North America: 100% Lafarge 100% Leader

Saving energy: news from the home front

Is social responsibility key to performance?

Amazing objects from a world made of concrete
Looking for greater energy efficiency

The future of the world’s energy is in question. Although the global economy adapted remarkably well to the last oil crisis, the increased revenues it afforded to oil producing countries has had obvious geopolitical repercussions, not always of a stabilizing nature. Those who argue that we must reduce our dependence on fossil fuels to avoid the effects of global warming have found the huge price hikes sustained by such energy to be grist to their mill. Nuclear energy, which avoids all carbon emissions, is once again finding favor in international opinion. But at the same time, Europe and the United States are again concerned about the security of their energy supply and the conditions for successfully easing restrictions on energy markets. Even China, a heavy consumer of coal, is looking for greater energy efficiency, at the same time as a lower level of pollution.

Lafarge continues to reduce its energy consumption, to diversify its supply sources and to use alternative fuels, biomass and additives to reduce its CO₂ emissions per metric ton of cement produced. Beyond the initial phase of the Kyoto Protocol to which only Europe and Japan have contributed significantly, we defend a worldwide approach in which the development of the most modern technological solutions will give rise to a global reduction, without incurring distortions of competition detrimental to Europe.

But we want to progress even more. By combining insulation, ventilation, the thermal inertia of materials and solar energy, the energy consumption of buildings can be brought significantly lower. We are working alongside architects and major players in the construction industry to devise solutions and offer new materials that are suited to these applications.

In this way, we can turn the world’s energy problems into a new opportunity for Lafarge.
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striving to attain our full potential
66 2006, a year of acceleration
message from Bruno Lafont

“Excellence 2008 has set us on the path towards long-term leadership.”

Bruno Lafont, Chief Executive Officer
“Excellence 2008” will make Lafarge the long-term leader for the world of tomorrow

On June 22, we unveiled our strategic plan for the next three years. This plan, which we have called Excellence 2008, embodies our ambition to be and remain the best in our sector for our employees, our customers, our shareholders and our stakeholders. It combines a strategy of profitable development, primarily through organic growth in emerging markets, with a demanding program seeking to achieve excellence in all our operations.

The internal growth currently taking place in the Group bears no comparison with anything it has experienced in the past. In the next three years, installations under construction in at least ten growth countries will generate nearly 30 million metric tons of additional cement capacity, more than the entire Blue Circle acquisition represented back in 2001. This tremendous human adventure requires all our people to show a wealth of ingenuity, creativity and rapidity to build the best state-of-the-art technology at the lowest cost and in the shortest timeframe, to keep pace with the growth of our markets and reinforce our local positions.

Innovation is the second vector of our organic growth. Here again, we intend to be inventive and do things differently. Our businesses are at the heart of people’s lives. Concrete is the world’s second most heavily consumed product, after water, and it satisfies the needs of the men and women of our time with regard to housing, mobility and infrastructures. Our businesses are at the heart of these aspirations and I believe that our Group has a key part to play in improving building methods, helping to make construction more sustainable for everyone.

The second major focus of Excellence 2008 is the quest for operational excellence. Thanks to the simplification of our organization, which has been made more rapid and more agile, and to the rigorous cost-cutting program we have launched, we are genuinely on the road to excellence. At the very heart of these endeavors, safety is a key issue. It is the absolute priority for all our men and women, and I am certain that it is the condition for operational excellence, especially in businesses where people are key to our success. We are devoting all our energy to the effort to improve our safety results so that we rate among the best.

Excellence 2008 has set us on the path towards long-term leadership. Being leader today is not enough for us; our ambition is to be the long-term leader that the world of tomorrow will need.

Bruno Lafont, Chief Executive Officer
event

100%

North America

100%

Lafarge

100%

Leader
Lafarge first established itself in Canada in 1956, constructing a cement plant and creating Lafarge Cement of North America (LCNA). Less than 20 years later, the company moved into the United States.

The conquest of the North American market took the form of a series of major acquisitions during the 1980s. The one that brought the biggest change was that of General Portland Cement, America’s second-largest cement producer. Lafarge thus became the leader in cement in North America. The Canadian and American companies merged in 1983 to form Lafarge Corporation, which was listed on the New York, Toronto and Montreal stock markets.

1997 was a decisive turning-point, with the acquisition of the Redland aggregates businesses in the United States, as a result of which Lafarge became number one in construction materials in North America.

