FSDE
Forum for Safe Insulation with EPS

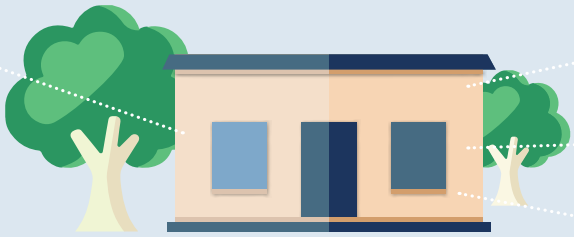
Energy and CO_2 savings using grey EPS

What is grey EPS?

Grey EPS differs from the widely used white EPS variant in that it features embedded infrared absorbers and reflectors made of graphite. They give the insulation material its characteristic grey colour and reduce heat transfer. As a result, the insulation performance achieved by grey EPS is up to 20 per cent higher, making the material even more economical and sustainable than the white variant.

Consumption and savings in a typical single-family house

Insulation boards used:
Grey EPS,
thickness 12 cm,
U-value 0.27 W/m²*K



1 storey, natural gas central heating

100 m² living space,
125 m² facade area

Lifespan of the building: 40 years

CONSUMPTION

How much energy is required to manufacture the grey EPS boards? How much CO_2 is released?

Energy: approx. 15,800 kWh

- The production energy (from natural gas) for 1 m3 of grey EPS amounts to **approximately 406 kWh**.
- With a horizontal surface of 2 × 100 m² (flat roof and floor), a facade area of 125 m², and an insulation thickness of 12 cm, 325 m² × 0.12 m = **39 m³** of insulation material is installed.
- IIn total, 39 m³ × 406 kWh/m³ ≈ **15,800 kWh** is used in production. One third (5,300 kWh) of the fossil fuel is converted into polystyrene and is contained in the raw material EPS. Two thirds (10,500 kWh) are used in the production process for the boards.

CO_2: approx. 2.3 t

- As a rule, 0.22 kg of CO2 is released in the consumption of 1 kWh of production energy (from natural gas).
- The energy required to manufacture the boards is 10,500 kWh, which corresponds to 10,500 kWh x 0.22 kg ≈ 2,300 kg of CO_2.

SAVINGS

How much energy and CO_2 are saved by using grey EPS insulation boards over an average building lifespan of 40 years?

Energy: approx. 580,000 kWh

- With 1 m³ of grey EPS, **145 kWh/m²** is saved per year.
- With a living space of 100 m², that is 145 kWh/m² × 100 m² = **14,500 kWh**.
- Over 40 years, that comes to 14,500 kWh × 40 years **580,000 kWh**.

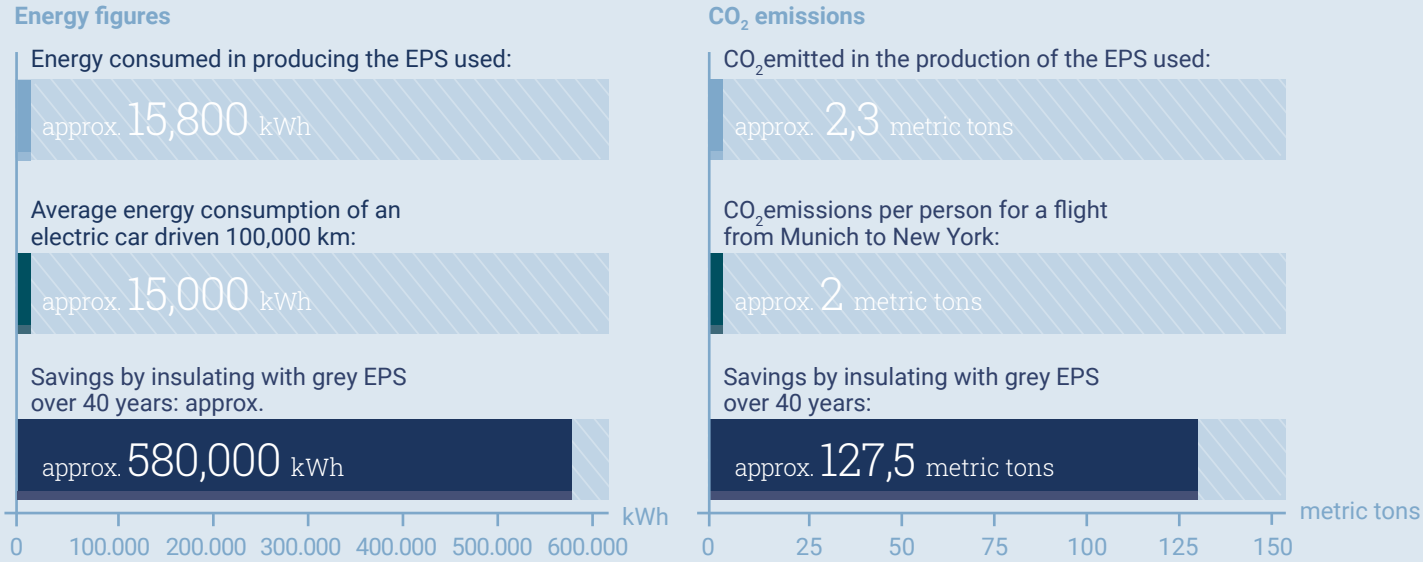
CO_2: approx. 127.5 t

- With natural gas heating systems, 0.22 kg of CO_2 is released through 1 kWh heating energy.
- A saving of 580,000 kWh is equivalent to 580,000 × 0.22 kg = 127,600 kg of CO_2.

Conclusion:

- In this example, insulating with grey EPS has saved almost as much energy (**14,500 kWh**) after just one year as was required for its production (**15,800 kWh**).
- Therefore (deducting the production energy) about **564,000 kWh** of heating energy – i.e. 36 times the production energy – and about **124.2 tonnes of CO_2** will be saved after 40 years.
- If the insulation boards are then used for energy recovery, approximately **5,300 kWh** will be recovered. This reduces the energy demand from the **15,800 kWh** initially required to just **10,500 kWh**.

The savings for the example house compared:



All figures have been rounded.

[1] **www.adac.de/rund-ums-fahrzeug/tests/elektromobilitaet/stromverbrauch-elektroautos-adac-test/?redirectId=quer.stronverbrauche.autos**
www.naturefund.de/en/information/co2_calculator

A much more favourable savings calculation can be produced by examining multi-family houses instead of unrenovated single-family houses. The calculation is less favourable where the aim is to improve the insulation performance of buildings that are already well insulated.

For more information, visit [1] **www.mit-sicherheit-eps.de/newsundpresse/graues-eps**

About the Forum for Safe Insulation with EPS (FSDE)

The founding members from industry, the housing sector, associations, and the research community are dedicated to saving energy through the correct insulation of new and existing buildings.

The FSDE is committed to …

- presenting the topic of insulation with EPS in an objective manner that is based on facts,
- establishing dialogue between all stakeholders involved with EPS as an insulation material,
- continuously improving insulation using EPS,
- supporting the sustainable use of EPS as well as the ongoing development of dismantling and recycling projects with EPS.

[1] Only available in German