

Green Strategies:

Energy Efficiency and Ecology in
Production of Building Materials based on
the Case of KNAUF

Jorg Lange

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Understanding of Energy Efficiency in Building

The main task in the 21st century is saving of energy sources:

Concepts used in building:

- long term,
- global,
- energy efficient,
- aimed at natural resources.



Focus on economic use of resources gives future generations freedom of selection of existing model.

State Significance of Building Energy Efficiency

Federal Acts of the Russian Federation:

- No. 261 **On energy saving and increase of energy efficiency** as of November 27, 2009,
- No. 384 **Technical Regulations on buildings and constructions safety** as of December 23, 2009.

The Federal Act **Technical Regulations on building materials safety** is in draft – until midyear, (prime-minister Putin)

- applied building methods and used building materials are reviewed
- new norms and national standards for buildings and constructions (for building, for inside and outside finishing) are developed

Understanding of Energy Efficiency in Building

Select of eco-friendly building materials

Building materials influence in different ways on environment and human health during their life.



Ecological Optimization means to find the best solution by complying with maximal number of influence factors. It concerns all phases of building materials life cycle: production, usage, utilization.

Energy efficiency in building concerns all phases of life cycles of building materials.

Energy Efficiency: evidenced ecological safety

High Standards of Ecological Safety:

The manufacturers are obliged to insure compliance of the finished product with safety norms evidenced by laboratory researches.

- land reclamation within area of raw materials extraction
- safety processing of production residuals
- production optimization for reduction of carbon dioxide release into the air



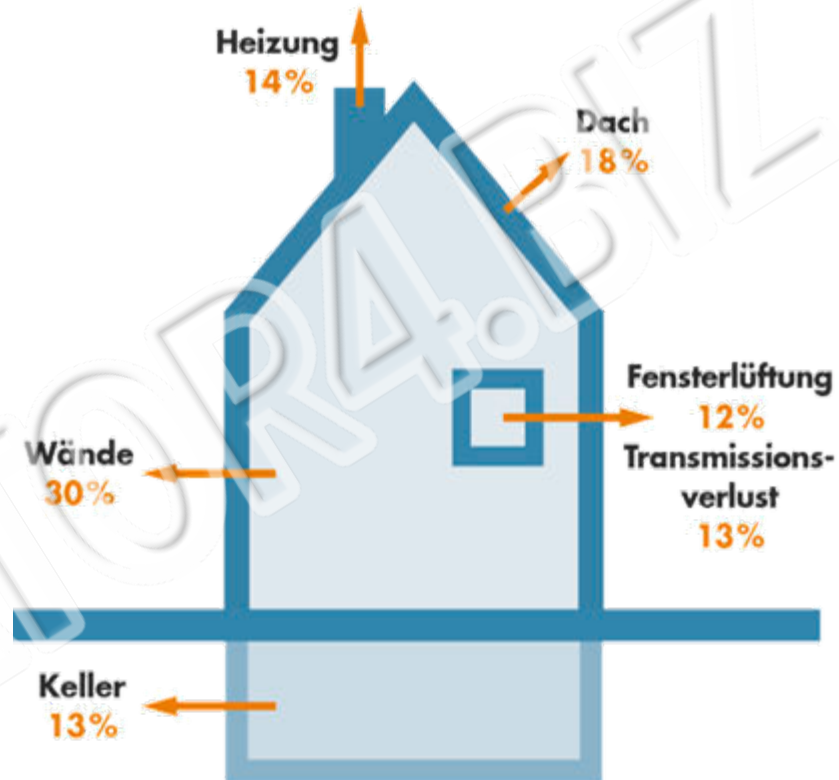
Eco-Sustainable Building Standards

No.	Criteria	DGNB Neubau Büro	LEED NC 2.2.	BREEAM International
1	Global Warming Potential	Green	Green	Green
2	Ozone Depletion Potential	Green	Green	Green
3	Photochemical Ozone Creation Potential	Green	Green	Green
4	Acid Potential	Green	Green	Green
5	Negative influence on soil – Eutrofication Potential	Green	Green	Green
6	Risks for local environment (risks for underground and surface waters, ground, air)	Green	Green	Green
7	Other influence on local environment	Grey	Green	Green
8	Other influences on global environment (usage of materials made from secondary materials)	Green	Green	Green
9	Microclimate	Green	Green	Green
10	Needs for primary non renewable resources	Green	Green	Green
11	Needs for primary renewable resources	Green	Green	Green
12	Other usage of renewable resources	Grey	Green	Green
13	Waste of different categories	Grey	Green	Green
14	Use of water in process of operation	Green	Green	Green
15	Needs for area (territory)	Green	Green	Green
	Significance high			Criterion is not applicable
	Significance middle			Criterion is not taken in account but it will be accepted in the next version
	Significance low			

