ABOUT HEMSPAN®

THE CONSTRUCTION INDUSTRY IS RESPONSIBLE FOR

39% OF GLOBAL CARBON EMISSIONS

Operational emissions (from energy used to heat, cool and light buildings) account for 28%. The remaining 11% comes from embodied carbon emissions, or 'upfront' carbon that is associated with materials and construction processes throughout the whole building lifecycle.

TRADITIONAL HOMES

1.5tCO_2e/m^2

CURRENT ESTIMATED WHOLE LIFE CARBON EMISSIONS FOR MAJOR UK DEVELOPMENTS

<5%

UK HOMES HAVE LOW CARBON HEATING

0.625t CO_2e/m^2

2030 RIBA TARGET FOR WHOLE LIFE CARBON EMISSIONS

Launched in 2019, The Royal Institute of British Architect's (RIBA) 2030 Climate Challenge exists to encourage architectural practises to take action and collaboratively shift the profession towards outcome orientated design approaches.

UK housing stock is **'the oldest and least energy efficient in Europe'** and Britain's homes 'use more energy than typical homes in other nations across the EU.'*

In 2022, UK homes made up **26%** of final UK energy consumption and caused **17%** of UK CO_2 emissions.

Natural gas was the most important single fuel used in homes with 64% of the total, electricity made up 24%, oil 7% and bioenergy, coal and other sources making up the rest. 62% of this energy consumption is used in heating the space.

The UK's 28.6 million homes are among the **least energy efficient** in Europe and lose heat up to three times faster than on the continent, making people poorer and colder.

Dr Salvador Acha Department of Chemical Engineering

*research by the Climate Change Committee for the IFG (Institute for Government)

THE PROBLEM

THE SOLUTION IS...

HEMP

One hectare of UK-grown industrial hemp can absorb **11 tonnes of CO_2** into their stems each year each year producing biomassyields of 8 tonnes per hectare in just 120 days

Regeneratively farmed hemp has the capacity to sequester a further **6 tonnes** per hectare of CO_2 into the soil each year

In addition to insulation and building products, hemp can be used as bio-cladding when combined with structural timber to create net-zero buildings

