

 ENVIRONMENTAL ADVANTAGES
OF CELLULOSE
A SAMPLE CALCULATION



ISOCELL

BASICS OF GREENHOUSE EMISSIONS

The emission of gases relevant to the climate favours the so-called greenhouse effect. This effect is responsible for heat radiation emitted by the earth, not immediately being radiated into space, but that gases in the atmosphere are reflected back to the earth. Depending on the gas this reflection behaviour varies greatly in certain frequency ranges of radiation.

For the purpose of compiling the effectivity of the gases, the so-called GWP factor (global warming potential) was identified for every gas. This enables the equivalent representation of the sum of greenhouse gas emissions in kilograms of CO₂. If more greenhouse gas emitted into the atmosphere than is immediately bonded, the greenhouse gas effect is intensified and global warming increases.

Every construction project requires varying amounts of energy in production. If thermal processes are needed, as for example, for glass wool, the energy requirement rises rapidly and is met by fossil fuel due to the necessary temperature conditions. As soon as the energy used does not come from renewable sources, climate-relevant emissions arise. Consequently, different quantities of greenhouse gas are emitted in the production of each construction product. For example, for the production of cellulose no energy-intensive processes are required in principle. The resulting energy requirement, as for example, operation of the mill, is met 100% from renewable sources.

In an Environmental Product Declaration based on international standards the various life cycle phases of a product have been examined. Besides the energy requirement for production of a product, the GWP (global warming potential) is identified. Taken into consideration is usually the production phase from A1-A3, which takes into account the supply of raw materials, the production and the transport of a product.

VARIOUS GASES – VARYING CLIMATE EFFECTIVENESS:

CO₂ CH₄ N₂O ...

These are always converted with the appropriate GWP factor to CO₂ equivalents (kg CO₂ eq.)

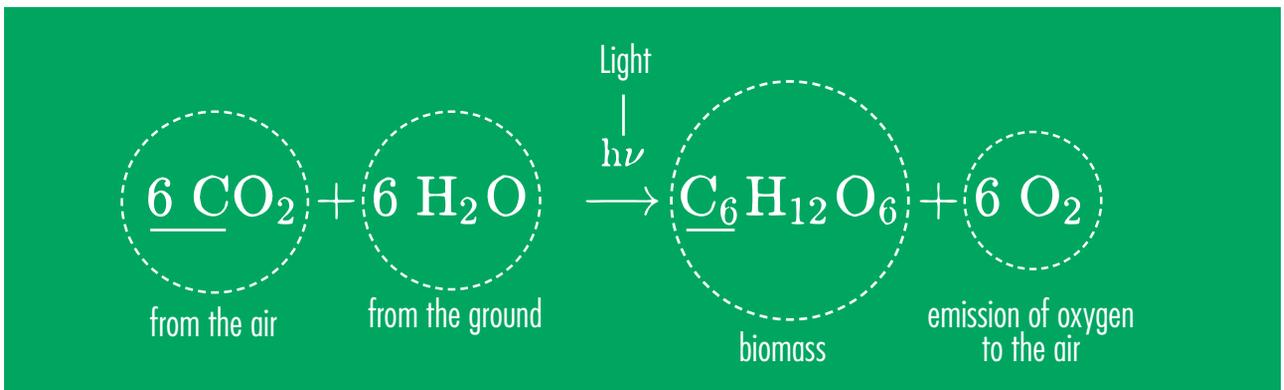
→ Example: CH₄ (methane) → GWP Faktor of 22
→ Emission 1 kg methane = 22 kg CO₂ eq.

GWP of a product = sum of the emissions of individual gases, measured by means of the corresponding **GWP factor** →

Taken into consideration is production phase
(Supply of raw material, Transport, Production)

NEGATIVE GWP?

Compared with non-organic products, organic products retain carbon. This carbon was taken from the air in biomass production (photosynthesis).



For this reason it may be, in the case of organic products, that the product itself stores more carbon than was emitted during production in the form of CO_2 . In this case the result is a negative GWP.

If this product is installed into a construction, the original CO_2 from the air is absorbed in this and the house becomes a CO_2 store.



