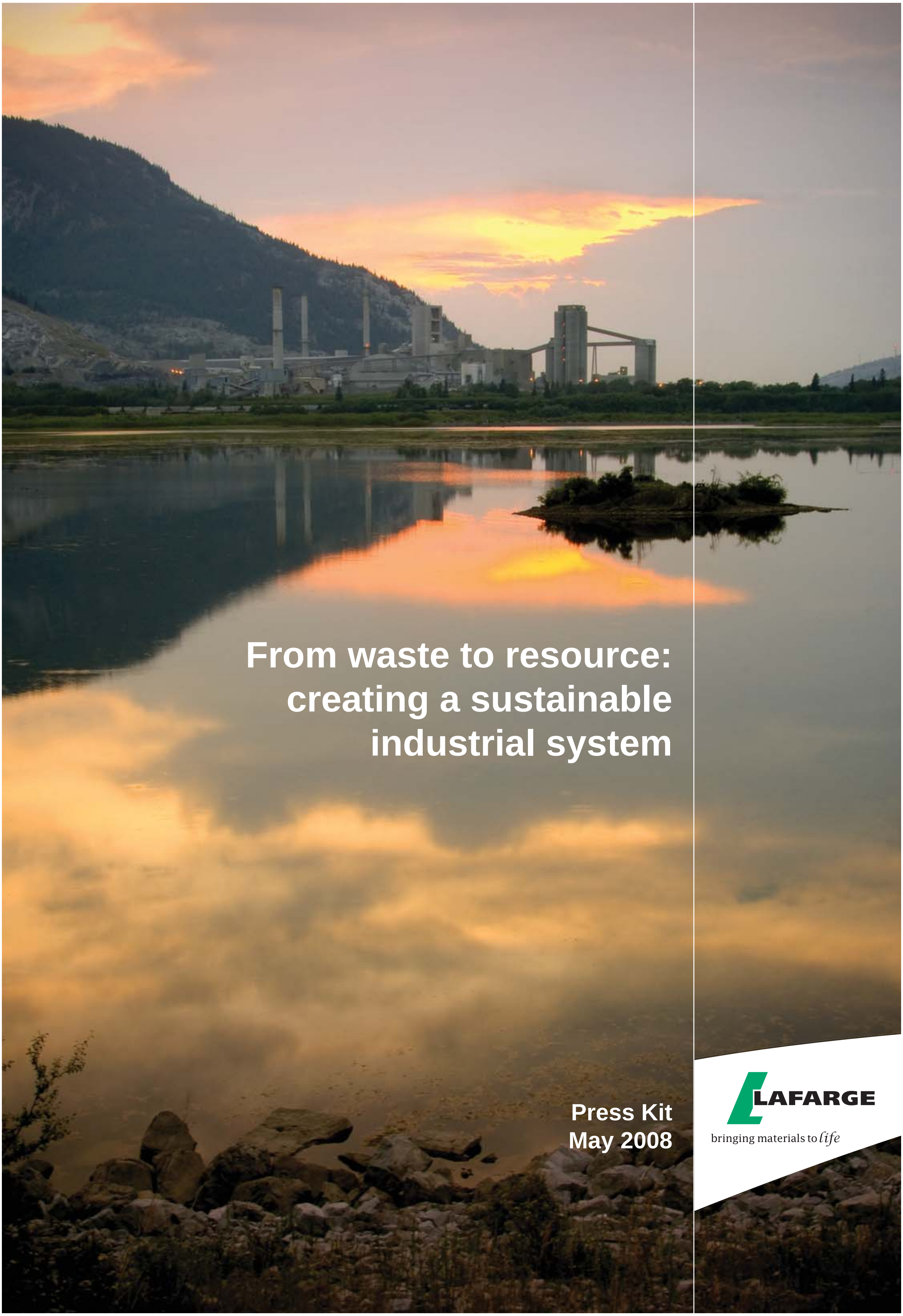


From waste to resource: creating a sustainable industrial system

Press Kit
May 2008

LAFARGE
bringing materials to life

CONTENTS

The emergence of the concept of eco-development

It was in the 1970s that awareness of key environmental issues started to be raised at an international level, particularly with the organization of the first Earth Summit in 1972, in Stockholm. There, the concepts of eco-development and the interaction between ecology and economy emerged, which put forward the idea of seeing the environment as our world heritage, to be exploited in a reasonable manner. This approach was formalized in 1987 with the Brundtland Report, which defined *"sustainable development"* as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

