

# Blended Cement: The Alternative

With increasing CO<sub>2</sub> emissions threatening our ecosystems and its inhabitants, industries, organizations and individuals from around the world must work together to mitigate our collective impact on the environment.

Our dependence on cement products to build homes, buildings and infrastructure is vast. It is vital that the cement industry become part of the solution in bringing sustainable construction to the forefront.

Ordinary Portland Cement or OPC (Type 1) is the most commonly used construction material in the world. Blended cement (Type 1P) is the alternative.

While both OPC and blended cement use clinker (the burned mixture of limestone and clay), the difference is that blended cement is mixed with up to 30% discarded materials such as fly ash (a by-product of power plants). Less clinker needed means less carbon emitted into the atmosphere during production.

\*In this study, the blended cement observed is composed of clinker, gypsum and fly ash.

## CEMENT BASICS

### 5 Things You Didn't Know About Cement

- 1** Cement is the most common construction material used in the world. It is also one of the most widespread and necessary resources around. <sup>1,3</sup>
- 2** It requires temperatures in excess of 1,450°C to produce cement from raw materials using an industrial oven known as a Kiln. <sup>5</sup>
- 3** Two of the ancient Romans' architectural marvels—the Colosseum and the Pantheon—were built using a material remarkably similar to modern cement over 2,000 years ago. Both are still standing today! <sup>2</sup>
- 4** In 1824, Englishman Joseph Aspdin invented Portland cement, which derives its name from its similarity to a stone quarried on the Isle of Portland in Dorset, England. <sup>4</sup>
- 5** Cement is the main binder of concrete. There is an increasing demand for concrete worldwide, estimated to double within the next 30 years. <sup>5</sup>

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<http://www.lafarge.com>

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# BLENDED CEMENT

## Concrete Solutions for a Better World



# The WWF-Lafarge Partnership

## Developing Sustainability Solutions for a Developing Country

In 2000, Lafarge formed an alliance with the World Wide Fund for Nature (WWF). This established the Lafarge Group as the first industrial player to become a WWF Conservation Partner.

In 2001, the Group set a target of 20% reduction of its net CO2 emissions over the period 1990-2010. By 2010, Lafarge took a significant step in the fight against climate change by achieving a reduction of 21.7% of its net CO2 emissions.

In 2009, Lafarge and WWF have jointly identified key areas of work to which the Group has made practical commitments:

- Climate change;
- Persistent pollutants;
- Water consumption;
- Biodiversity;
- Sustainable construction.

## A Local Initiative

Here in the Philippines, the global partnership translates to drive to use Life Cycle Analysis Tools (LCA) to compare the environmental footprint of blended cement versus Ordinary Portland Cement (OPC). The data this study generates serves as a backbone in a campaign to decrease overall the impact the cement industry makes on the environment as well as promoting sustainable construction practices.

### LCA Up Close

Life Cycle Analysis (LCA) is a tool which helps organizations assess the environmental impact of a product or a process. LCA has the capacity to **evaluate the impact of each stage of the production cycle.**

In its simplest form, LCA is an instrument which measures and accounts what comes in and comes out during the life cycle of a product.

With the ability to measure and assess, LCA helps companies increase awareness and accountability, and eventually open horizons to more environment-friendly products.

### LCA and the Cement Industry

The cement industry is in need of a tool that will help review current practices. LCA can **give a clear picture of the overall environmental burden of the cement manufacturing process:** which contributes most and in what amount. It empowers the industry to make choices for product and process innovation to lessen environmental burden.

### Comparing Blended Cement with Portland Cement Through Life Cycle Analysis

WWF and Lafarge embarked on this local initiative with the goal of furthering the cause of sustainable construction in the Philippines. Project objectives are the following:

- To raise awareness on the environmental benefits of using blended cement
- To influence policy makers and industry leaders to adopt more sustainable building standards
- To foster interaction between the private sector and the government towards developing relevant standards for sustainable materials

### Process

Using SIMAPRO, a software used in computing for environmental effects, the production of 1 ton of Type 1 Portland cement (ASTM C 150) and 1 ton of Type 1P blended cement (ASTM C 595) were compared.

### Results / Interpretation

Both data sets confirm a **significant difference of 20-26%** between the total environmental burden points for producing Type 1 Portland and Type 1P blended cements.

ORIGINAL DATA		
Type	Total Burden	Climate Change Impact
<b>Portland</b>		
Average	6355.5	1858.5 (29.2%)
Highest	7559.2	2163.6 (28.6%)
Lowest	1274.975	375.61 (29.5%)
<b>Blended</b>		
Average	4853.4	1419.2 (29.24%)
Highest	5983.9	1712.7 (28.84%)
Lowest	937.46	275.96 (28.16%)

The table above shows the difference between the climate change impact of the two cement types.

### Conclusion / Findings

This LCA study **concludes that Type 1P blended cement production has lower CO2 emissions**, as proven by the total environmental burden points in the chart above, and thus has a lower environmental impact, compared to that of Type 1 Portland cement.

This study hopes to be the local construction industry's springboard in the move influencing public policy ushering industry leaders towards a more sustainable direction.