



THE SUSTAINABLE* BENEFITS OF CONCRETE

When comparing the cradle-to-cradle impact of various building materials – extraction, processing, construction, operation, demolition and recycling – concrete stands out as a significant contributor to the triple bottom line of sustainable development.

Here's how concrete contributes to sustainability:

ENVIRONMENTAL BENEFITS

Reduce

- The thermal mass of concrete contributes to operating energy efficiency and reduced cooling costs, under certain climatic conditions.
- Longer lasting structures – reduce energy needs for maintenance and reconstruction.
- Made to order concrete means less construction waste.
- No need for additional interior or exterior finishes.
- Light reflectance – light coloured walls reduce interior lighting requirements.
- Permeable concrete pavement and interlocking concrete pavers can be used to reduce runoff and allow water to return to the water table.

Reuse

A well designed concrete building that takes advantage of long floor spans with column-free space is adaptable to a variety of occupants over time.

Recycle

- Used concrete can be 100% recycled as aggregate for use in roadbeds or as a granular material.
- Industrial by-products such as slag or fly ash,

from the production of steel and electricity, can be used to supplement the use of cement in concrete mixtures while improving product performance.

ECONOMIC BENEFITS

- Cost-effective and competitive building material.
- Less transportation costs.
- Less maintenance.
- Polished concrete floors do not require carpeting.
- Lower operating costs – thermal mass properties help to moderate heating and cooling peaks, lowering HVAC equipment requirements.
- Lower lighting costs due to reflectance of concrete.
- Concrete walls do not require paints or sealants.
- Concrete does not sustain mould growth and can be easily cleaned.
- Buildings last longer – resistant to wear and tear, severe weather, rot, insects and fire.

SOCIAL BENEFITS

- Better indoor air quality – no of gassing from Volatile Organic Compounds (VOCs) - combatting Sick Building Syndrome.
- Safety – resistance against fire, wind, vibration, sound transmission and seismic impact .

Now and for future generations

The decisions made by architects, engineers, and developers influence our shared future. They have a responsibility to design and select materials and systems that will provide durable foundations for sustainable communities.

For Architects:

Concrete offers a dramatic range of colours, finishes and unlimited design possibilities difficult to match with other materials, while creating a structure that provides superior environmental and energy performance. Cost-effective, energy efficient and aesthetically pleasing, concrete structures deliver client satisfaction.

For Engineers:

Engineers have shown the many ways they can use concrete to achieve state-of-the-art environmental and energy performance. Designs that take advantage of the thermal mass and structural integrity of concrete have resulted in many award-winning projects.

For owners:

Concrete offers both aesthetic appeal and cost effectiveness. Its strength and natural thermal mass result in a building that has low maintenance and high operating energy efficiency.

For developers:

Concrete offers a competitive building solution based on first cost, long-term economic benefits, energy efficiency, lower maintenance, and overall operating costs as well as opportunities for future reuse should the occupancy of the building change.

Cement vs. concrete

Cement, an ultra-fine powder, is the critical ingredient that locks the sand and gravel together into an inert matrix – typically representing 9 to 14 % of a concrete mix.

Energy consumption

A complete Life Cycle Assessment (LCA) including operating energy usage, must be undertaken when determining the full potential environmental footprint



a building will leave on society. Work completed by the ATHENA Institute for the international Green Building Challenge demonstrates that over the lifetime of a building, operating energy has a far greater impact than embodied energy.

Concrete and SCMs

Although the embodied energy associated with concrete is already low, supplementary cementitious materials (SCMs) can further reduce its embodied energy while enhancing its durability. To ensure desired performance, the substitution of fly ash for more than 30% and slag cement for more than 35% of the Portland cement in concrete should be considered.

Concrete and blended cements

Although it is most common to make use of supplementary cementing materials in the replacement of cement in the concrete mixture, blended cement is produced at the grinding stage of cement production where fly ash, blast furnace slag or silica fume are added to the cement itself. The advantages include expanded production capacity, reduced CO₂ emissions, reduced fuel consumption and close monitoring of the quality SCMs.

Green Building rating systems

Green building rating systems promote the construction of better buildings – better for the environment, the owner and the occupant.

These rating systems, still in an evolutionary stage, attempt to consider as many relevant factors as possible. However, many factors such as durability have yet to be incorporated into these building rating systems. These factors can significantly influence a building's environmental impact and should be incorporated at the building design phase. Concrete can be used in combination with other building materials to earn desired levels of certification.

Sustainable concrete solutions

Concrete is a strong, durable, low environmental impact material. It is the cornerstone for building construction and infrastructure that can put future generations on the road towards a sustainable future.

CONCRETE HAS BEEN USED FOR OVER 2000 YEARS