

THE BENEFITS OF CONCRETE IN SUSTAINABLE CONSTRUCTION

Buildings account for around 40% of energy consumption in the European Union. Increased awareness of the role of the built environment in maintaining the sensitive balance between man and nature has placed Sustainability at the heart of modern construction and design. A sustainable approach to construction brings lasting environmental, social and economic benefits to society. Concrete has valuable inherent properties that can significantly contribute to the above-mentioned three pillars of sustainable construction for the benefit of people and society.

Concrete buildings and infrastructure works are part of the solution to achieve EU CO₂ savings targets.

Globally, efficient use of energy is key to limiting the impacts of climate change. When assessed over the whole life cycle of a building, concrete outperforms all other primary construction material in terms of energy efficiency. The thermal inertia of concrete allows it to absorb and store surplus heat or cold, and release these back to the air (heat in winter and coolness in summer) as part of a designed thermal strategy. This can:

- Reduce heating energy consumption by 2-15% with a typical saving in Northern European climate condition of 10% when comparing light and heavyweight buildings and
- Reduce energy use for cooling by up to 50% when combined with natural ventilation.

Concrete is made from coarse aggregates (gravel or crushed stone), fine aggregates (sand), water, cement and admixtures. It is an inorganic, versatile and durable construction material. Its unique properties provide a comfortable and safe environment in which to live and work. Due to its high thermal mass, concrete provides a stable indoor climate by moderating rapid temperature swings which otherwise would necessitate the use of expensive, energy-intensive air conditioning units. As an inert, stable material,

concrete is completely non-toxic and contributes to good indoor air quality and a healthy living environment.

Concrete also has excellent sound suppression and vibration dampening properties. It absorbs both low and high frequency sounds. It also displays safety and security benefits that are related to its massiveness and density. Concrete does not burn and therefore provides comprehensive fire protection including life safety, protection of properties and of the environment in case of fire.

Its well documented high resistance to fire stops fire spreading and is an effective fire shield, providing safe means of escape for occupants and protection for fire-fighters. Furthermore, it is easy to repair after a fire, and so helps businesses recover sooner at lower cost than rebuilding. People need to rely on structures which maintain their robustness during extreme events. Concrete offers resistance to explosions, break-ins and break-outs, high temperatures and extreme natural events, and is not affected by fungal or insect attack. Concrete-framed structures suffer less damage from leaks or water ingress. Other inherent sustainable benefits of concrete structures are its long lifespan and recyclability. After being crushed, concrete

can be re-used as aggregate for roads for example, replacing naturally-sourced gravel as a fill material. Precast concrete elements can even be re-used in their original form. This approach developed by the concrete sector preserves natural resources, and reduces environmental impacts from waste disposal and extraction, manufacturing and transportation of virgin materials.

In terms of cost-efficiency, using concrete elements in house construction contributes to 'affordable homes' by reducing energy consumption. Concrete has low operational and maintenance costs, which are the most impor-

tant part of a building's whole life-cycle costs. Construction materials that require servicing and maintenance become extremely expensive over the long term.

The concrete sector actively works at reducing its impact on the environment.

Progress continues to be made in reducing emissions by means of improved cement and concrete manufacturing processes and the increased use of alternative fuels and raw materials, putting waste materials, which would otherwise go to landfill, to good use in the manufacture of cement and concrete.

The concrete sector supports the recasting of the Energy Performance of Buildings Directive (EPBD) and calls for a coherent regulatory framework avoiding duplication of regulations, which provides both specifiers and end-consumers with a net CO₂ approach focusing on the holistic sustainable performance (including energy) of the whole buildings during its whole life cycle (rather than the environmental footprint of construction material on their own).