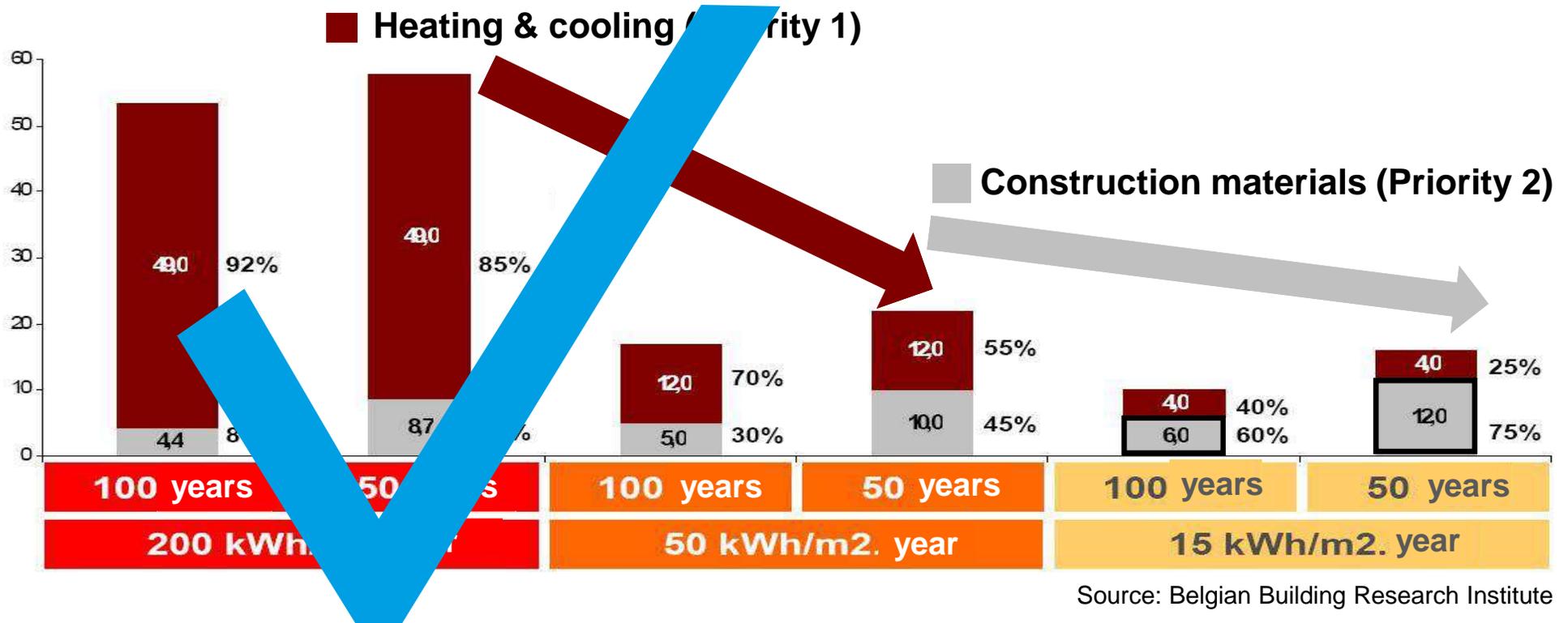
Oil / gas deposit

- Available in Romania for how long
- Difficult to extract
- Pay, pay, pay \$\$\$, € € €
- Strategic dependence



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# Evolution of Building Environmental impact (energy)



Reducing H&C energy demand was, and still is, the right priority but now, additionally, we need to care about the construction products

**We have a collective  
responsibility to  
progress and find  
solutions to the global  
challenges**



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## Beyond traditional mineral wool: ECOSE® Technology by Knauf Insulation

## Indoor Air Quality and Environmental Impact

**KNAUF**INSULATION

### ECOSE, a revolutionary technology:

- New **binder** technology without added formaldehyde
- Based on **rapidly renewable materials** instead of petro-based chemicals
- Reduces **impact on environment** through lower embodied energy
- Reduces **workplace exposures** and pollutant **manufacturing emissions**
- **Impact on indoor air quality** once installed in buildings



A step change in  
sustainability  
for binder technology



## Superior level of sustainability

**KNAUF**INSULATION

Mineral wool with ECOSE Technology delivers a superior level of sustainability...