Meanwhile, the North American plasterboard market, which represents 50% of the world market on its own, was expanding substantially. After acquiring two gypsum wallboard plants, Lafarge inaugurated a brand new ultra-modern facility in Silver Grove, Kentucky, in 2000. The plant uses 100% recycled raw materials such as synthetic gypsum in the manufacturing process.

Lafarge Corporation changed its name to Lafarge North America Inc. (LNA) in 2001. In the same year, on May 16, 2006, Lafarge raised its 53% stake in Lafarge North America to 100%, becoming sole owner of the subsidiary following a successful bid. The leading diversified building materials producer in the United States, Lafarge has been growing substantially in each of its businesses: Cement, Aggregates, Concrete, Asphalt, Gypsum and Roofing.

The conquest of North America

Already leader on a market which represents a quarter of its worldwide sales, Lafarge is now ready to move on to the next phase in its development.

“Need $200,000 for Lulu”

This was the famous wire that triggered the acquisition of the site for the new Richmond plant on Lulu Island, near Vancouver, Canada, in March 1956. A new book is currently in preparation, drawing on the memories of many of those who took part in this epic story. Recreating all the key stages in Lafarge’s growth in North America, it will be richly illustrated with photographs from the entire fifty-year period. Further details will be available shortly.
LNA signed a partnership agreement with the NGO Habitat for Humanity, pledging to provide one million dollars worth of financial aid and donations of materials. As a result, many homes have been built for highly needy communities.

In 2006, the Group finalized the acquisition of the remaining shares in Lafarge North America, which is now a wholly owned subsidiary. This will result in savings and organizational simplification in line with the Group’s business-focused structure, streamlining processes, speeding up decision-making and optimizing efforts to pursue the development of Lafarge throughout the North American continent. Today, Lafarge is able to capitalize on one of the most familiar brand names in its sector in the United States and Canada.

Five businesses for North America’s leading diversified materials operator

More than 15,000 people work in roughly 1,000 sites divided over Canada and the United States.

This strong potential has seen Lafarge become the leading diversified construction materials operator in North America, with five businesses. Exchanging know-how and improving performance, particularly with regard to safety, are priorities shared by all the Lafarge Group’s North American production sites.

**Cement**

Lafarge is the top supplier in the United States and Canada, with a range of more than 20 types of cement designed to satisfy conventional needs such as residential and commercial buildings, but they can also meet more specific demands on the most complex construction projects.

**Aggregates & Concrete, Asphalt**

The most innovative producer in North America, Lafarge has developed the most sophisticated ranges of materials in the building industry, including Agilia®, Ductal® and Ultra-Series™, three innovative, high- and ultra high-performance products, and three successes!

**Gypsum**

With the most competitive costs on each of its markets, Lafarge has developed impact-resistant, fire-resistant and noise-resistant wallboards with significantly more attractive appearance.

**Roofing**

Managed by MonierLifetile, a joint venture formed in 1997 by Boral and Lafarge, the Roofing business in the United States benefits from very high growth potential market.
America builds growth

How is the North American market currently characterized, and how is it likely to develop? Lafarge is currently well placed to take advantage of growth in the construction market due to a sharp rise in spending on infrastructures.

Characteristics of the North American construction market...

Much less cyclical over the past 15 years or so, the North American market is experiencing net growth. It does not enter the category of so-called “mature” markets. There has been an overall advance in cement, with growth in cement content per cubic meter of construction, particularly marked in engineering structures. This factor alone accounts for 1% of annual growth in the cement market, equivalent to the consumption of an additional 1.5 million metric tons per year.

… and medium-term prospects

“We do not forecast any real slowdown in current growth in the coming years, although there may be a hiatus in the market in 2007-2008,” affirms Jacques Sarrazin, Senior Vice President, Group Strategy. The residential market is beginning to slow down, and the non-residential market is experiencing moderate growth. However, the cement market should continue to hold steady, because of significant growth in the building of infrastructures, which is the principal outlet. Infrastructure spending constitutes almost a half of America’s cement consumption in North America. The United States, in particular, is investing very heavily in transportation. Evidence of this is seen in the recent SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users) legislation, which proposes $286 billion of transport infrastructure spend between 2004 and 2009.


Average annual growth: 2.2%.

Source: Strategic Base Files, Cembureau.
Forecast: Lafarge estimates.
Bridges of the future built in Ductal®

Thanks to joint development work, the performance of Ductal® has been optimized for the constraints of highway construction.