Energy Efficiency: heat loss in buildings

The most heat loss goes through external building walls.

General insulation (cellar + walls + roof) are responsible for approximately 60% of total heat loss.



Share in costs*	%
Wall insulation	25
Roof/cellar insulation **	9
Windows	24
Ventilation	16
Heating	26

* Estimated values based on performed works
** without additional works (digging works , roof covering)

Quelle Bild: Rehau/ArgeFaktor10

Energy Efficiency: Market Requirements

The European Buyer nowadays wishes:

- “green” products
- energy efficient products
- CO₂- free buildings
- eco-friendly buildings
- building methods complying with modern norms and standards

ENERGIEAUSWEIS für Wohngebäude

gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

Berechneter Energiebedarf des Gebäudes 2

Energiebedarf

Endenergiebedarf
kWh/(m²·a)

CO₂-Emissionen ¹⁾ kg/(m²·a)

0 50 100 150 200 250 300 350 400 >400

Primärenergiebedarf („Gesamtenergieeffizienz“)
kWh/(m²·a)

Nachweis der Einhaltung des § 3 oder § 9 Abs. 1 EnEV ²⁾

Primärenergiebedarf	Energetische Qualität der Gebäudehülle
Gebäude Ist-Wert <input type="text"/> kWh/(m ² ·a)	Gebäude Ist-Wert H _t <input type="text"/> W/(m ² ·K)
EnEV-Anforderungswert <input type="text"/> kWh/(m ² ·a)	EnEV-Anforderungswert H _t <input type="text"/> W/(m ² ·K)

Endenergiebedarf

Energieträger	Jährlicher Endenergiebedarf in kWh/(m ² ·a) für			Gesamt in kWh/(m ² ·a)
	Heizung	Warmwasser	Hilfsgeräte ³⁾	

Sonstige Angaben

Einsetzbarkeit alternativer Energieversorgungssysteme

nach § 5 EnEV vor Baubeginn geprüft

Alternative Energieversorgungssysteme werden genutzt für:

<input type="checkbox"/> Heizung	<input type="checkbox"/> Warmwasser
<input type="checkbox"/> Lüftung	<input type="checkbox"/> Kühlung

Lüftungskonzept

Die Lüftung erfolgt durch:

<input type="checkbox"/> Fensterlüftung	<input type="checkbox"/> Schachtlüftung
<input type="checkbox"/> Lüftungsanlage ohne Wärmerückgewinnung	<input type="checkbox"/> Lüftungsanlage mit Wärmerückgewinnung

Vergleichswerte Endenergiebedarf

0 50 100 150 200 250 300 350 400 >400

Passivhaus

MFH Neubaus

EFH Neubaus

EFH energetisch bei Modernisierung

Durchschnitt Wohngebäude

MFH energetisch nicht wesentlich modernisiert

EFH energetisch nicht wesentlich modernisiert

Erläuterungen zum Berechnungsverfahren

Das verwendete Berechnungsverfahren ist durch die Energieeinsparverordnung vorgegeben. Insbesondere wegen standardisierter Randbedingungen erlauben die angegebenen Werte keine Rückschlüsse auf den tatsächlichen Energieverbrauch. Die ausgewiesenen Bedarfs-werte sind spezifische Werte nach der EnEV pro Quadratmeter Gebäudenutzfläche (A_n).

¹⁾ freiwillige Angabe

²⁾ nur in den Fällen des Neubaus und der Modernisierung auszufüllen

³⁾ ggf. einschließlich Kühlung

⁴⁾ EFH – Einfamilienhäuser, MFH – Mehrfamilienhäuser

Experience in Germany. Passive Building as Energy Efficient Standard

Passive Building Standard

Prof. Dr. Wolfgang Feist

(Passive Building Institute in Darmstadt):

The passive building concept means the highest degree of comfort by minimal energy consumption.