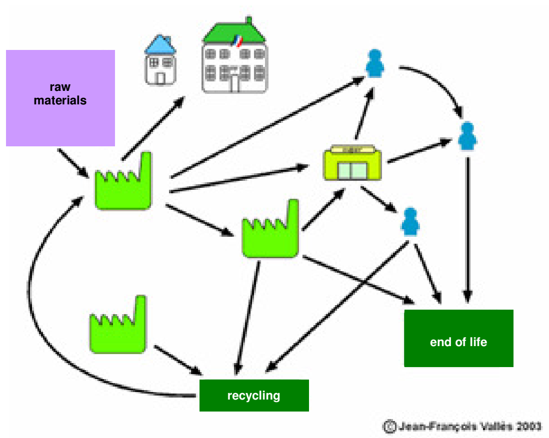
The notion of industrial ecology was defined by Robert Frosch and Nicolas Gallopoulos, both research managers at General Motors. They questioned the traditional industry model, in which "*each transformation operation, independently of another, consumes raw materials, provides the products that we sell and the waste that we stock. We must replace this simplistic method with a more integrated model: an industrial ecosystem*[1]*"* that can behave in the same way as a biological ecosystem.

A new approach for industry

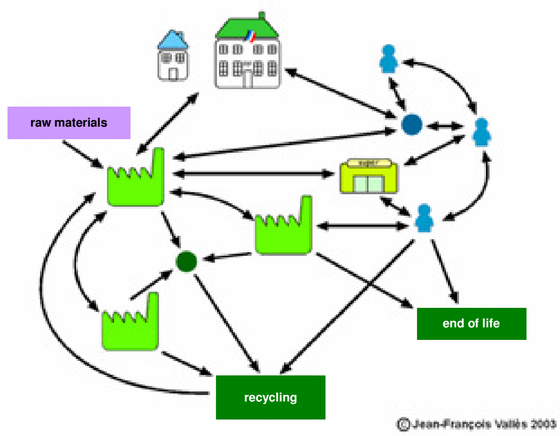
Industrial activities consume large amounts of natural resources (raw materials and fuel) and generate waste and by-products. The traditional solution used by the majority of companies aims at limiting these by-products or processing them. However, this "end of pipe"[2] approach rarely envisages their re-use.

Industrial ecology suggests another approach, one of interdependence and creating synergies between different industries in which the by-products of one company are incorporated into the production processes of another. In this way, industrial ecology offers a vision of a new type of industrial system, inspired by the functioning of ecosystems and harnessing the potential to decrease environmental impacts while at the same time providing a new source of income.

Flow of materials and goods today



Industrial ecology: new flow of materials and goods



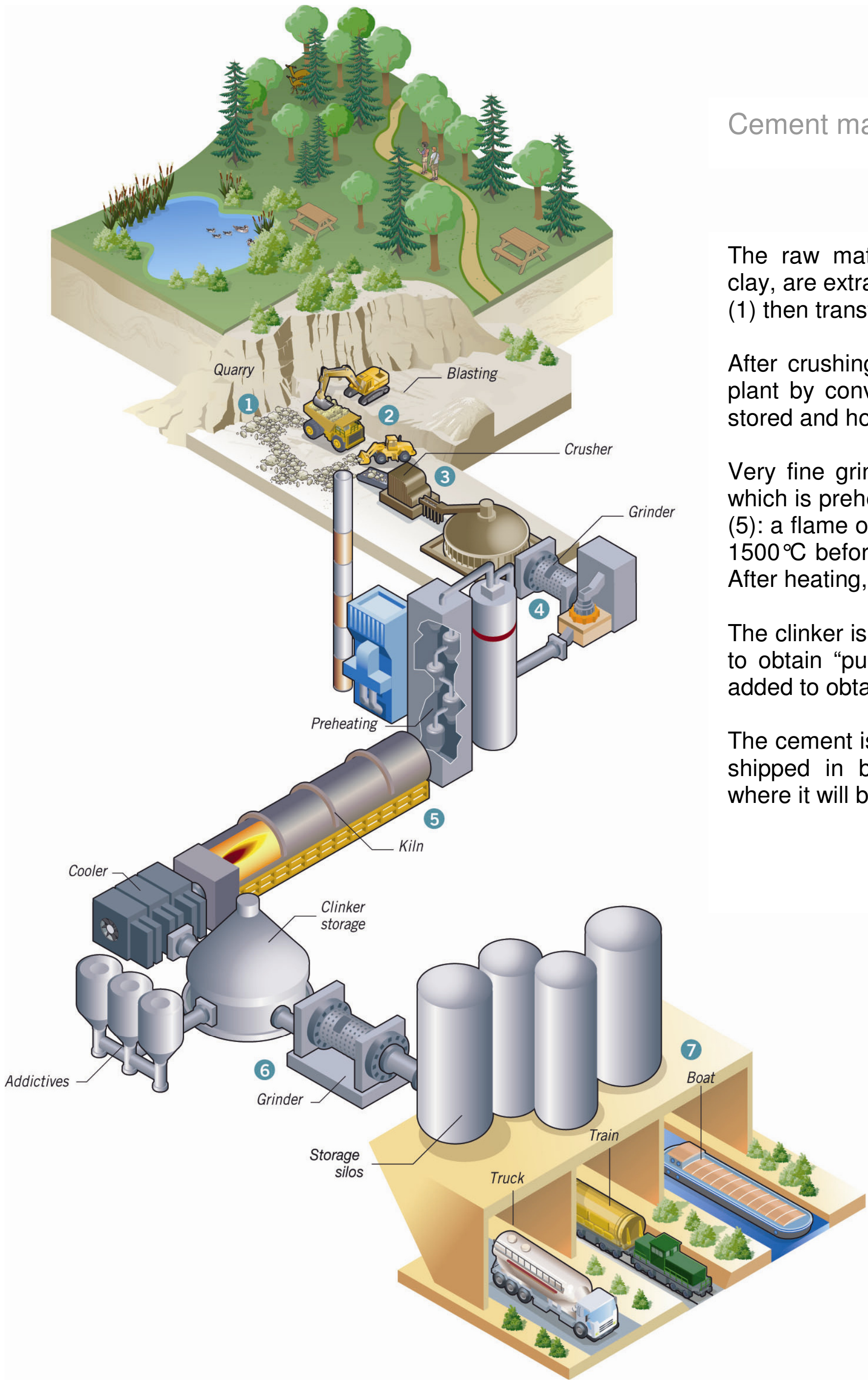
[1] Article "Strategies for Manufacturing", Scientific American, 1989
[2] Reactive environmental approach (vs. preventive) that only considers the problems of pollution at the end of the process when it has already been generated.