On May 5, 2006, a highway bridge was inaugurated in Wapello County, Iowa. The event might have gone unnoticed had it not been for the fact that the Mars Hill bridge is the first highway bridge in North America built with Ductal®, the ultra-high performance concrete from Lafarge. The innovative bridge, consisting of three 33 meter-long girders with no rebar for shear stirrups, marks the culmination of more than four years of collaboration between Lafarge, the Iowa Department of Transportation, the Iowa State University/Bridge Engineering Center and the Federal Highway Administration (FHWA), a division of the United States Department of Transportation responsible for overseeing the safety of highways and introducing the most recent technological innovations into highway construction. “We launched Ductal® into the American market in 2001,” recounts Vic Perry, Vice President and General Manager of Ductal® for Lafarge North America, “and the FHWA very soon showed an interest.” The agency soon set about testing the new material. “Ultra-high performance concrete provides exceptional durability, in spite of the heavy stresses suffered by highway structures,” explains Dr Joey Hartmann, Senior Research Structural Engineer at the FHWA. Studies carried out by Lafarge and the FHWA, in conjunction with MIT (Massachusetts Institute of Technology) and a pre-caster, led to the development of a new pi-shaped girder, which optimizes the resistance and durability properties of Ductal® by comparison with conventionally shaped girders, explains Hartmann. “Pi-girders also mean time-saving as far as bridge construction is concerned. They weigh less and incorporate a structural driving element, important characteristics which accommodate a number of efficient assembly options.” With influence from the FHWA, a number of States, including Virginia, Georgia and Florida, are expected to choose Ductal® for new bridges. “The Mars Hill bridge convinced Iowa to carry out another full-scale trial of the pi-girder by using it for a second structure,” reports Hartmann. “Between 3,000 and 5,000 bridges are built in the United States every year,” points out Vic Perry, “and our target is to see 5% of them constructed in Ductal®.”

Four years after a far-reaching collaboration began between Lafarge, the State of Iowa and the FHWA in conjunction with MIT, the first highway bridge using Lafarge’s ultra-high performance concrete Ductal® has been inaugurated.
New York's renowned skyline has had few noteworthy additions in the past ten years. That is about to change, as the city's thirst for good architecture is returning. American journalist Sam Lubell, a specialist in architecture, gives us the lowdown on the Big Apple.

Several top designers have recently completed buildings, and New York will soon see an unprecedented amount of stunning projects.

So why is this happening? First, the city's real estate market, while cooling slightly, is at its all-time high. Next, developers are beginning to realize that quality architecture (and renowned architects) will help them collect higher fees. And the city authorities will not be outdone: Amanda Burden, head of the New York planning department, is an architectural visionary, while the city's mayor, Michael Bloomberg, is very interested in architecture.

Cities around the U.S. are beginning to embrace culture – often meaning architecturally ambitious new museums – as an economic engine. And finally the public has developed a keener interest in architecture. On Manhattan's East Side, Renzo Piano last spring finished the Morgan Library addition, a luminous glass, steel, and concrete box that opens completely onto its surrounding neighborhood. On the other side of the city, Norman Foster completed the new headquarters for Hearst Publishing in July, a 47-story glass tower whose diagonally-braced steel skeleton produces a series of diamond-shaped protrusions. In Midtown, Yoshio Taniguchi created a serene yet invigorating new home for the Museum of Modern Art.

But the profusion of future projects inspires even more excitement. Alongside Foster and Piano, other architects now working in New York include Frank Gehry, Richard Rogers, Santiago Calatrava and Jean Nouvel. The new World Trade Center, including Skidmore Owings and Merrill's 1,776-foot (541-meter) Freedom Tower, will contain almost $10 billion in new construction. Gehry's Atlantic Yards development in Brooklyn – one of five Gehry projects underway in New York – will bring his famously off-kilter aesthetic to a sports arena and several apartments. Piano's New York Times tower, covered with white ceramic rods, will be a major midtown anchor.

This is just a selection from literally dozens of upcoming projects which all make the Big Apple an inexhaustible source of inspiration for American architecture.

) Sam Lubell
Listen to explore, and make progress to act in the best interests of the planet.

Twice a year, Crescendo opens its pages to those whose work explores the future and helps re-energize the world. We are totally committed to this approach, and it is our constant priority to look for new ways to drive progress.
oring

a world on the move
exploring a world on the move

Biography

Christophe Gobin has been with the Vinci Construction group for over 20 years. A specialist in progress initiatives, he has a cross-disciplinary view of the construction industry. He teaches project management and interaction between architecture and civil engineering at the École Spéciale des Travaux Publics engineering school and the Paris La Villette École Nationale Supérieure d'Architecture school of architecture. He is a member of Vinci’s sustainable development committee.
How does a construction company such as the GTM group choose its construction materials?

