



Relationships between sustainability issues are complex and interactive

Sustainability Design at LeeMcCullough

The design of sustainable buildings and environments requires a higher environmental and social standard than traditional design.

It is recognised that the embodied energy of most buildings (the energy required to manufacture the component parts of the building) is far outweighed by the operational energy (the energy required to operate the building).

With the construction, renovation, and deconstruction of a typical building on average being responsible for the emissions of 1,000-1,500 kgCO₂/m² (around 500 kgCO₂/m² for construction only), the careful selection of building materials can reduce the embodied energy required to construct a building.

At LeeMcCullough we are aware that small changes in our specifications for construction materials can have big effects on the amount of emissions released during the construction of a building. In the UK, the introduction of the Code for Sustainable Housing is enabling a step change in sustainable building practice for new homes and can be used as a source of guidance here.

In traditional building practice, the use of cement leads to very large CO₂ emissions, however for some years, at LeeMcCullough we have been specifying a form of low carbon concrete. Up to 70% of the cement in concrete can be replaced with GGBS, a by-product of the steel industry. We successfully

specified / used this mix for the 1 Warrington Place office block project — which has achieved a BREEAM rating. Concrete blocks formed using GGBS are now also available.

Lee McCullough have been involved in alternative sustainable building solutions including timber framed office buildings (Ballyogan Depot) and housing developments (Castle Park). We have also been involved in the use of clay block single leaf system (a high performance honeycombed block fabricated from terracotta clay, itself reusable after crushing) to construct 36 houses (Garristown Housing) for Fingal Co. Co.

Flooding in recent years has highlighted the requirements for sustainable drainage systems that take account of our changing weather patterns. At LeeMcCullough we utilise 'top of the range' drainage software to assist in our design of sustainable systems - from simple attenuation tanks to landscape features such as ponds and permeable pavements.

Sustainability can mean many different things to different people possibly the best definition of sustainability is *'meeting the needs of the present without compromising the ability of future generations to meet their own needs'* (Brundtland, 1987). We strive to achieve this goal on all our projects in a socially responsible and economical way that attains our Client's requirements.



LeeMcCullough
Consulting Engineers

Sustainability

Some recent LeeMcCullough projects include

- Garristown** - 36 B2 rated houses
- Castlepark** - 9 timber framed houses
- 1 Warrington Place** - BREEAM rated office building
- Trinity Point** - office building with double skin climate wall
- Ballyogan Depot** - 1,500 m² timber framed office building
- Laurel Avenue** - development incorporating permeable pavement roads.

At LeeMcCullough when we specify Ground Granulated Blastfurnace Slag (GGBS) concrete, the environmental savings are as follows:

Per 100 m³ of concrete with 300 kg/m³ of cement with 50% GGBS:

- 1) CO₂ emissions saving:
 - 12 tonnes of CO₂ saved, which equates to taking 4 cars off the road for one year, or saving 4 years electricity in the average home.
 - The same amount of CO₂ would be absorbed by 2 acres of managed Irish forest in one year.
- 2) Harmful pollutants savings:
 - 38 kg of SO₂ saved
 - 53 kg of NO₃ saved
 - 38 kg of CO saved
 - 7 kg of PM10 saved
- 3) Embodied energy of concrete savings:
 - 51,844 MJ of energy saved, equal to the electrical energy used by 3 average homes in one year.
- 4) Depletion of natural resources saving:
 - 24 tonnes of limestone and/ or shale saved.