

solidian

green building

sustainable
structures
with concrete

build solid.





Our earth is a unique ecosystem and a very complex habitat for us humans, the diverse plant and animal world. It offers us a retreat and a home on land, in the water or in the air. However, the progressive climate change due to CO₂ Emissions and the excessive overexploitation of almost all natural resources, force us to rethink - towards a more resource-saving, environmentally conscious way of life.



To stop climate
change and to
protect our
planet, we all
must change
our behaviour.



READY
FOR THE
CHANGE?

The building sector is

responsible for almost 40% of global CO₂ emissions and equivalent green house gases. A large part of this is due to the operation and use of buildings, but there are already many known solutions for optimising the energy efficiency of buildings. For example, by using more economical heating systems, better windows or additional insulation, they consume less energy and produce fewer CO₂ emissions.

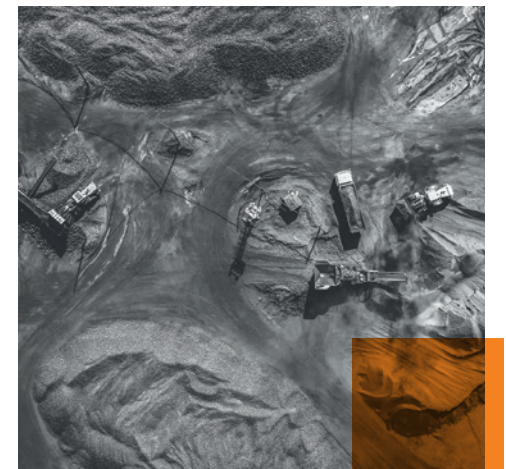


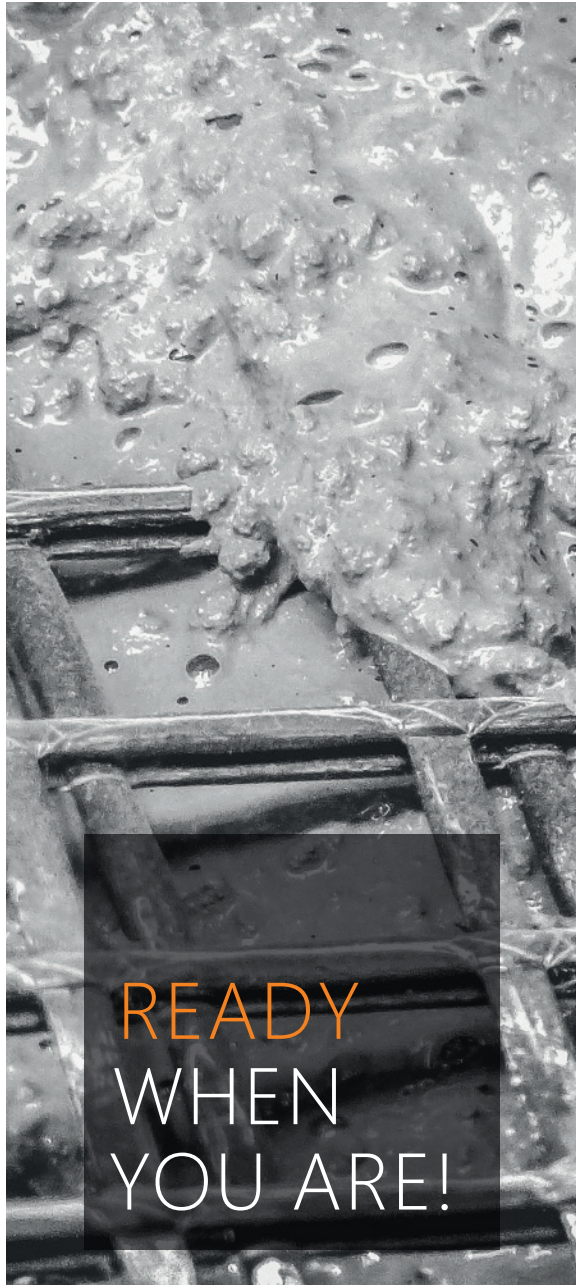
However, new construction accounts for 10% of global CO₂ emissions from the building sector. In addition, the production of cement for concrete construction accounts for 8% of global CO₂ emissions in the industrial sector. This corresponds to about half of the CO₂ emissions from transport.