Christophe Gobin: You need to understand that a construction material is not an end in itself, but is a means to an end that serves the purpose of a project. What matters is the performance of the finished object, whether this is a civil engineering structure or a building. The project must be analyzed as if it were a system in movement. For example, a building is going to entail behavior, thermal interchange and energy consumption over a certain period of time. Therefore the performance of the building is largely dependent on these interactions and the choice of materials that are to be used to build it should take account of this global vision. This often runs contrary to architectural monoculture.

How does the intrinsic performance of any given material form part of this structural logic?

C.G.: What matters is not so much the intrinsic performance of a material as its behavior working in synergy with other materials. From this point of view, we are currently living a virtual cultural revolution that I call the re-engineering of the construction profession. Choice of materials is governed by increasingly complex arguments that take account of multiple criteria, resulting in the selection of an ensemble of materials depending not only on the localization of the building and its use, but also on locally available sources and of course the budgetary resources allocated to the project.

In your view, does this global approach have an influence on actual construction techniques?

C.G.: Of course it does. Take the example of the construction of public housing in Montpellier and Barcelona. On both sides of the French-Spanish border, the chosen material was concrete. But in one case, load-bearing walls were erected to define the interior partitions, and in the other, concrete columns and lightweight partitions were used to give greater flexibility to the building in terms of interior layout and subsequently of its use.
Another example is the use of structural frames for school buildings. For many years these were made exclusively of steel or timber, but they are now made of a sophisticated blend of concrete, steel and glulam.

How closely is the performance of the material related to the use that is made of it?

C.G.: Very closely, but not exclusively. For example, we now have anti-pollution concrete that can be used for building facades. This feature has been shown to exist in the laboratory but it is much less reliable in real-world conditions. It depends on, among other things, wind speed, the orientation of the building, and the passage of air in the street. We refer to this as a usage feature in a given context. This level of complexity is what makes the building profession such a noble one. For a long time, the performance of a material was held only to be in its strength, particularly in the case of civil engineering structures. Performance now takes account of other criteria such as workability, or industrial manufacturability. For example, ultra high-strength concrete is used not only for its strength, but also because of the weight-saving benefit for the structure and its suitability producing three-dimensional elements. When we choose a material, we now have to think more about what it will bring to the structure as a whole, in terms of acoustic and thermal performance, strength – of course – but also flexibility, in terms of layout, and ultimately even demolition. We must also think in terms of supplying the site, the labor required in application and environmental nuisances. More than performance, we’re talking about efficiency – this is the relationship between the value added and the impacts generated by its application.

Does this lead to new relationships between architects and civil engineers?

C.G.: The architect Auguste Perret said: “Architecture is the art of organizing space, and construction is its means of expression.” I’m particularly fond of this quotation because it seems to me that it really isn’t possible to choose an architectural design that doesn’t take account of the way in which the building is to be built. The role of an architect is to suggest a solution that is acceptable, as well as being affordable, and he can only do this by working closely with the construction company, which must have expertise in construction materials assembly. This implies that upstream, materials manufacturers also have a different view of their role; they have to know how to work out in advance how their materials will interface with the other elements of the construction as part of a new method of complementarity. This is how you find out that there is never a single solution, but a number of possibilities that are more or less ingenious. We are in the process of rediscovering the “art” of construction.
Material revolution at the heart of the Chinese growth

by Zhang Renwei, Chairman of the CBMIA (China Building Materials Industry Association)

In China, the building materials sector is today able to meet the needs of the construction industry, in terms of quantity. Driven by an improving standard of living, there is now a trend towards greater product quality and diversity. Concrete, glass and decorative materials are on an upturn. The current priorities for improvement, which focus on optimized use of resources, energy efficiency and environmental protection, open the way to new generations of materials.

The recent governmental directive encouraging the construction of energy-efficient buildings is promoting the development of more complex solutions (walls, windows, and so on), and has sounded the knell for silt brick construction. Construction techniques are also becoming increasingly elaborate. Although the principal methods used for major construction sites remain poured concrete and on-site masonry work, substantial progress has been achieved in a number of areas.

The Three Gorges project, which is the construction of the world’s largest hydroelectric dam, employs inspection techniques for concrete cracking.