Industrial ecology offers socio-economic stakeholders in a given area concrete applications and an operational content to the notion of sustainable development. The objectives are manifold:

- *Connecting production cycles*
  Where waste is usually considered the norm and is treated at the end of the process, industrial ecology creates new utilization networks and synergies between different economic stakeholders, so that waste products from one activity become a resource for another activity.
- *Limiting dissipative emissions*
  This involves thinking in a different way about products and services during their life cycle to limit losses due to their production or use and to ensure that they are as inoffensive as possible
- *Connecting economic cycles, with product transformation*
  Ways are found to optimize the use of resources in order to produce more (using fewer non-renewable natural resources) and in a better way (to extend the useful life of products and allow for their reutilization). In this way, products become services which are consumed by one person and that can be reused, repaired, reconditioned or recycled for use by another.
- *Decarbonizing energy*
  The efficiency of processes consuming fossil fuel should be improved and fossil fuels should be gradually replaced by other types of fuel that emit less carbon dioxide per unit of energy produced.

Understanding the cement manufacturing process

Cement manufacturing consists of extracting and then heating limestone and clay to produce clinker, which is then finely ground with gypsum. Cement is used to make concrete.



Cement manufacturing process

The raw materials, mainly limestone and clay, are extracted from quarries by blasting (1) then transferred in a dumper (2).

After crushing, they are transported to the plant by conveyor belt (3) where they are stored and homogenized.

Very fine grinding produces raw meal (4), which is preheated and then sent to the kiln (5): a flame of 2000 °C heats the material to 1500 °C before it is cooled by bursts of air. After heating, clinker is obtained.

The clinker is finely ground with gypsum (6) to obtain "pure cement". Additives can be added to obtain blended cements.

The cement is stocked in silos before being shipped in bags or in bulk to the sites where it will be used.

Two major environmental challenges

The cement produced by Lafarge meets a basic need: the construction of housing and infrastructure indispensible to humankind. Today, the world cement market represents over two billion tons and is growing by 5% every year. Demographic growth, the need for infrastructure and the dynamism of developing countries is boosting the building materials market. In fact 80% of cement consumption is in emerging markets. However, the production of building materials has an impact on the planet:

- Producing cement naturally consumes non-renewable raw materials: limestone and clay which are the basic constituents of cement, as well as the fuel which is required in the heating process - generally fossil fuel (coal, petcoke, etc.),
- CO_2 is generated during the heating process in the kiln: by the chemical reaction of the materials and by burning the fossil fuels necessary to heat the kiln.

An innovative commitment

It was during the energy crisis of the 1970s that the cement industry, which uses significant amounts of energy, started to optimize its energy needs and think about reducing its environmental impact. Lafarge became involved very rapidly in this and was the first cement company to apply the principles of industrial ecology to its activities. First of all, the group developed the use of **alternative fuels**, using industrial by-products or biomass to partially substitute fossil fuels used to heat its kilns. Lafarge then started to use certain by-products from other industries as **cement additives**, i.e. as raw materials which could partially replace clinker in cement production.

In 2007, Lafarge recycled over 7.7 million tons of biomass, waste and by-products, and 16 million tonnes of cement additives.