BIOHAUS®

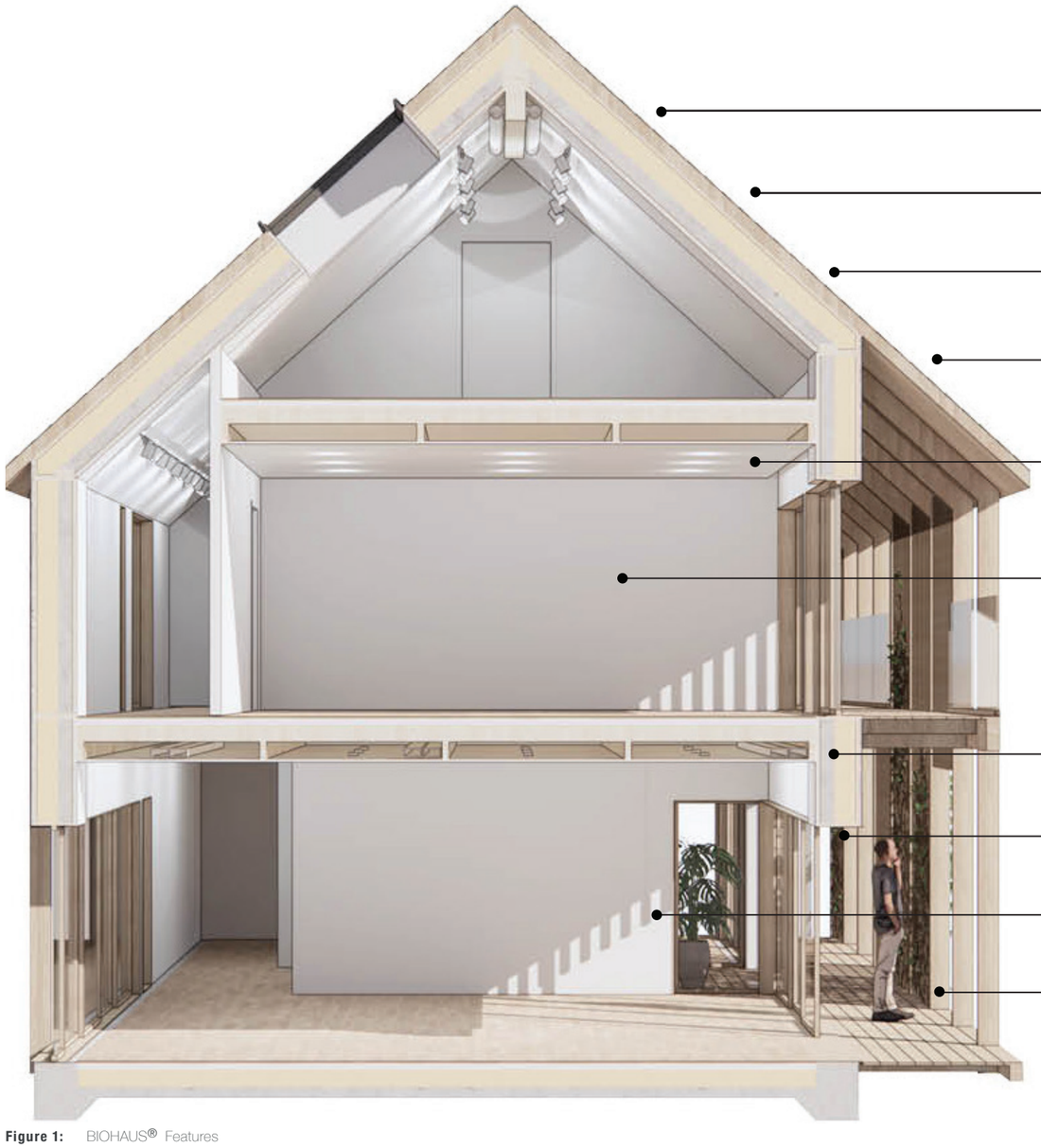
U-VALUE
0.100W/m²K

LIFECYCLE EMBODIED CARBON
0.1 tCO_2e/m^2
EXCEEDING RIBA 2030 TARGET

75% +
REDUCTION IN ENERGY COSTS

KEY BENEFITS OF A BIOHAUS® HOME

- The BIOHAUS® system is itself carbon negative
- A completed BIOHAUS® home locks up more carbon than it emits during the construction phase
- A BIOHAUS® home generates more energy than it uses
- Passive house design principles are enhanced by breathable, bio-construction materials and renewable technologies