- **Manufactured from naturally occurring and/or recycled materials**
- **Free from formaldehyde, phenols and acrylics**
- **Contributes to improved indoor air quality compared to our conventional mineral wool**
- **Improves the overall sustainability of buildings**
- **Lower embodied energy**
- **Improves the overall sustainability of buildings**



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# Beyond regulations to voluntary Green Buildings Rating Systems

# Green Building Rating Systems in a nutshell



## THE RISE OF GBRS IN EUROPE

14,400 BREEAM

2,390 HQE

1,770  
LEED

1,201  
DGNB

4 WELL

CERTIFIED PROJECTS  
\*non-residential buildings

Source: Knauf Insulation compilation (2017)

	BREEAM	LEED	HQE	DGNB	WELL
Country of origin	UK	USA	France	Germany	USA
Creation date	1990	1998	2004	2007	2014
Organism	BRE	USGBC / GBCI	Cerway / Certivéa	DGNB	IWBI / GBCI
# of main themes	10	9	14	6	7
Performance levels	Pass / Good / Very Good / Excellent / Outstanding	Certified / Silver / Gold / Platinum	Bon / Très Bon / Excellent / Exceptionnel	Bronze / Silver / Gold / Platinum	Silver / Gold / Platinum
Audit schedule	Design Post-Construction Or combined	Pre-certification (optional for LEED CS) Design Post-Construction	Schematic (optional) Design Post-Construction	Pre-certification option Post-construction	Pre-certification option Post-construction
Audit process	BREEAM Assessor report reviewed by BRE	LEEDOnline report reviewed by GBCI	Onsite audit by an auditor accredited by Certivéa	DGNB team verifies the DGNB auditor report	WELL assessor report reviewed by GBCI and onsite audit by GBCI
Accreditations	BREEAM AP	LEED AP with or without specialty	Référent certification MOE/MOA	DGNB Consultant	WELL AP

## In Green Building Rating Systems , a clear tendency

**In all Green Building Rating Systems, increasing focus on:**

- **Construction Materials sourcing:**
  - Responsible supply chain (Raw materials ISO 14001 certified suppliers)...
  - Recycled content
  - Wood from sustainable forest (FSC certification)...
  
- **Products and Buildings Life Cycle Assessment (LCA):**
  - Environmental Product Declarations (EPDs)
  - Building Life Cycle Assessment
  - Building Life Cycle Costing
  
- **Indoor air quality and comfort:**
  - Reduced formaldehyde emissions and VOCs
  - Thermal & acoustic comfort

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create.  
care.

## Tools for use in Green Building Rating Systems: LCA - EPD

**The question is...**  
**... how to measure, analyze**  
**and communicate product's**  
**environmental impact?**

Life Cycle Assessment (LCA)  
Environmental Product Declaration (EPD)

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## Examples of Mineral Wool ECOSE Technology documentation for Green Building Rating Systems



# LCA => Environmental Product Declaration (EPD)



Most Knauf Insulation products are covered with EPD's

**ENVIRONMENTAL PRODUCT DECLARATION**  
as per ISO 14025 and EN 15804

Owner of the Declaration: Knauf Insulation  
 Programme holder: Institut Bauen und Umwelt e.V. (IBU)  
 Publisher: Institut Bauen und Umwelt e.V. (IBU)  
 Declaration number: EPD-KNF-20160223-GB01-EN  
 ECO EPD Ref. No.: ECO-00009493  
 Issue date: 12/15/2021  
 Valid to: 12/15/2023

**SmartRoof Top / SmartRoof Norm**  
Rock Mineral Wool for Flat Roofs

**Knauf Insulation**

[www.ibu-epd.com](http://www.ibu-epd.com) / <http://pac.epd-online.com>






**KNAUF INSULATION**  
Knauf Insulation Group

### LCA: Results

CONSTRUCTION ON-PACIFIC STAGE INCLUDED IN EPD AND IN MODULE NOT DECLARED

PRODUCT STAGE	CONSTRUCTION ON-PACIFIC STAGE										USE STAGE				END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Renovation	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Benefit-recovery potential		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D			
X	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	MND	X	X		