Dedicated experts

To ensure industrial waste is recovered safely and to optimize the industrial process, Lafarge provides its engineers, technicians and foremen with advanced training in the processes relating to industrial ecology in the cement industry.

Because industrial ecology is an activity in its own right, and one that is closely related to its core business, Lafarge has created an industrial ecology department, both at Group level and in its business units. Lafarge's industrial ecology experts support the plants with their industrial ecology projects, by sharing the experience acquired in other units of the Group.

> Lafarge strives to gather a maximum number of skills in the countries where it develops industrial ecology activities. In many countries, it teams up with professionals in the waste sector. And wherever this is not possible, it develops its own structures, such as Systech in North America, where it directly operates pre-processing units on its own cement sites.

A winning system

This optimized organization of industrial flows, so that the waste of certain industries can be recovered in cement making, has a number of benefits:

Reducing CO_2 emissions

Applying the principles of industrial ecology to the cement manufacturing process has significantly contributed to reducing the CO_2 emissions recorded by Lafarge since 1990. In 2000, the Group, as part of its partnership with the WWF, agreed to reduce its net CO_2 emissions per ton of cement by 20% between 1990 and 2010. These emissions were down by 16% at the end of 2007.

To reduce its CO_2 emissions, Lafarge has three strategies. Apart from improving the efficiency of its kilns, which was responsible for 20% of the drop in emissions between 1990 and 2007, the two others are directly inspired by the principle of industrial ecology:

- The use of biomass and waste products as alternative fuels in the Group's cement plants accounts for 30% of the drop in CO_2 emissions since 1990.
- Using waste from other industries as cement additives, or alternative raw materials, accounts for 50% of the drop in the Group's CO_2 emissions since 1990.

This approach adopted very early on by Lafarge has led to it start using local sources of waste, putting into place local recycling channels and organizing maritime or river transport. This also reduces CO_2 emissions originating from the transportation of raw materials.

Saving non-renewable raw materials

Limestone

Producing one ton of cement uses a large quantity of non-renewable natural resources:

- 1.6 tons of raw materials, mainly limestone and clay which are extracted from quarries located near cement plants
- 0.1 tons of an oil equivalent, i.e. fossil fuels such as coal, gas or even oil which are required to heat the kiln.

By using industrial or agricultural waste products (after grinding or processing) as either cement additives or alternative fuels, it is possible to reduce the quantity of raw materials and fossil fuels used to produce cement.

A solution for the waste and by-products of other industries

Collecting and treating waste has an impact on the environment, health and the economy. Industrial ecology responds in two ways to this problem:

- It encourages the optimization of the use of resources and influences the amount of waste produced.
- It encourages the creation of new utilization networks by favoring the development of recycling.

The use of by-products from other activities turns waste products into resources, instead of burying them in landfill sites or incinerating them. Lafarge offers a second lease of life to waste products. Furthermore, the Group carries out quality checks to control the industrial process from start to finish, ensuring that these products are recycled safely. The transportation of this waste is carried out in a closed circuit to avoid any risk of contamination.

Using waste products as fuel in cement kilns is a radical solution for the elimination of certain waste products which otherwise would have reached the end of their lifecycle. In France, since 1998, following authorization from the Government, bone meal is now used as a substitute fuel. Placed into the kiln's flame at 2000°C it is instantly destroyed and, as indicated in research carried out by the ADEME [3], it has no detrimental impact on the environment.

The cement industry can also bring solutions to countries where waste processing systems are inadequate.

[3] France's public environment agency

In November 2007, Lafarge signed a strategic agreement with Yunnan Province, China. The agreement, worth a total investment of $600 million, involves modernizing and reorganizing the building materials industry in the province, and provides for the introduction of energy saving policies and the development of waste as alternative fuel.

Employee at one of Lafarge's Chinese plants

Creating a new value chain

The optimized organization of industrial flows as promoted by industrial ecology also leads to the reorganization of markets and employment. In fact, the strategies of sustainability and intensive use naturally result in a large decrease in the resources being used and in an increase in the consumption of reconditioning and maintenance activities which themselves require more state-of-the-art technological resources.

In real terms, the recycling of waste products creates new jobs such as those involved in the processing, collection and analysing of waste etc. - a real service economy based on know-how and local networks.

In Uganda, the Hima cement plant has reduced fossil fuel consumption by around 30% by using coffee bean husks as a source of alternative fuel. Coffee accounts for 50% of the country's exports. After harvesting and drying, the coffee grains are separated from their husks, which were formerly treated as waste. Now they are transported to the cement plant, where they fuel the furnaces thanks to a system developed especially for this purpose. A new local activity has been created, along with around a hundred jobs.

Coffee husks used as alternative fuel

Reducing costs

Energy is the most expensive production cost in Lafarge's cement activity (around one third). One third of Lafarge's energy mix comes from oil or petcoke (a by-product of oil refining).