Work on the Qinghai-Tibet railroad has involved pouring concrete at very low temperatures. And the “bird’s nest” Olympic stadium for Beijing 2008 which spearheaded our current construction techniques owes its nickname to its innovative structure.

All these examples prove that the building materials industry in China is only just beginning its technological revolution.
When architect Rémy Marciano designs a building, he weaves it around the strands of its inhabitants’ history and geography.

When I first came to Marseilles I found a city that was incredibly strong – I still haven’t got over it. I discovered the poetry of certain places that people have made their own, such as the urban landscapes and waterfronts that film directors are so fond of. In Marseilles, you don’t have to work under the weight of a suffocating architectural tradition. There are not many heritage sites, for instance. This means that there is room for imagination and poetry, which suits me perfectly.
What interests me most is the idea of projects as vectors for encounters – an encounter between owner, property development and site, but also an encounter with the history of the place, the way the site is used and the dreamlike vision that arises out of the architecture and its context. The arrival of a building on a plot of land is far from innocent; it radically alters a balance that has been consolidated with time. Frequently the project is seen as an invader. I take great care over issues like this, which appear vital to me. The architectural response touches upon the intimate landscape of the memory. A project reveals the actual geographical and social dimensions of the site. It’s something that always goes beyond the program assigned to it! This overflow makes it a player within the city – it brings a dynamic to the context of which it forms a part, and adds some constructive criticism in the form of a new perspective on the city.

The Cosec Ruffi gymnasium was finished in 1999 and is a good example of my approach. It is located in a fairly chaotic area behind the Marseilles Docks, set between grain silos, housing developments and warehouses. It forms part of the long-term Euro-Méditerranée development project. I was anxious not to seem to be the “clean-up squad” for this cheerful chaos that makes the area so interesting. It was not just a question of building a gym to be used by a sports club and local schools. We opted to open up the playing fields to the streets making a lively space located between a disused church and the covered gym. On Sunday, children come there to play soccer.

I decided to use concrete. The aim was to regenerate and to improve, and it is a very common material, but is not appreciated by residents. The treatment I chose was in contrast to a smooth, architectural concrete, and is an evocation of the poetic assembly of ad hoc materials people use to build shanties, which are found all around here. As far as I was concerned, the use of materials is part of the research of the architectural project. It is part of the design of the fabrication, structure and skin of the building. I like to avoid showy technical features in favor of a low-key application, entirely without superfluous elements, so that the material can express itself, and I particularly favor unfinished materials such as concrete and steel. So the concrete of the Cosec Ruffi gymnasium is not just a construction product, it is the very skin of the building. In another context, for a teaching college at Seyne-sur-Mer, in the South of France, I used a highly carpentered timber skin. It is a reminder of the site’s past as a shipyard. Materials talk, and they cling to ideas.

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**Biography**

Rémy Marciano was born in Villeneuve-Saint-Georges, south of Paris, in 1968. A graduate in architecture and town planning, he opened his practice in Marseilles in 1994. The Ruffi gymnasium won him international recognition, but he has continued to operate locally. He has recently designed a control center and off-duty facility for the Marseilles transport authority, and in 2008 will hand over a performance venue in Sophia-Antipolis and premises for the Marseilles Port Authority. Rémy Marciano likes to say that there are no big projects, only ones that matter.
exploring a world on the move

Zaha Hadid

challenges materials

Pritzker Architecture Prize Laureate in 2004, Zaha Hadid believes in an architecture capable of rethinking form and space by using materials in an unconventional way.

Above: the Phaeno Science Center in Wolfsburg, Germany, open to the public since November 24, 2005.
Biography

Zaha Hadid, who was born in Baghdad, Iraq, in 1950, studied in Beirut, Lebanon, and then in Switzerland and Britain at the Architectural Association before setting up a practice in London. Her masterworks include the Vitra Fire Station (1993) in Weil am Rhein, Germany; the Hoenheim-North tram terminus (2001) in Strasbourg, France; the Bergisel ski jump (2001) in Innsbruck, Austria; and the Rosenthal Center for Contemporary Art (2003) in Cincinnati, Ohio, United States. More recently she worked on the Phaeno Science Center (2005) in Wolfsburg, Germany and the BMW Central Building (2005) in Leipzig, Germany. In 2004, she became the first woman recipient of the Pritzker Architecture Prize, the most prestigious award in architecture.