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Global warming potential	kg CO <sub>2</sub> e/m <sup>3</sup>	1.88E+0	1.88E+0	1.88E+0	4.41E+1	2.06E+0	-1.42E+0
Acidification potential	kg SO <sub>2</sub> e/m <sup>3</sup>	1.33E+0	1.33E+0	1.33E+0	3.05E+1	1.30E+0	-9.30E-1
Eutrophication potential	kg PO <sub>4</sub> e/m <sup>3</sup>	2.28E-1	2.28E-1	2.28E-1	5.25E+0	2.02E-1	-1.41E-1
Abiotic depletion potential	kg Sb eq/m <sup>3</sup>	2.88E-2	2.88E-2	2.88E-2	6.70E+0	2.54E-2	-1.78E-2
Photochemical smog potential	kg C <sub>2</sub> H <sub>4</sub> e/m <sup>3</sup>	2.58E-1	2.58E-1	2.58E-1	5.95E+0	2.22E-1	-1.57E-1
Renewable energy use (non-fossil resources)	kg oil eq/m <sup>3</sup>	1.88E+0	1.88E+0	1.88E+0	4.41E+1	2.06E+0	-1.42E+0
Renewable energy use (fossil resources)	kg oil eq/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Renewable primary energy use (non-fossil resources)	MWh/m <sup>3</sup>	1.33E+0	1.33E+0	1.33E+0	3.05E+1	1.30E+0	-9.30E-1
Renewable primary energy use (fossil resources)	MWh/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	MWh/m <sup>3</sup>	1.33E+0	1.33E+0	1.33E+0	3.05E+1	1.30E+0	-9.30E-1
Non-renewable primary energy use (non-fossil resources)	MWh/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-renewable primary energy use (fossil resources)	MWh/m <sup>3</sup>	2.28E-1	2.28E-1	2.28E-1	5.25E+0	2.02E-1	-1.41E-1
Total use of non-renewable primary energy resources	MWh/m <sup>3</sup>	2.28E-1	2.28E-1	2.28E-1	5.25E+0	2.02E-1	-1.41E-1
Use of secondary material	kg/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary material	kg/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary material	kg/m <sup>3</sup>	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of recycled content	%	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

**RESULTS OF THE LCA ON OUTPUT FLUXES AND WASTE CATEGORIES**  
LCA SmartRoof Top / SmartRoof Norm

Parameter	Unit	A1-A3	A4	A5	B1-B7	C1-C4	D
Hazardous waste disposed	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Non-hazardous waste disposed	kg	1.21E+1	1.21E+1	1.21E+1	2.74E+2	1.03E+1	-6.88E+0
Recyclable waste disposed	kg	1.00E+0	1.00E+0	1.00E+0	2.22E+1	8.10E-1	-5.50E-1
Recyclable fraction	%	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Waste-to-energy recovery	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Recovery of energy recovery	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Recovery of electrical energy	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Recovery of thermal energy	kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

**INTERPRETATION**

**REOURCES USE**  
The primary energy demand from non-renewable resources is dominated by the production of rock mineral wool products (especially due to the energy carrier, coke) and the binder.  
The renewable energy demand regarding the product is dominated by the production, mostly due to electricity consumption, and packaging.

**ENVIRONMENTAL IMPACT**  
Every impact category except the abiotic ADP elements is dominated by the production. This is due to the consumption of energy (electricity and thermal energy) during the production.  
The Abiotic Depletion Potential elements (ADPs) are dominated by the supply of raw materials such as cement or bitumen.  
The Global Warming Potential (GWP) is dominated by the production in the copole, mostly due to CO<sub>2</sub> emissions from raw materials and energy consumption (50%). The production of the binder represents more than 15% of the impact.  
The Ozone Depletion Potential (ODP) is most notably influenced by the production and the binder.  
The Acidification Potential (AP) is also dominated by the production due to the emissions related to the processes and the energy consumption. Mostly, the impact refers to emissions to air: 75% from dioxide and 20% from nitrogen oxides.