The use of alternative fuels allows the Group to diversify its energy sources, reduce the Group's dependence on traditional fuels and in this way reduce energy costs.

Two ways of reducing CO2 emissions

Substitute fuels

Using substitute fuels is an attractive alternative to fossil fuels and one of the main ways in which the Group can reduce CO_2 emissions and costs, two of its strategic objectives.

Diversifying the Group's energy mix

At the end of 2007, energy from alternative fuels at Lafarge represented 9.8% of the overall fuel mix, compared to only 2.5% in 1990.

Fuel mix evolution in Lafarge's Cement business

	2006	2007
Coal	44.9%	45.5%
Coke	28.1%	24.3%
Oil	6.1%	4.5%
HVF**	0.4%	1.6%
Gas	11.7%	11.3%
Biomass	2.1%	2.1%
Waste	6.7%	7.7%
Others	0.0%	3.0%

**HVF: High Viscosity Fluids

The nature of alternative fuels used in cement plants varies according to what type of waste is produced locally. This can be biomass such as palm kernel shells, rice husks etc. - a resource which is both renewable and carbon neutral - or industrial waste such as used tires, bone meal, solvents or even used oil, which becomes a resource for cement plants.

Investment is necessary at the plant level to adapt installations or procedures (setting up a preparation workshop, adjusting the kiln etc.) so that the plant is able to use a particular type of waste product.

In Malaysia, part of the coal used in the cement plants of Rawang and Kanthan has been replaced by biomass (palm kernel shells). This saves over 60 000 tons of CO_2 per year and uses by-products from the local production of palm oil which would otherwise be wasted. This initiative was approved as a Clean Development Mechanism (CDM) in April 2007.

Recycling on a case by case basis

Wherever possible, Lafarge tries to put in place waste supply channels. The situation differs widely from country to country, according to the regulations in place and the historical organization of waste supply channels to different markets. Today, more than half of the Group's cement plants use waste as alternative fuel. In France, for example, Lafarge substitutes up to 26% of its fuel.

In 2004, in Brazil, Lafarge and Cimpor created a waste management joint venture called Eco-Processa, which supplies plants with substitute fuels, placing Lafarge's Brazilian operations at the cutting edge of this technology: 42% of the fuel used comes from biomass or waste, which saved 156 000 tons of CO_2 in 2007. Furthermore, using scrap tires stops them from being dumped and helps to fight against the proliferation of mosquitoes which are responsible for dengue fever.

Matozinhos cement plant, Brazil

Using waste safely

Lafarge's use of waste, seen as a resource, solves the problem of eliminating it as the destruction of organic molecules at very high temperatures removes any risk of pollution. The chemical composition of fuel ashes, very close to that of cement, allows them to be added to the clinker. Therefore, there is no residual waste as a result of using alternative fuel sources.

The emissions from cement kilns using alternative fuels are no different to those from traditional cement plants and always meet the norms fixed by regulations. Neither is the quality of the cement affected by the use of alternative fuels.

At the Atlanta cement plant, USA, scrap tires are used as an alternative fuel. They are placed whole in the kiln.

Scrap tires are a very good example of intelligent recycling. Since the beginning of the 1990s, Lafarge has been partially substituting traditional fuel sources with scrap tires. Today in France, their utilization for energy purposes represents around 30% of all scrap tires (40% in the USA).

Whole or ground, the tires are placed in the kiln at 2000°C, which allows them to be completely destroyed and avoids dispersing black smoke. Furthermore, the material is homogeneous and has a high calorific value, which makes it a very effective fuel for cement plants. Burning tires requires prior authorization.

The Cauldon plant in the UK was the first cement plant in the country to use scrap tires as an alternative to petcoke and coal. Over the last ten years, it has used around two million tires a year, allowing an annual saving of 24 000 tons of fossil fuel. To be able to use the tires it was first necessary to set up a preparation workshop with an investment of 2.2 million Euros.

Alternative raw materials

The Pantheon in Rome was built in around 125 AD, and although is it centuries old it remains one of the best preserved ancient buildings. The modern formulation of concrete is very different from that used in the construction of this monument, but the materials used at that time already contained lime and pozzolan.

Today, pozzolan is still used as a cement additive, or cementitious product, but other materials, including waste products, can also be used. As alternative raw materials, they decrease the amount of non-renewable raw materials needed to produce cement and reduce CO_2 emissions linked to the cement manufacturing process. Since they are used as a substitute for clinker, they reduce the amount of clinker used to produce cement and also the fuel required to produce the clinker.