The passive building means ongoing improvement of the building with minimal energy consumption. The main components of the passive building technology are the perfect heat insulation, good connections density and efficient intake of warm from air released into the air. In connection with use of internal and solar energy sources there is no need of use of convertors.



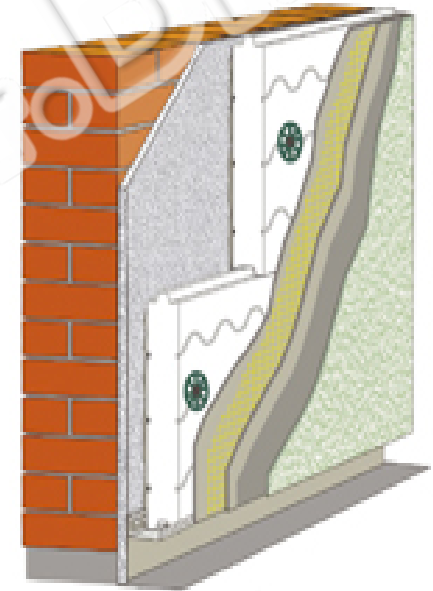
KNAUF warm wall: heat loss solution

KNAUF – warm wall allows:

- ✓ to increase buildings heat protection;
- ✓ to decrease energy consumption without need to increase wall thickness above limits insuring structural strength of buildings.

KNAUF – warm wall ensures:

- ✓ reduction of heat expenses during the building operation;
- ✓ reduction of new building expenses by reducing wall thickness and accordingly by reducing wall material consumption.



Meaning of the Term “Green Building”

Carbonic Free Production

The carbonic neutral production means that the product is free from carbon. Even by the state-of-the-art and efficient production and distribution a certain quantity of energy is used with further release of carbon dioxide. That is why any quantity of carbon dioxide released into the air needs to be neutralized or bound by some processes.

Renewable Energy Source

These energy sources are of natural origin. For example solar energy, hydro electricity, geothermal energy, wind and wave energy.



KNAUF: Gypsum as Natural Product

Ecological Compatibility

Ecological compatibility means that needs will be satisfied without harm to environment.

Building materials are ecological if they don't deplete our natural resources. Timber is ecological sustainable i.e. cut down trees can be renewed soon.

The processed gypsum is ecological sustainable i.e. production residuals are used in further production.

Gypsum has a neutral acid /alkaline balance compatible with human skin.



KNAUF Gypsum Wallboard from ecological point of view

KNAUF wallboards:

- natural gypsum,
- cardboard (95% pulp)
- ecological safe additional substances.

Range of application:

all types of premises excluding premises with permanent high level humidity or permanent high temperatures.



KNAUF Gypsum Wallboard from ecological point of view

KNAUF offers for premises with permanent high humidity or permanent influence of high temperature:

- special non-combustible boards with gypsum fiber Fireboard,
- concrete boards Aqua panel with substance preventing humidity absorption.



KNAUF: meaning of “green building”

Thermal efficiency of walls and ceilings. Gypsum board with additional insulation allows to conserve heat.

The effect even by minimal reduction of room space comes quickly.

These materials are ideally suitable for reparation and improvement of apartment building efficiency.



KNAUF:

Meaning of the Term “Green Building”

Heat Insulating Mixture

This material conserves heat likely to heat insulating brick or one-coat plaster KNAUF MP75. This mixture slows down the process of temperature change in the premises resulting in reduction of energy consumption necessary for conserving building temperature.



KNAUF: Sample of “green strategy”, natural insulation ECOSE

The insulation with ECOSE™ technology is not likely to previous thermal insulation and is of natural brown color: without artificial dyes and bleaching agents.

ECOSE™ technology is a technology which is more environment and human friendly based on natural substances for production of binder without use of phenol – formaldehyde and acrylic resins.



The innovative thermal insulation KNAUF Insulation with technology ECOSE™ is smooth to the touch (practically doesn't prick) and odorless. The new material is easy to use: it is easy to cut and contains less dust.

THANK YOU FOR ATTENTION!