5 Environmental Product Declaration Knauf Insulation – Smart Roof Top / Norm

# EPD are available for architects, contractors, assessors to use



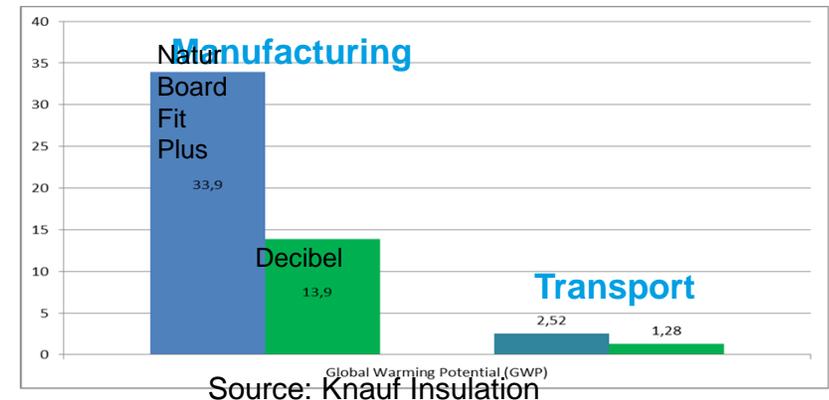
**ENVIRONMENTAL PRODUCT DECLARATION**  
as per ISO 14025 and EN 15043

**Where is the information available?**

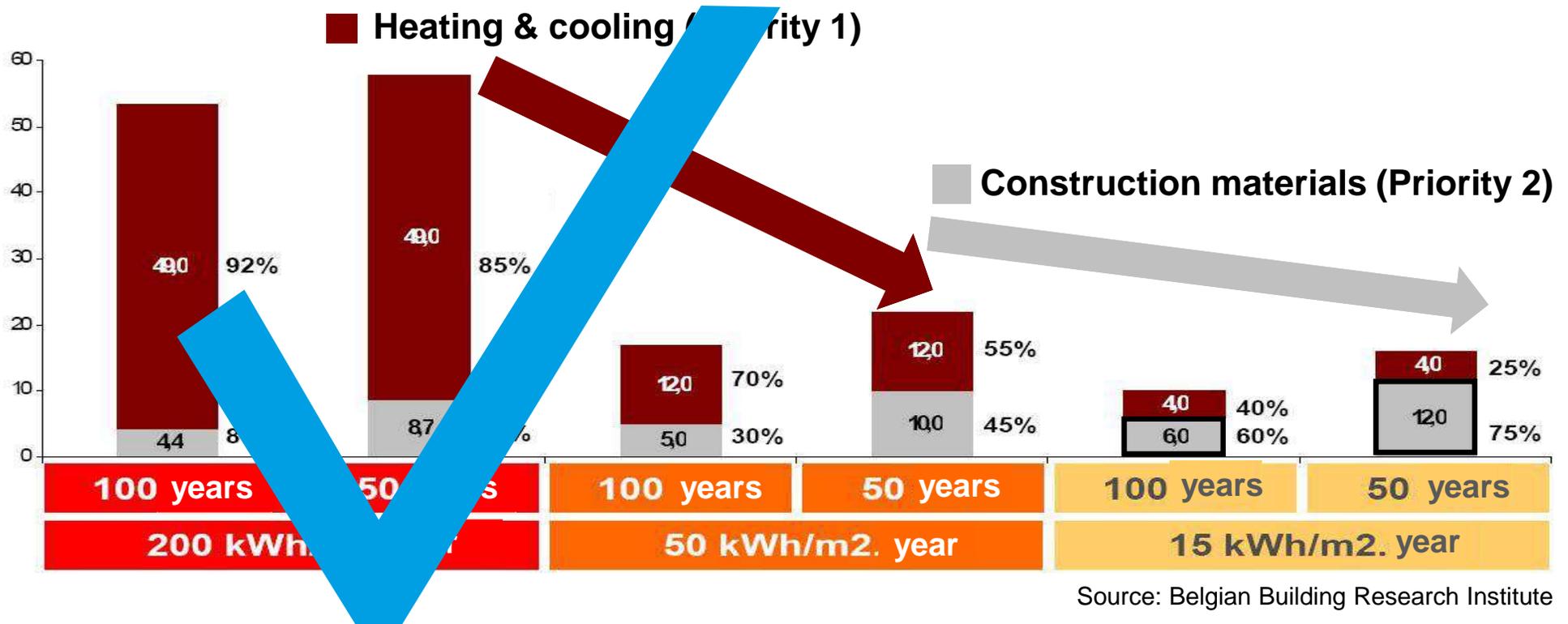
<http://www.knaufinsulation.com/en/environmental-product-declaration-epd>