Clinker

Cement additives can be of natural origin (pozzolan, limestone) or industrial. The waste products from other industries can be used in cement and replace a certain amount of clinker, such as:

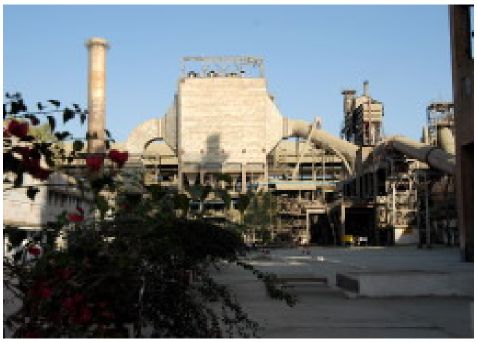
- fly ash obtained from coal-burning power stations
- slag obtained from steel industry blast furnaces

These waste products added to cement have hydraulic binding properties similar to that of clinker and can even change the properties of concrete: e.g. cement blended with a high proportion of slag reduces the setting speed of concrete, whereas adding fly ash improves its mechanical resistance.

Their use in cement, which is called “blended cement”, meets certain norms. The rate of authorized clinker substitution varies from country to country and depending on its use (roads, structures etc.). The dosage limits are between 50 and 90% for slag and 20 and 40% for fly ash.

Today, 60% of the cement products sold by Lafarge are blended cements.

In India, Lafarge has set up a project to substitute part of the clinker with fly ash at its cement plant in Arasmeta (Chhattisgarh). This project was approved as a “Clean Development Mechanism” as it contributes to fighting climate change by generating a saving of 70 000 tons of CO_2 per year. India is the country where the Group uses the most cement additives.



At the end of 2007, the overall utilization rate of alternative raw materials in the manufacturing of cement at Lafarge was 11.4%, while the total amount of raw materials used has continued to fall over the last few years.

Lafarge is looking for ways to improve the substitution rate and is investing in this area with the construction of new slag and fly ash grinding plants throughout the world.

In December 2007, the Group opened a slag grinding plant in Bassens, near Bordeaux. The slag is shipped from Dunkerque to be transformed and ground before it is transported by train to the Martres cement plant near Toulouse. This reduces the number of lorries on the roads by 12 000, and saves 250 000 tons of CO_2 per year by substituting clinker with slag.

Lafarge has had a cement plant at Port la Nouvelle since 1971; it is the Group's most recently built cement plant in France. It employs 100 people directly, who work on operations, maintenance, environmental quality, safety and administration, and also results in around 500 indirect jobs in the region.

Every year, 750,000 tonnes of clinker and 500,000 tonnes of cement are produced at Port la Nouvelle, to supply the surrounding regions, particularly Pyrénées Orientales, Aude, Tarn and Hérault – all strongly growing markets.

Since 1988, the plant has used alternative fuels to reduce its consumption of fossil fuels. With the aim of continued improvement, more and more local residues are being used in the plant's cement kiln. In 2007, the plant substituted 34% of its traditional fuels, enabling it to save almost 80,000 tonnes of CO_2. Waste such as meat and bone meal, tyres and substitute liquid fuel (SLF) have been used in the plant's kiln.

In order to store the waste and use it as an alternative fuel, significant reorganization has had to be undertaken at the plant. In 2001, an animal and bone meal processing unit was set up, and in July 2007, €2.5 million was spent on introducing a processing unit for shredded solid waste such as tires.

In 2008, the Port la Nouvelle plant set itself the target of substituting 56% of its traditional fuels, allowing it to save nearly 130,000 tonnes of CO_2.

The plant has the ISO 9001 Quality Label and the ISO 14001 Environmental Label.

A NEW GRINDING PLANT IN SETE

With a production capacity of 600 000 tons per year, the future Sète plant will grind clinker from the Port-la-Nouvelle plant and will also transform slag from the blast furnaces in nearby Fos to provide the region with a new range of slag blended cements. This project is further proof of Lafarge's commitment to sustainable development:

- The range of slag blended cements will allow a saving of 200 000 tons of CO_2 per year.
- Raw materials - clinker and slag - will be transported by sea, which will ease traffic on the A9 – a heavily congested motorway.
- The new plant is well supported, thanks to partnerships with the local authorities, and will safeguard the activities of the ports of Sète, Fos/Marseilles and Port-la-Nouvelle.

The groundbreaking ceremony for the plant took place in December 2007 and it will be up and running in the second half of 2009. It represents a total investment of 50 million Euros and will employ 20 people.

Cement additives or cementitious products
Materials used in varying proportions during the last phase of the cement production process. The additives make it possible to obtain a range of cements with different properties. They can be:

-of natural origin, for example limestone or volcanic and sedimentary rock (pozzolanic rock),

-of industrial origin, for example by-products of the steel industry (slag from blast furnaces), and coal-fired power plants (fly ash).

Fly ash
Product derived from burning coal, collected from the chimney filters in coal-powered plants, which has very good hydrophilic properties and can be used as a cementitious product, partially substituting clinker. Fly ash is mainly composed of vitreous silica, alumina, iron oxide and lime.

