



ICF's Point to LEED NC

ICF construction contributes to USGBC LEED NC Energy Optimization credits...

*the 10 toughest points
with the greatest savings in life cycle costs.*

Several programs have been created over the past few years in an attempt to quantify the environmental footprint of a building, and identify a benchmark for green building. Insulating Concrete Form (ICF) construction is a consistently strong contributor to any these green build measures.

Perhaps the most recognized is the US Green Building Council Leadership in Energy and Environmental Design (LEED) Green Building Rating System. LEED promotes a whole-building approach with performance criteria in five areas: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Energy Performance

A quick review of the 69 possible points available in the LEED for New Construction (LEED NC) identifies energy savings as the most heavily weighted criteria, with up to 10 points achievable. This strong focus on energy savings is appropriate considering the bulk of a building's environmental footprint is caused by the energy consumed in the heating and cooling of a structure over the course of its lifetime.

"ICF construction provided a high performance thermal envelope that contributed significantly to down-sizing the HVAC system and reducing energy consumption."

*John A. Boecker, AIA
L. Robert Kimball & Associates
Clearview Elementary School*

The high performance thermal envelope of ICF construction can offer a significant contribution towards achieving all 10 of the **Energy & Atmosphere Credit 1** Optimize Energy Performance points. The energy effectiveness of an ICF wall is due to the unique synergy of continuous insulation, virtually no air infiltration and the added thermal mass of the concrete wall.



*LEED NC v2.0 Gold with all 10 Energy Points
Clearview Elementary, Pennsylvania*

Reduced Footprint

Sustainable Sites Credit 5.1 calls for reducing the development footprint and limiting site disturbance to conserve existing natural areas. ICF construction can reduce impact to a construction site, as the bracing is typically erected on the inside of the ICF wall, with limited construction activity around the perimeter.

Materials Credits

ICFs contribute to the **Materials & Resource Credits** in three areas: construction waste reduction, recycled content and regional materials.

MR Credit 2.1 and 2.2 seeks to reduce construction waste. ICF construction typically factors in only 2 – 5% waste, much lower than most other wall materials.

The **Recycled Content Credit MR 4** is applicable for some ICF manufacturers who have incorporated recycled content in the plastic ties. The expanded polystyrene (EPS) used for the forms may contain some factory regrind, but generally no post-consumer waste, as the possible contaminants may jeopardize the function as a safe concrete forming material.

The concrete mix used for ICFs can incorporate high percentages of fly-ash, which is 100% pre-consumer waste. The reinforcing steel (rebar) is generally over 80% post-consumer recycled. LEED calculates recycled content by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value. The values of all the recycled materials used in the building are adjusted for pre- vs post-consumer and then added together to determine a combined recycled materials percentage of total value.

The **Regional Materials MR Credit 5** requires not only the manufacturing, but also the extraction of the material to be within a 500 mile radius (per LEED-NC Vrs.2.2 and LEED® Canada- NC 1.0). The aggregate in the concrete mix would generally qualify.

Durability

LEED Canada has introduced a **Materials and Resources Credit 8, Durable Building** with the intent of minimizing construction waste due to premature failure of the building from moisture and structural deterioration. The Canadian Standards Association (CSA) *Guidelines on Durability in Buildings* identifies concrete as a durable material, with high resistance to mold and mildew. Indeed, the architecture of ancient Rome is time tested evidence of the endurance of concrete. Moreover, ICFs protect the concrete with layers of EPS foam, which is a stable material and not subject to deterioration or loss of thermal value.

Five Ways ICFs Help Build Green

- 1. Optimized Energy Performance***
 - 2. Durability***
 - 3. Recycled Material Content***
 - 4. Local Materials***
 - 5. Improved Indoor Air Quality***
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Indoor Air Quality

ICF structures can also achieve a high **Indoor Environmental Quality**. The airtight nature of the ICF concrete wall allows for better control of air flow required by **Credit EQ2, Increased Ventilation Effectiveness**: additional outdoor air ventilation (v2.2) or effective delivery and mixing of supply air (Canada v1).

Using ICFs for the building envelope can reduce temperature and humidity variables, and facilitate the maintenance of the comfort ranges specified for **Credit EQ7, Thermal Comfort** (Canada v.1, provide a thermally comfortable environment.)

The **Environmental Quality Credits 3.2 and 4.1** are concerned with the reduction of pollutants. The EPS foam used in most ICF forms emits no VOCs or formaldehyde, nor does it produce any CFCs or HCFCs during manufacturing. EPS will not generate any off-gassing, as the material is inorganic and inert. The adhesives and low expanding foams used in the ICF assembly are equally non-toxic, as is the concrete mass.



LEED Certified residential units at Yellowstone National Park in Yellowstone, Montana built using an ICF system.

Innovative Design

The LEED system also offers the opportunity to be awarded points for exceptional or innovative performance. For example, LEED recognizes the Cradle to CradleSM (C2C) Evaluation Protocol developed by McDonough Braungart Design Chemistry (MBDC). MBDC sets the benchmark for independent evaluation of a products' impact on the environment and the waste stream. Recently, a leading ICF company met the rigorous requirements to earn a Silver C2C Certification. Projects using this ICF product would contribute toward a LEED Innovation in Design credit.

Sustainable Construction

In addition to the points delimited by the USGBC LEED system, ICFs contribute to sustainable construction in many other ways. The sound dampening of the concrete and foam is ideal for protection from urban noise. The solid monolithic concrete wall withstands the worst of rain storms, fires, and high winds. It is also impenetrable to insects, including termites. This is a product that will endure, as will its qualities and benefits.

No matter what the green point system, Insulating Concrete Forms offer the most straightforward solution for an environmentally preferred, energy efficient thermal envelope so vital to sustainable construction.



1730 Dewes Street • Glenview, IL 60025
(888) 864-4232 • www.formis.org

The Insulating Concrete Form Association (ICFA) is a business association, representing over 500 international firms through ICF promotion, codes and standards, research, partnering and education. Founded in 1994, the ICFA is located in Chicago, IL.