At the very beginning “provocative” might have been a word used to describe the work of my office. We established a reputation among clients of delivering solutions that reinvented the program, of having our own ideas and interpretations that weren't tied to the form of an institution. We never take a brief literally but instead try to interpret the purpose of an institution. It is not only the form of a building that interests us. We are also interested in the ways in which a new organization of the life of a building can be applied. Contemporary urban life is becoming ever more complex, with diverse, overlapping audiences who have multiple, simultaneous demands. The task today is to order and articulate this complexity in ways that maintain legibility and orientation.

Going beyond the conventional applications of materials

At a time when computer-aided architecture is prevalent, my work takes the fluid dynamism of the sketching hand as a literal option. The current architectural scene is one where many streams of investigation are needed. It is essential to find key collaborators to work on these discoveries and push them into the mainstream.

The choice of specific materials for an architectural object follows the formal approach. In a design environment which is dominated by new software that enables us to rethink form and space radically, it is always a challenge to find materials that match our computer-generated complex shapes and spatial conditions. We aim for an expansion of a material’s performance and try not to think within the limits that are given to a certain material by conventional applications.

I like to work a lot with curvilinearity because I believe it simplifies the configuration visually, and you can then cope with more complexity without crowding or cluttering the visual scene, and I am interested in developing techniques for doing that in concrete. I like concrete a lot because it is a very fluid and continuous material. Recently we have also been working with other materials, but our basic experience is concrete.

In our work on complex, dynamic and fluid spaces, the Phaeno Science Center in Wolfsburg, Germany, is our most ambitious project thus far. The visitor is faced with a degree of strangeness: the floors are not piled above each other, and the mass is supported by funnel-shaped cones protruding into it and extending from it. Apart from these architectural aspects, this is the largest building constructed from self-compacting concrete to date in Europe. Without this new type of concrete, the building’s diverse forms – its jagged angles, looming curves, fractured planes and daring protrusions – would have been difficult to achieve.
“Safety calls for a global response”

Chad Holliday

DuPont is world renowned for its expertise in the area of safety and protection. To what do you attribute its performance?

Chad Holliday: Safety has been a core value of ours ever since the company was founded, in 1802. It is built into everything we do. All new employees experience it as they join DuPont, and it is reinforced throughout their careers. This certainly has to be the principal explanation for our success in this field. Today, it is recognized that safety is unquestionably a factor in saving money and improving results. But placing safety first visibly demonstrates a company’s attachment to certain values.

The DuPont plant in Luxembourg is considered a model. How is safety managed there?

C.H.: Clear and effective safety leadership is the key to safety at the Luxembourg site, like all our facilities throughout the world. For DuPont, safety is a line management responsibility, and our commitment to safety must be felt by everyone in the organization. This “cascade” management is part of the ten-point safety philosophy and makes everyone feel concerned [see opposite].

Founded more than 200 years ago, the DuPont group is the acknowledged world benchmark for safety management. Why?

Chad Holliday, DuPont’s Chairman and Chief Executive, explains.
How does DuPont help companies improve their safety?

C.H.: For some years, DuPont has shared its experience through our unit, DuPont Safety Resources. More than 1,700 companies throughout the world have been supported in aspects ranging from safety in the workplace to the safety of subcontractors, and from ergonomics to risk management. Not only major companies but also governments need experts who can bring them global solutions and a new outlook.

What are the principal needs of companies with regard to safety?

C.H.: To develop a global approach, companies need to work on four essential points: leadership, prevention, operational discipline and technological development. I’ve already talked briefly about the importance of leadership; let me say a few words about prevention and operational discipline. We are living in an increasingly dangerous world where we cannot allow ourselves to be reactive. On the contrary, we must be proactive in order to prevent accidents. One of the most effective ways of doing this successfully is through operational discipline. A strong operating discipline is based on interdependence, where the collective body of an organization comes together as a team to achieve success.

The key principles of the DuPont safety policy are based on 10 points

1. All injuries and occupational illnesses are preventable.
2. Management is responsible and accountable for safety.
3. All exposures to products can be controlled.
4. Safety is a condition of employment.
5. All employees must be trained to work in safety.
6. Management must carry out audits.
7. All deficiencies must be corrected immediately.
8. People are the most critical element of workplace health and safety programs.
9. Safety off the job is an important element in the effort to improve safety on the job.
10. Safety is good for business.
exploring a world on the move

Pierre Radanne

Energy saving: news from the home front

Heatwaves, climate change, rising oil prices... never have energy issues been so much to the forefront of people's minds. Housing is no exception to this – it is also guilty of over-consumption. What about the house of tomorrow? Pierre Radanne shows us round.

Thinking of homes and energy, what issues arise from construction?