Clinker
Clinker is the main ingredient in cement. These hardened granules are obtained by firing a mixture of approximately 80% limestone and 20% clay to a high temperature. Cement is obtained by grinding clinker and, in some cases, supplementing it with additives.

SLF
Substitute Liquid Fuel.

Petcoke
A fossil fuel by-product obtained from crude oil refining and used as a heating agent. Petcoke is in solid form.

Slag
This mixture of lime, alumina and silica is produced when iron is smelted with coke in blast furnaces. Slag accumulates on top of the molten cast iron. If cooled quickly, its hydraulic properties are close to those of clinker. Slag takes longer to hydrate but it offers greater stability in corrosive conditions. It is therefore a suitable additive for cement and concrete.

Energy mix
Proportion of different sources in the production of energy.

Pozzolan
Pozzolan is named after Pozzouli, a region near Naples, Italy, which is rich in volcanic ash. Natural pozzolan is a light siliceous mineral produced during basaltic volcanic eruptions. It contains silica, alumina and iron oxide (which gives it a red colour), as well as lime and magnesium oxide. Pozzolan is used as a cement additive. Artificial pozzolans with the same properties as natural pozzolans can be created by heating clays, basalts or schists.

Group corporate snapshot and key figures

Lafarge is the world leader in building materials, with top-ranking positions in all of its businesses: Cement, Aggregates & Concrete and Gypsum. Following the acquisition of Orascom Cement in January 2008, the Group now has **90,000** employees in **76** countries.

Lafarge posted sales of **17.6 billion euros** and net income of **1.9 billion euros** in 2007.

The Group is listed on the Euronext Paris stock exchange.

Lafarge has been committed to sustainable development for many years, pursuing a strategy that combines industrial know-how with performance, value creation, respect for employees and local cultures, environmental protection and the conservation of natural resources and energy. Lafarge is the only company in the construction materials sector to be listed in the 2008 '100 Global Most Sustainable Corporations in the World'.

Cement
World leader
€9,456 million in sales
45,481 employees
163 production sites
Present in 46 countries*

Lines of cement, hydraulic binders and lime for construction, renovation and public works

Aggregates & Concrete
World leader & No. 3 worldwide
€6,586 million in sales
24,167 employees
1,732 production sites
Present in 29 countries*

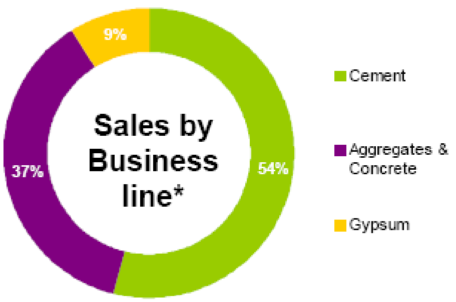
Lines of aggregates, ready-mix and pre-cast concrete products, asphalt and paving for engineering structures, roads and buildings

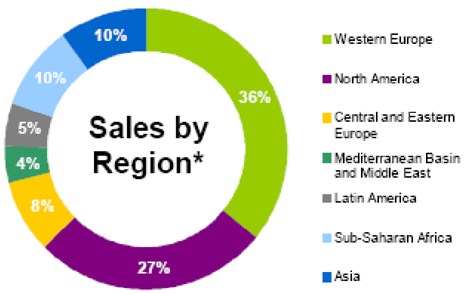
Gypsum
No. 3 worldwide
€1,556 million in sales
8,073 employees
77 production sites
Present in 28 countries*

Plasterboard systems and gypsum-based interior solutions for new construction and renovation