If we want to stop climate change, every percent counts. That's why something has to be done about concrete as a building material - for building with concrete

non-metallic reinforcement
is one solution!





LET'S MAKE CARBON CONCRETE THE GAMECHANGER.

The reinforcement is a composite material and consists of carbon or glass fibres with a coating, for example, an impregnation of epoxy resin. The building material can then contribute to a more sustainable use of our resources in the form of grids, mats or bars because it does not corrode and needs a much thinner concrete cover than conventional reinforcement.

The highly load-bearing and non-corrosive carbon reinforcement also has a significantly longer service life, so that new buildings can be used for much longer than it is possible with today's structures made of concrete and saving resources at the same time. In addition, the building material can help to extend the useful life of existing buildings in the renovation sector, which also helps to use resources carefully. Instead of demolishing a structure and building a completely new one, a repair with carbon concrete can be sufficient.

Compared to existing concrete construction the use of carbon concrete can save up to

50%

of resources and reduce CO₂ emissions by up to

30%



LIFE CYCLE ASSESSMENT BRIDGE

the key facts

- Span: 15 m
- Use: Pedestrians, cyclists, snow clearing vehicles up to max. 10t total weight
- Reinforcement: ... All reinforcements in the superstructure were made of carbon
- No surface protection is needed since no steel reinforcement is used

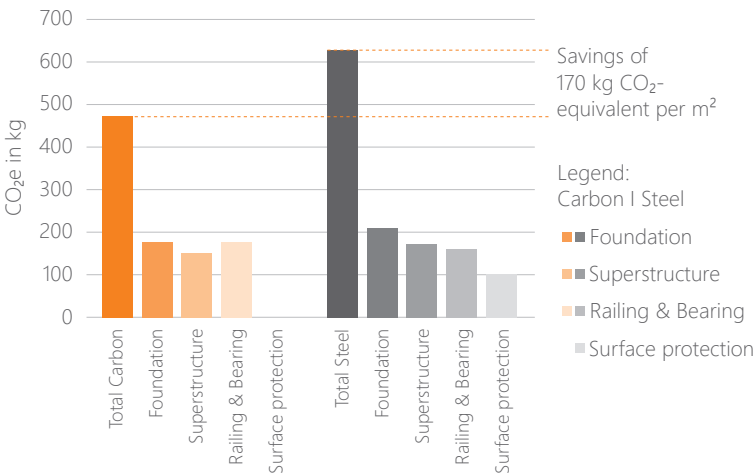
the study

- was carried out by LCEE Life Cycle Engineering Experts GmbH using the life cycle assessment method according to DIN EN ISO 14040 and 14044



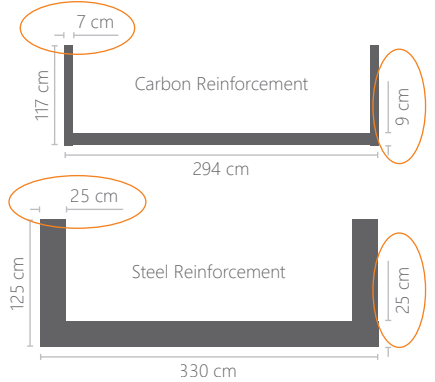
comparison CO₂ emissions

The CO₂ equivalent saving per m² of the reference bridge in our example is approx. 170 kg. For the entire bridge this means a total saving of roughly 7.5 tons of CO₂ equivalent. The savings in CO₂ emissions come from the use of less cement and other materials such as sand, water and steel. In addition, the elimination of a surface protection system, for example an asphalt road surface, can save a lot of CO₂.



constructional differences

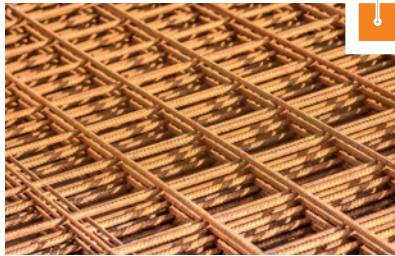
The deck area can be reduced from 25 cm with steel-reinforced concrete to only 9 cm when carbon concrete is used. Due to the lower weight of the superstructure, the design of the abutments and foundations can also be made leaner. The material savings thus extend through all components of the bridge.