Pierre Radanne: The construction industry is a heavy energy consumer. In developed countries, one third of energy consumption is related to heating and hot water. At the same time, houses release one third of all greenhouse gas – an enormous quantity! Taking the electrical power consumed by all household appliances, whether electric or electronic, into account, the quantity of electricity consumed rises to two thirds. Encouraging energy saving in the construction industry is a priority today, and it will need to be maintained in the long term. The construction phase weighs surprisingly little in the energy balance. Globally, the ratio between the construction of the building and its use throughout its life is in the order of one to five. In other words, it requires five times the amount of energy to run the house than it does to build it. The
current issue is reduced energy consumption during the occupation of the house. Construction companies and decision-makers must strive to put themselves in the place of the residents – those of today as well as those of tomorrow. For example, it is necessary to work out if constructions will meet the needs of an ageing population, of rising temperatures, of increasingly expensive oil, etc.

**Has the situation become more worrying today?**

**P.R.:** A great deal of progress has been made. Before 1973 and the first oil crisis, there was absolutely no requirement to insulate new buildings. With the result that consumption ran at around 200 kWh/m². With the hike in oil prices, a great deal of effort was expended on heating equipment, thermal control of faucets and the insulation of buildings. Ever more numerous laws stipulated reductions in energy...
consumption. All of this had its effect. Today, energy consumption is around 70 kWh/m\(^2\), which is three times lower than it was 30 years ago. The target is 30 kWh/m\(^2\) by 2020.

**How can energy efficiency be improved?**

**P.R.:** Reducing energy expenditure above all means consuming less. To achieve this, a building must be as well insulated as possible. Double or triple glazing is required, along with more efficient insulation materials, new roofing elements and fewer heat channels through which warm air can escape easily. This is quite easy to do with new build, and much harder in old buildings. But this is where the challenge lies in developed countries. In France, for instance, we only construct 1\% of homes per year, which is not a very high rate. We have to focus all of our efforts on the 27 million existing dwellings and see how they can be rehabilitated to be more environmentally friendly.

**Whose job is it to do this? Who are the main players?**

**P.R.:** There are four families of players: local authorities, residents (both tenants and owner-occupiers), construction industry professionals and banks and loan companies. But this must all join up. The necessary modification of the behavior of residents (purchasing choices, regulation of heating, etc.) has to be supported by public policies and an evolution in the offering of construction professionals. If centralized government is to give greater encouragement to local initiatives at the same time as working for coordinated European policy, the bank and finance sector must also start to think more globally. Think what would happen if in future a loan were not just granted on the basis of the cost of installation work but also took account of running costs! If this happened, consumers would look for higher quality, less energy-guzzling housing. They would oblige the industry to design such housing and innovate. This would be a truly socially responsible policy of the banking sector – a real sustainable commitment.

**Are you optimistic about the future?**

**P.R.:** I’ve got children! It’s too easy to despair. I can’t bear the arrogance of the “end-of-civilization-as-we-know-it” brigade. I have decided to like this century. We have some terrifying challenges to meet, but all is not lost. As far as housing is concerned, we have to manage to consume less fossil energy and to reduce greenhouse gas. There are a number of examples in the world that prove this is possible. In Germany, there are experimental houses that consume less than 8 kWh/m\(^2\). In a London suburb, an entire community has almost zero energy consumption [see opposite]. Solar and thermal energy cells, heat extracted from the ground, biomass, etc. Renewable energy is being developed with encouraging results. We are now familiar with a number of paths to success. We must not forget them. And above all, we must not count on other industries to achieve the result. Periods of change are often very long. It took an entire generation to design a TGV high-speed train, don’t let us wait another 80 years to see clean freight haulage on the road. Let’s rather try and make use of local resources.
A tour of Bedzed, the ecological village