Key Figures

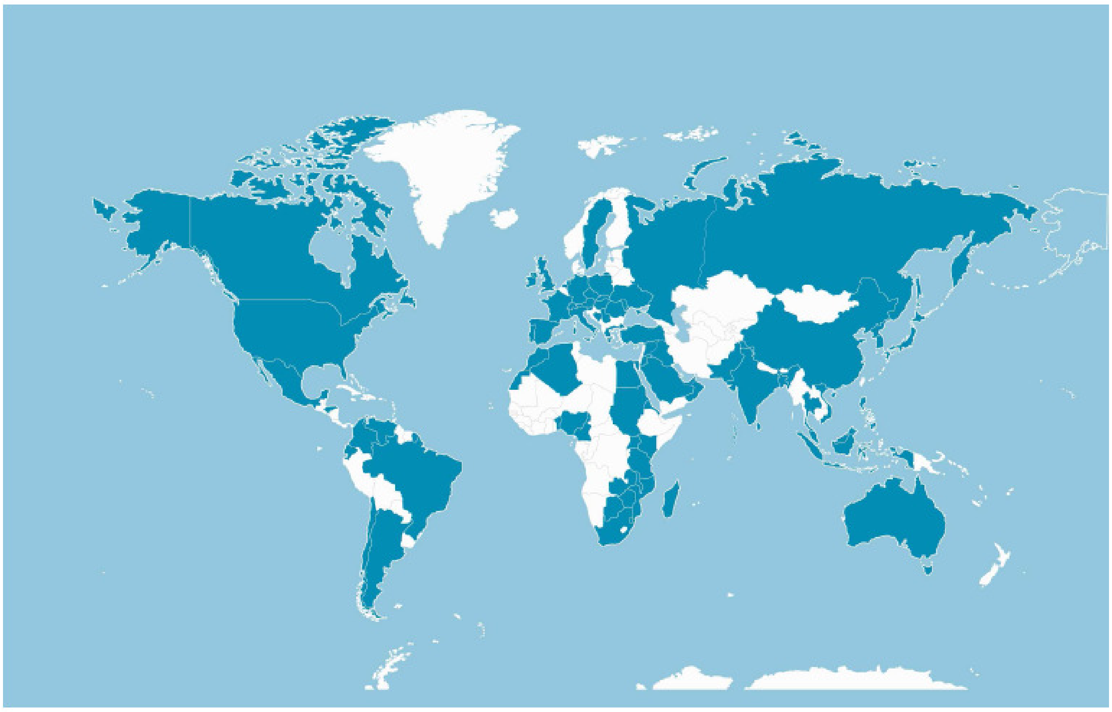
(in millions of euros)	12/31/2006	12/31/2007*	
Sales	16,909	17,614	+4%
Current Operating Income	2,772	3,242	+17%
Net Income	1,372	1,909	+39%
Earnings per share	7.86 €	11.05 €	+41%





Consolidated figures at December 31, 2007 (excluding Orascom Cement, the acquisition of which was completed in January 2008)

A well balanced geographical portfolio, with a worldwide presence in 76 countries



Lafarge Key Dates

1833	Lafarge founded in France
1864	The Group signs its first major international contract for the supply of 110,000 tons of lime for the construction of the Suez Canal
1887	Lafarge opens its first central research laboratory at Le Teil in the south of France
1956	Lafarge builds its first North American cement plant at Richmond in Canada
1990	Creation of Lafarge Research Centre (LCR) at L'Isle d'Abeau, near Lyon, the world's largest building materials research facility
1994	Lafarge enters the Chinese market
1997	Acquisition of Redland, strengthening the Group's position in aggregates and concrete and allowing it to enter the roofing market
2000	Signature of a voluntary environmental conservation partnership agreement with the WWF
2001	Acquisition of Blue Circle, making Lafarge the world's leading cement producer
2005	Renewal of partnership with WWF
2006	Buyout of minority stake in Lafarge North America
	Announcement of sale of Roofing business
2007	Acquisition of Orascom Cement, marking an acceleration in the Group's strategy for Cement in emerging markets and reinforcing its presence in the Middle East and Mediterranean Basin

Key events 2006 - 2008

January 2006	Bruno Lafont becomes Chief Executive Officer
February	Cash tender offer for outstanding minority stake in Lafarge North America (acquisition concluded in May 2006)
June	Announcement of strategic plan "Excellence 2008" to ensure sustainable world leadership
October	Lafarge presents Sensium® technological cements, a major innovation in the construction sector
December	Announcement of Lafarge's plan to sell Roofing business to PAI partners (sale effective in February 2007)
May 2007	Bruno Lafont is appointed Chairman and CEO
	Lafarge presents its Sustainability Ambitions 2012, a road-map for sustainable leadership
June	Announcement of the new Group Executive Committee from September 1st
	Lafarge presents Extensia™ and Chronolia™, two new value-added concrete products
November	Signature of a strategic cooperation agreement with Yunnan Province, China
December	Acquisition of Orascom Cement, reinforcing the Group's presence in the Middle East and Mediterranean Basin
February 2008	Full-year 2007 Results: another year of strong earnings growth
	Lafarge exceeds most of its Excellence 2008 objectives a year early

For more information about the Group, please contact:

Stéphanie Tessier
Head of External Communications
Tel: +33 1 44 34 92 32
stephanie.tessier@lafarge.com

Lucy Saint-Antonin
Media Relations Manager
Tel: +33 1 44 34 19 47
lucy.saint-antonin@lafarge.com

Claire Mathieu
Media Relations
Tel: + 33 1 44 34 18 18
claire.mathieu@lafarge.com

CONTACTS

Stéphanie Tessier
stephanie.tessier@lafarge.com
+ 33 1 44 34 92 32

Lucy Saint-Antonin
lucy.saint-antonin@lafarge.com
+ 33 1 44 34 19 47

Claire Mathieu
claire.mathieu@lafarge.com
+ 33 1 44 34 18 18

LAFARGE