- Climate change, circular economy:
  - **GWP (Global Warming Potential) and Resource Used** are THE LCA priority indicators of the EU Commission building framework, LEVELS (August 2017) => **ECOSE Technology and recycled content** are significantly contributing to improve these indicators
- EcoDesign: for some applications (i.e. partition walls), replacing NaturBoard Fit Plus by Decibel with ECOSE improve environmental impact
  - ❑ **NaturBoard Fit Plus = 1 m<sup>3</sup> NaturBoard Fit Plus**
  - ❑ **Decibel = 1 m<sup>3</sup> Decibel**
- All Knauf Insulation ECOSE products are covered by a LCA. It demonstrates **transparency and leadership** in the way we want to position our innovation. These LCA are available for buildings LCA calculations.



# Evolution of Building Environmental impact (energy)



Reducing H&C energy demand was, and still is, the right priority but now, additionally, we need to care about the construction products

## Indoor Air Comfort Gold for Knauf Insulation products with ECOSE Technology means....

**KNAUF**INSULATION

- Very low emissions from products
- no impact on Indoor Air Quality

Due to ECOSE Technology:

- No added formaldehyde



VOC TEST REPORT  
Indoor Air Comfort GOLD®

14 April 2016



LEEDv4 : Low Emitting Materials credit (3 points)

# Knauf Insulation Factsheets for Green Building Rating Systems



**KNAUF INSULATION**  
It's time to save energy

July 2016

## BREEM INTERNATIONAL NEW CONSTRUCTION 2016 PRODUCT DATA FOR CERTIFICATION GLASS MINERAL WOOL ECOSE

BREEM (Building Research Establishment Environmental Assessment Methodology) International New Construction<sup>1</sup> is a voluntary standard that defines high performance green buildings which are healthier, more environmentally responsible and more profitable structures. Using independent assessors, BREEM examines criteria covering a range of issues in sections that evaluate: management processes, health and wellbeing, energy, transport, water, materials, waste, land use and ecology, pollution.

KNAUF INSULATION products can put you on the right track to get the highest result for certification.

BREEM Credit Category code	Assessment criteria and definition	Knauf Insulation contribution
Hea 02 Indoor air quality	Emissions from insulation materials (product types) must meet the requirements of the following table: Formaldehyde Total volatile organic compounds (TVOC) Carcinogens s 0.001 mg/m <sup>3</sup>	MINERAL F products are in compliance with the requirements of the following table: Formaldehyde Total volatile organic compounds (TVOC) Carcinogens category 1A and B s 0.001 mg/m <sup>3</sup>
Hea 04 Thermal comfort	To ensure the thermal comfort levels are achieved through design, and controls are selected to maintain a thermally comfortable environment for occupants.	Thermal insulation products facilitate the achievement of thermal comfort levels by maintaining a thermally comfortable environment for occupants.

<sup>1</sup> Technical manual : 00233 – 1.0.2016  
<sup>2</sup> www.product-testing.eurofnis.com  
<sup>3</sup> www.product-testing.eurofnis.com  
<sup>4</sup> www.bimetrica.com

For additional information please contact [Sustainability@knaufinsulation.com](mailto:Sustainability@knaufinsulation.com) 1/7

**urbanscape** **KNAUF INSULATION**

June 2016

## LEED version 4 PRODUCT DATA FOR CERTIFICATION URBANSCAPE GREEN ROOF SYSTEMS

LEEDv4 (Leadership in Energy and Environmental Design) is a voluntary standard that defines high performance green buildings which are healthier, more environmentally responsible, and more profitable structures. Credits for certification can be earned in various categories, each with a unique focus on sustainable design: sustainable sites, water efficiency, energy and atmospheric resources, indoor environmental quality, innovation and design process.