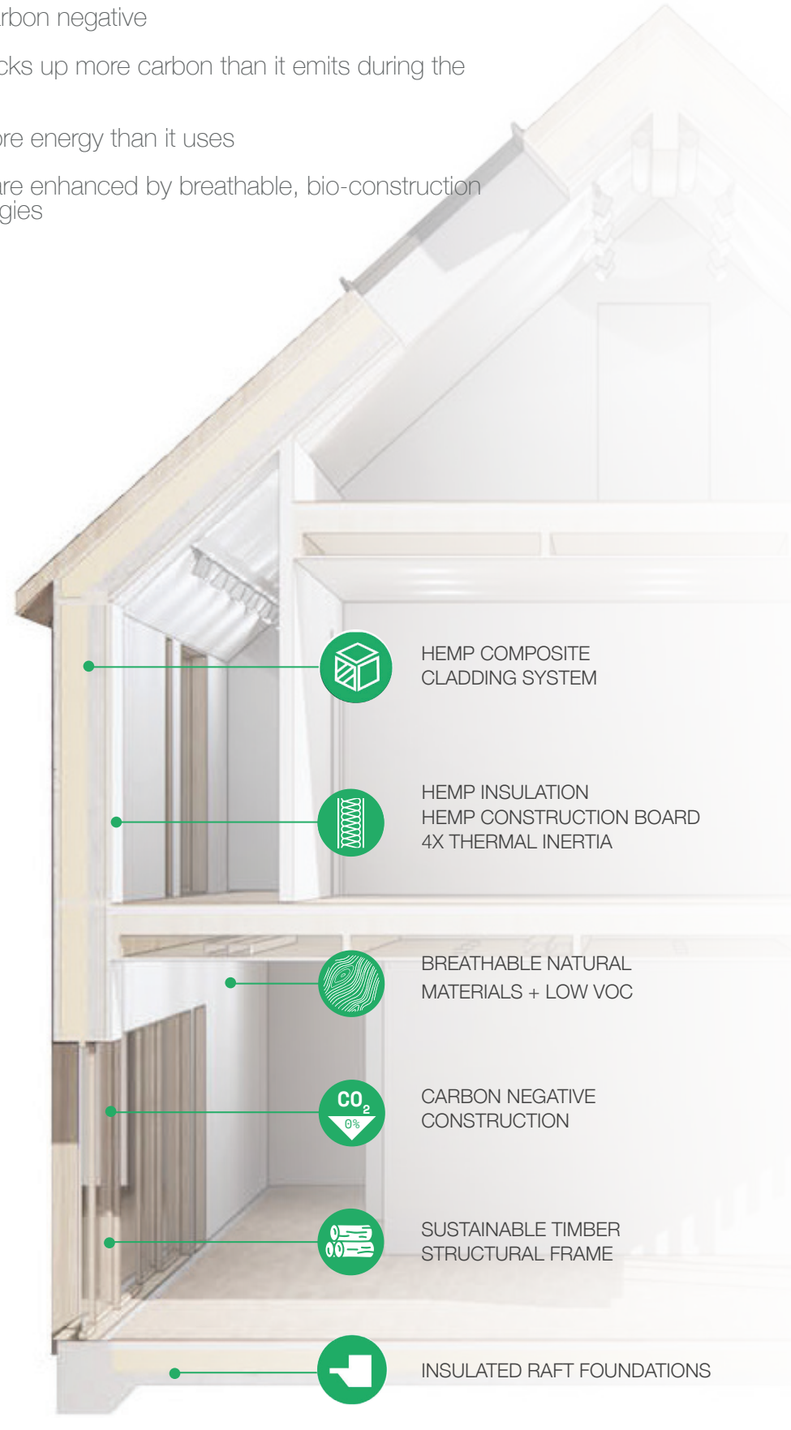


Figure 1: BIOHAUS® Features

The table life cycle embodied carbon (LCEC) table to the right shows emissions in buildings, measured in kg CO_2e per square metre (KG CO_2e/sqm), across different building types. The colour-coded bands indicate performance, ranging from **BIOHAUS®** (best) to **G** (worst).
This indicates that the project house at **142kg CO_2e/sqm** would significantly **outperform RIBA's 2030 target by at least 75% lower emissions**.

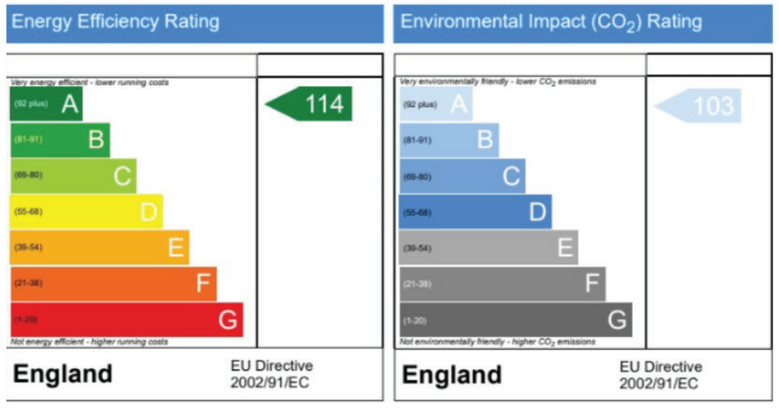
Ultra-low carbon performance of less than **100kg CO_2e/sqm** will be achieved through vertically integrated processing and manufacturing through to final assembly of the BIOHAUS® system.

This table effectively highlights the potential of cutting-edge sustainable design to significantly reduce the carbon footprint of buildings well beyond established targets.

LIFE CYCLE EMBODIED CARBON, A1-5, B1-5, C1-4

Band	Office	Residential (6+ storeys)	Education	Retail
BIOHAUS®	<100	<100	<100	<100
A++	<150	<150	<125	<125
A+	<345	<300	<260	<250
A	<530	<450	<400	<380
B (RIBA 2030 TARGET)	<750	<625	<540	<535
C	<970	<800	<675	<690
D	<1180	<1000	<835	<870
E	<1400	<1200	<1000	<1050
F	<1625	<1400	<1175	<1250
G	<1900	<1600	<1350	<1450

Figure 2: *Revit model showing MVHR layout*



MASSIVE CARBON REDUCTION

Achieving BIOHAUS® standards ensures the project house will emit far less embodied carbon than the industry's 2030 (RIBA) sustainability benchmark, demonstrating significant decarbonisation potential for the UK, and beyond.

REGULATORY AND CERTIFICATION BENEFITS

Such superior performance can support achieving green building certifications (e.g., LEED, BREEAM, Passivhaus) and align with net-zero carbon ambitions.

MARKET LEADERSHIP

If adopted widely, low-carbon buildings using the facade-agnostic BIOHAUS® system could help drive the industry toward even more ambitious carbon reduction goals. Its adaptability allows integration with local architectural styles, including classical and traditional designs, as this case study demonstrates.

BIOHAUS® CASE STUDY HOUSE

Our first fully certified **BIOHAUS®** home construction will complete in winter 2025.

The client brief required a performance level that would set the standard for future projects.

The initial predicted energy efficiency assesement uses the government approved **SAP 10** methodology, and is rated in terms of energy use per m^2 of floor area. The energy effeciency is based on fuel costs and the environmental impact based on carbon dioxide (CO_2) emissions.