
# 1.0 Sustainable Building

Sustainable building is the concept of constructing homes and buildings that we need today without depleting resources for future generations. In this new world of "sustainability" information about the strength, durability and indestructible nature of concrete as a resourceful building material is emerging. More builders and homeowners are now embracing sustainable building and concrete is emerging as a champion rather than a rebel. Read on to find out why, and learn how you can use concrete to build environmentally responsible homes without compromising beauty, comfort, or economy. For most homebuilders and homeowners, expressions such as "sustainable development," "green building," and "eco-friendly design" weren't part of the vernacular several years ago (although commercial builders have long been familiar with these terms). But with mounting concerns about rising energy costs and the continued depletion of finite resources, these environmental buzzwords are becoming mainstream.

In New Zealand, green building is slowly beginning to show some popularity in residential (and more recently commercial) construction and an increasing number homebuyers are making environmental issues a top priority for new construction and remodeling.

From March 2019 Litecrete will be manufactured using HR Cement's ECO-CEM, which has a 25% pozzolan (perlite) replacement, so offers a considerable saving in carbon emissions compared to precast manufactured using typical Portland cement and will qualify for Green Star points.

Sustainability expands on the basic concept of "reduce, reuse, and recycle." It seeks to balance sensitivity for the environment with economic and social values. For homeowners, the benefits of green living go beyond environmental stewardship. Sustainable homes also offer many practical, personal, and economic advantages including:

- **Lower utility costs.** Through such strategies as proper site orientation, the use of insulating building materials, and tighter construction to reduce drafts, sustainable homes require much less energy to heat and cool. Sometimes off-grid energy sources, such as solar power, can be used to meet all or part of the home's electricity needs.

- **Reduced impact on the surrounding environment and community.** Sustainable homes make more use of materials manufactured or harvested in an environmentally responsible manner. They also use materials available locally, not only to reduce transportation impacts (such as fuel consumption and pollution) but also to stimulate the local economy. Attention to landscaping is important as well, with consideration given to minimizing stormwater runoff, which can pollute local waterways.

- **A healthier, more comfortable living environment.** By using non-toxic materials, sustainable homes have better indoor air quality. They also use materials resistant to moisture and rot to eliminate concerns about the growth of hazardous mould and mildew. Exterior walls typically have greater thermal mass, which offers the dual benefits of reducing temperature fluctuations and muffling outdoor noise.


- **Greater durability with less maintenance.** Building with highly durable, low-maintenance materials, such as concrete, extends the useful life cycle of a sustainable home and reduces maintenance and replacement costs. Many homeowners are unaware of the negative impacts their homes and surrounding paved surfaces can have on environmental health. But the effects are dramatic, ranging from resource depletion to climatic changes to disruption of fragile ecosystems. Consider these disturbing facts:
- With about 25,000 homes built each year, prior to 2008, homes represent 55% to 60% of all environmental impacts of buildings.
- It can take over 40 trees to build one timber-framed home
- Operating a typical home or building over time consumes far more energy than it does to build it, according to Vera Novak, a US environmental specialist and one of the *ConcreteNetwork's* industry leaders. While investigating the life cycle of buildings, she found that a mere 2% of total energy is expended for materials and construction and a staggering 98% are used to heat, cool, and power the building.
- Studies have shown that urban environments have higher temperatures in areas where there are few trees and lots of buildings and paved surfaces. This additional heat (called the "urban heat-island effect") causes air conditioning systems to work harder, consuming up to 18% more energy.
- Stormwater runoff is a leading source of the pollutants entering our waterways; about 90% of surface pollutants are carried by the first 150 mm of rainfall.
- As much as 95% of the hydrocarbons in urban runoff are from the binder and sealer used in asphalt pavements.

Litecrete lightweight concrete is a friend of the environment in all stages of its life span, from raw material production to demolition, making it a natural choice for sustainable construction. Here are some of the reasons why:

**1.1 Resource Efficiency.** The predominant raw material for the cement in concrete is limestone, the most abundant mineral on earth. Litecrete uses pumice aggregate which is also available in large quantities and is recovered from deposits using very little energy.

**1.2 Durability.** Litecrete builds durable, long-lasting structures that will not rust, rot, or burn. Life spans for concrete building products can be double or triple those of other common building materials.

**1.3 Thermal mass.** Homes built with concrete foundations and Litecrete concrete walls, and floors are highly energy efficient because they take advantage of concrete's inherent thermal mass—or ability to absorb and retain heat. This means homeowners can significantly cut their heating and cooling bills and install smaller-capacity HVAC equipment.

**1.4 Reflectivity.** Concrete minimises the effects that produce urban heat islands. Light-coloured concrete pavements and roofs absorb less heat and reflect more solar radiation than dark-coloured materials, such as asphalt, reducing air conditioning demands in the summer.

**1.5 Minimal waste.** Litecrete can be produced in the quantities needed for each project, reducing waste. After a concrete structure has served its original purpose, the concrete can be crushed and recycled into aggregate for use in new concrete pavements or as backfill or road base.

**1.6 Healthier Environment.** VOC emissions from concrete building products are much lower than those for most other building materials. The use of natural lime-cement plaster wall finishes can also significantly reduce total VOC concentrations inside a home. Exposure to toxic mould in homes and buildings has been blamed for ailments ranging from headaches to severe respiratory infections and immune system disorders. Mould can thrive on any organic material, especially in warm, moist, humid conditions. In addition to carpeting, mould can feed on drywall, timber joists and framing and wall sheathing. Litecrete lightweight concrete floors and walls won't support the growth of toxic mould.

**1.7 Concrete Reabsorbs $CO^2$ Emissions**

During the life of a Litecrete lightweight concrete structure, the concrete carbonates and absorbs the $CO^2$ released by calcination during the cement manufacturing process. Once concrete has returned to fine particles, full carbonation occurs, and all the $CO^2$ released by calcination is reabsorbed. A recent study indicates that in countries with the most favourable recycling practices, it is realistic to assume that approximately 86% of the concrete is carbonated after 100 years. During this time, the concrete will absorb approximately 57% of the $CO^2$ emitted during the original calcination. About 50% of the $CO^2$ is absorbed within a short time after concrete is crushed during recycling operations.