KNAUF INSULATION products can put you on the right track for the highest result for certification.

LEED Credit Category code	LEEDv4 Definition	Knauf Insulation Products contribution	Contribution
Sustainable Sites Rainwater management	To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site.	Urbanscape products are a rainwater control system that helps reducing peak rate of runoff from the site. (See annex 1: Urbanscape Green Roof Performance Evaluation Tool).	3 points
Sustainable Sites Heat Island Reduction	To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.	Temperatures on the roof can be up to 45°C lower which reduce heat island effect and extend life of waterproofing (up to 50%).	2 points
Sustainable Sites Protect or restore habitats	To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	The Urbanscape vegetated roof is counted toward the overall restored area calculation.	2 points
Sustainable Sites Open Space	To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.	Vegetated roof is an open space qualified for its environmental benefits. The presence of green areas has a relaxing psychological effect, helps to reduce blood pressure and lowers the heartbeat.	1 point
Energy and Atmosphere (EA) Optimize Energy Performance	To achieve increasing levels of performance to reduce environmental and economic harms of excessive energy use.	Urbanscape products help reducing heating/cooling energy demand. (See annex 1: Urbanscape Green Roof Performance Evaluation Tool).	20 points

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July 2016

## LEED version 4 PRODUCT DATA FOR CERTIFICATION WOOD WOOL - HERAKLITH

LEEDv4 (Leadership in Energy and Environmental Design) is a voluntary standard that defines high performance green buildings which are healthier, more environmentally responsible, and more profitable structures. Credits for certification can be earned in various categories, each with a unique focus on sustainable design: sustainable sites, water efficiency, energy and atmospheric resources, indoor environmental quality, innovation and design process.

KNAUF INSULATION products can put you on the right track to get the highest result for certification!

LEED Credit Category code	Definition	Knauf Insulation Products contribution	Contribution towards
Energy and Atmosphere (EA) Optimize Energy Performance	To achieve increasing levels of performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.	Heraklith products help reducing energy demand through very high insulation efficiency.	20 points
Materials and Resources (MR) Building Product Disclosure and Optimization – Environmental Product Declarations	To encourage the use of products where Life Cycle Assessment (LCA) is available and have environmentally, economically and socially preferable LCA. To reward project including products with verified LCA.	Third party verified Environmental Product Declarations (EPDs) are available on line for Heraklith products.	2 points
Materials and Resources (MR) Building Product Disclosure and Optimization – Sourcing of Raw Materials	To encourage the use of products where LCA is available and have environmentally, economically and socially preferable LCA. To reward project including products verified to be extracted or sourced in a responsible manner.	Heraklith Products are manufactured with up to 80% of wood-based materials certified following FSC labels (remaining part is the binder).	1 point

<sup>1</sup> <http://www.knaufinsulation.com/en/product-sustainability>  
<sup>2</sup> See annex 1

For additional information please contact [Sustainability@knaufinsulation.com](mailto:Sustainability@knaufinsulation.com) 1/7

<http://www.knaufinsulation.com/en/sustainable-buildings-and-green-building-rating-systems>

challenge.  
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## Conclusion: Impact of ECOSE Technology



## Impact of ECOSE Technology

**KNAUF**INSULATION



- New binder technology
- Based on **rapidly renewable materials** instead of petro-based chemicals
- Reduces **impact on environment** through lower embodied energy
- Reduces **workplace exposures** and pollutant **manufacturing emissions**
- **Impact on indoor air quality** once installed in buildings

No added formaldehyde

Bio-based

Global Warming Potential

Low Emitting Materials  
Indoor Air Comfort Gold

Documented by Knauf Insulation with:

- Certifications
- Factsheets
- Environmental Product Declarations (EPD)





## Knauf Insulation mission

**KNAUF**INSULATION

Our mission is to **challenge** conventional thinking and **create** innovative insulation solutions that shape the way we live and build in the future, with **care** for the people who make them, the people who use them and the world we all depend on.

 Knauf Insulation mission

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Thank you