■ less ressources and material

By using approx. 330 m² or 190 kg of carbon reinforcement,
the following raw materials and materials could be saved:

Sand: ~ 21.000 kg
Water: ~ 4.000 kg
Steel: ~ 1.500 kg



Other materials:

Cement: ~ 7.500 kg
Asphalt: ~ 9.000 kg



SUSTAINABILITY
FOR ALL OF US



LIFE CYCLE ASSESSMENT FACADE

the key facts

Curtain wall facade with rectangular elements.

- element dimensions: 2.5 m x 3.4 m
- element area: 8.5 m²
- total facade area: 1,635 m²

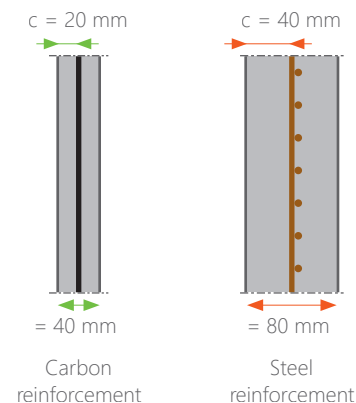
the study

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LCEE Life Cycle Engineering Experts GmbH

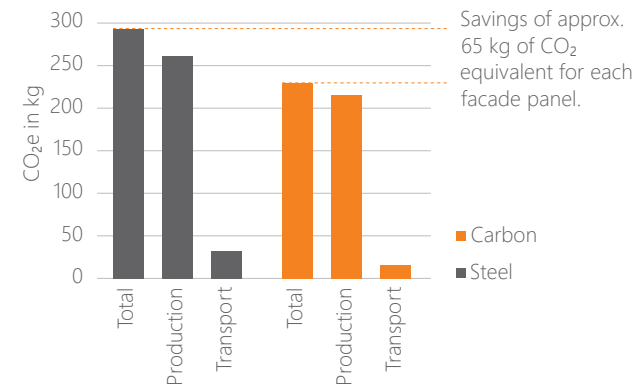
constructional differences

The thickness of the facade panel can be reduced from 80 mm to just 40 mm. With carbon reinforcement, a concrete cover of just 20 mm is required, while 40 mm is needed with steel reinforcement.



comparison CO₂ emissions

Due to the lighter weight of carbon reinforcement, CO₂ could also be saved on the transport distance of approx. 300 km. The concrete grade C35/45 was used for the steel-reinforced concrete and C50/60 for the carbon concrete. The panel thickness was 80 mm for the steel-reinforced panel and only 40 mm for the carbon reinforced panel. In this reference project example we saved with that key figures aprox. 65 kg of CO₂ equivalent for each facade panel with 8,5 m². In addition, a common anchoring system was used.



■ WE ARE COMMITTED as member of organisations to the transformation of the construction industry

The German Sustainable Building Council - DGNB e.V. is a non-profit and nongovernmental organization whose mission is to develop and promote ways and solutions for sustainable design, construction and use of buildings.



The C³ - Carbon Concrete Composite project is currently the largest research project in the German construction industry. Since 2014, with the help of a consortium of over 140 partners, the composite material carbon concrete has been researched and developed in 61 joint projects and over 300 individual projects and has been increasingly used in practice since 2006.



CU Bau as a supra-regional specialist network of Composites United e.V. promotes the acceptance and widespread use of fibre-reinforced materials in the construction industry for its members from industry and science.





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