CALCULATION EXAMPLE INSULATION OF A NEWLY BUILT SINGLE-FAMILY HOUSE

COMPARISON OF INSULATION MATERIAL, USING THE EXAMPLE OF A NEW SINGLE-FAMILY HOUSE



CELLULOSE:

Area insulated	300 m²	
Insulation thickness	0,24 m	
Proportion of insulation	90 %	
Volume insulated	64,8 m ³	
Density	55 kg/m³	
Cellulose installed	3564 kg	
GWP	-1,21 kg CO ₂ eq/kg	EPD ISOCELL/baubook Thermal conductivity group 038

COMPARED WITH PRODUCT:

GLASS WOOL

Density	24 kg/m ³	
GWP	2,45 kg CO ₂ eq/kg	baubook: glass wool 036 guideline value <i>Higher insulation value observed for insulation thickness (23 instead of 24cm)</i>

MINERAL WOOL

Density	40 kg/m ³	
GWP	1,93 kg CO ₂ eq/kg	baubook: mineral wool 040 guideline value

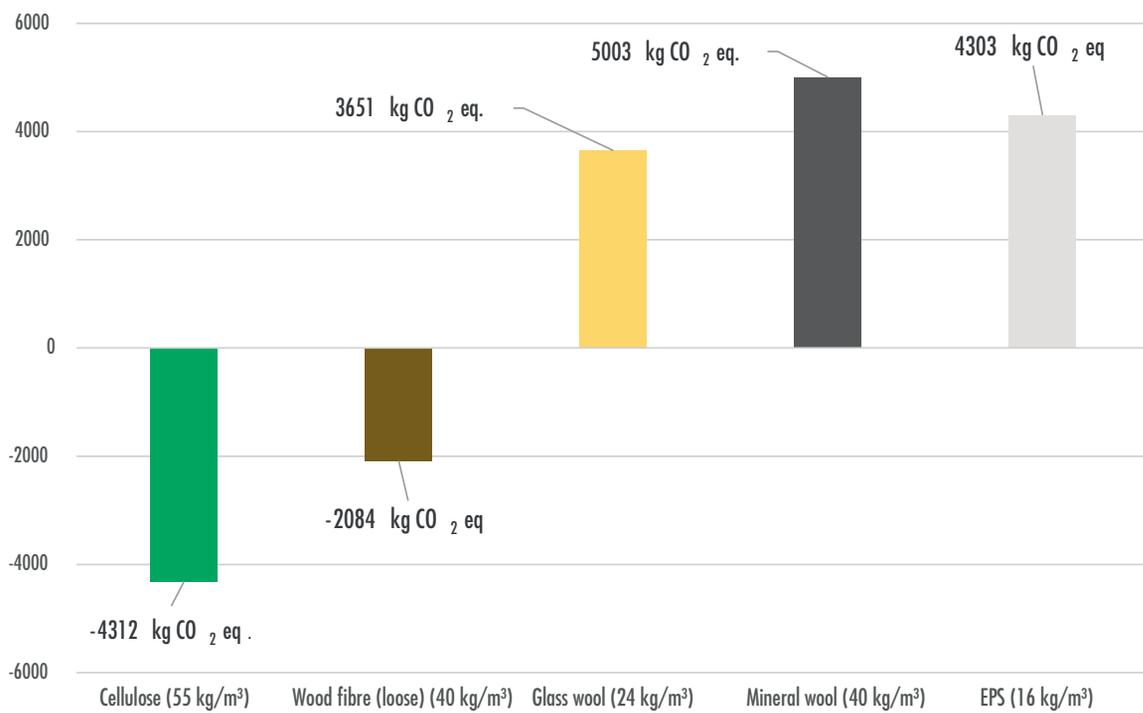
EPS „Styropor“

Density	16 kg/m ³	
GWP	4,15 kg CO ₂ eq/kg	baubook: EPS 040 guideline value

WOOD FIBRE loose

Density	40 kg/m ³	
GWP	-0,804 kg CO ₂ eq/kg	baubook: wood fibre loose 038 guideline value

CO₂ – BALANCE OF INSULATION OF A SINGLE-FAMILY HOUSE Insulation volume 65m³



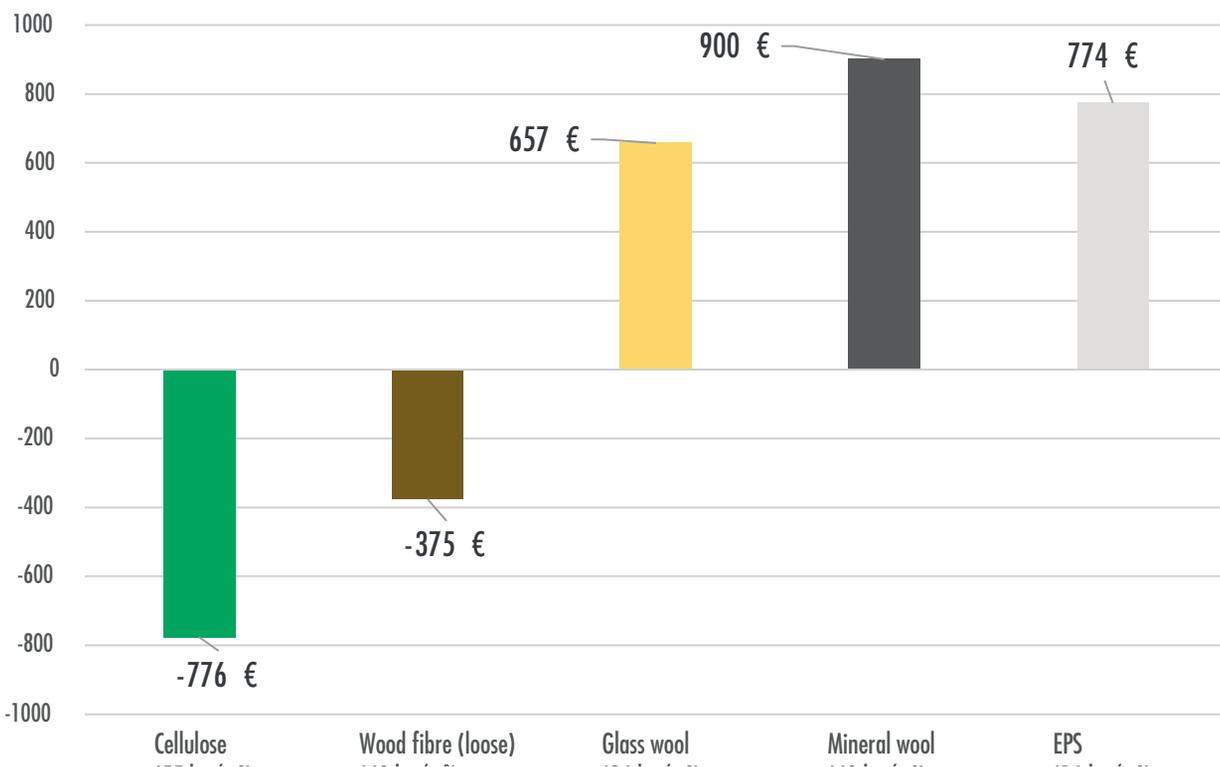
Source: baubook.info;
ISOCELL Cellulose;
HF, GW, SW & EPS: Standard values as per baubook

CLIMATE CHANGE COSTS

CLIMATE CHANGE COSTS FOR INSULATION OF A SINGLE-FAMILY HOUSE

Insulation volume 65m³

Costs according to UBA Germany € 180/t CO₂ eq.



Source CO₂-price: <https://www.umweltbundesamt.de/presse/pressemittelungen/hohe-kosten-durch-unterlassenen-umweltschutz>



SPECIFIC 'CLIMATE BONUS'

By using cellulose the resulting cost of climate impact can be avoided. At the same time, with every kilogram of cellulose used the emission of CO₂ is compensated to the extent of 1,21kg, whereby a specific 'climate bonus' arises. No provision is (yet) generally made for the compensation of this bonus in the taxation system, depending on nation, (with the exception of country-specific aid for ecological construction), which is the reason why in this case only an indirect financial effect can be referred to. The costs are carried at the moment by the general public in the form of taxation.

Cost benefit through CO₂ retention when installing cellulose:

= 0,22 €
per kg cellulose used

Cost benefit for substitution of glass or mineral wool by avoiding CO₂ emissions and storage:

= 0,41 – 0,47 € per kg cellulose,
which replaces the production of 0.5 – 0.8 kg mineral wool



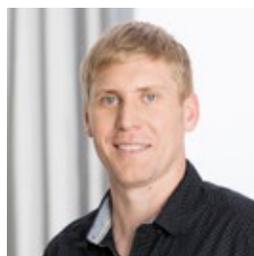
A decision for ISOCELL cellulose insulation
means the practice of active climate protection!

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