Welcome to what is surely the star of environmentally-friendly developments! With its brightly-colored chimneys, shared cars and individual gardens, BedZed – in the suburbs of London – attracts visitors from all over the world. It is indeed an exemplary project. Seven structures were designed to meet the criteria of sustainable construction. To reduce energy consumption arising from freight transportation, 90% of the materials used came from within a radius of less than 60 km. Old railway sleepers and scrap from building sites were recovered and used in the buildings. Rainwater is recycled and wastewater is filtered on the site by a system of treatment plants. Energy expenditure is fully under control. Architect Bill Dunster, in collaboration with the environmental NGO BioRegional Development Group, designed the apartments with triple glazing, made them south-facing, placed the living rooms upstairs, used plants to insulate roofs and 50 cm thick Rockwool to insulate walls, and installed solar energy cells. Each home has a veranda that also functions as a greenhouse and captures heat during the winter. The heat for the domestic water is produced by a boiler fed with local forestry waste. The net result is that 90% of heating requirements are reduced by insulation, and the total energy bill is 70% lower than traditional buildings. BedZed, alias the Beddington Zero Energy Development, has certainly lived up to its name. With a neutral carbon footprint, the eco-development actually uses less energy than it produces!
Moving forward, faster and further, exploring the world to develop a shared performance culture. The individuals who make up the Group are its source of energy. The exchange of experience now taking place everywhere within the Group, coupled with the actions, creativity and perseverance of each individual, is keeping Lafarge on the move and always one step ahead.
forward
How do you build a facility under extreme conditions?

How does a manufacturer deal with setting up a new facility in a challenging context? The example of the construction of the Surma cement plant, which Lafarge has recently completed in Bangladesh, is one answer to the question. This vast project took eight years to come to fruition. Eight years of meeting challenges at political, technical, logistics and social levels. We look back at the lengthy story of a project that is now coming fully into its own.

A 17 kilometer-long conveyor belt links the quarry in India with the Chhatak cement plant in Bangladesh.
The new cement plant at Surma in Bangladesh is one of the largest projects the Group has ever been involved in. Located in the north of the country, close to the border with India, it will supply the rapidly growing Bangladesh market through a joint venture with Cementos Molins. So it is not surprising that the production targets are ambitious – 1.2 million metric tons of clinker per year and 1.5 million metric tons of cement. As Jean Desazars, the Group’s Senior Vice President, Strategy and Development, is quick to emphasize, the Bangladesh market is set for a buoyant future, and Lafarge is coming in at the right moment. “Cement consumption today stands at 7 million metric tons per year, but is growing 10% annually,” he adds. Although it remains one of the world’s poorest countries, Bangladesh is now commencing its growth curve. This economic upturn is resulting in accelerated urban development with construction of housing, road infrastructure and public buildings. The Surma cement plant, the country’s first, will put Lafarge one step ahead. To understand the thinking behind the project, we need to go back to its origins. 

A real competitive edge

“There is no limestone available in Bangladesh, because the soil is made up of clay and deposits,” points out Desazars. “Cement producers therefore have to import clinker at high cost by boat and then process it in grinding stations located in Bangladesh. These imports entail high foreign currency costs and the quality of the cement is not great.” In other words, a company that is capable of delivering competitively-priced cement of good quality will have a real competitive edge. This is why eight years ago Lafarge decided to rise to the audacious challenge of constructing a cement plant within Bangladesh itself that will be continuously supplied with limestone from neighboring India. “Limestone is available in abundance on the Indian side of the border,” explains Desazars, “so when a Bangladeshi businessman came to see me with a project to link a Bangladesh plant to the limestone quarry by conveyor belt, I said I was interested. It was in line with Group strategy which was interested as a priority in establishing itself on
markets with high potential profitability.” That was back in 1998. The opening moves of this large-scale project had now been made. Lafarge soon found itself facing the first challenge: obtaining the necessary permits so that the conveyor belt could cross the frontier between India and Bangladesh. Two long years of negotiations were needed, in view of the state of the sensitive relationship between the two countries. Convinced ultimately by the economic interests of the project, both the Indian and Bangladesh administrations finally agreed to open a special border crossing exclusively for Lafarge on the path of the conveyor belt.

Another highly fraught political issue was purchasing land and securing building permits on both sides of the border. In the Indian state of Meghalaya, the land lies within what are known as “tribal zones”, which are subject to specific regulations and customs. For a further two years, Lafarge negotiated with the chiefs of the local communities, trying to demonstrate the benefits the project would have for their communities and convince them to sell their lands. Similarly, on the other side of the border in Bangladesh, village leaders had to give their assent before fishermen and farmers would agree to move a few kilometers away where they would be re-housed in better conditions. The final hurdle consisted of satisfying the environmental requirements of the international financial organizations taking part in the project, whose specialists in rural anthropology and animal and plant life spent six months in the region and needed to be convinced of the Group’s good intentions.

Solving the construction problem

After four years devoted to resolving administrative problems, Lafarge was finally able to get down to constructing the plant itself. “While the site was ideal geographically in terms of the limestone source and access to waterways, it proved rather problematic for the construction of a cement plant,” recollects Project Manager Jean Hidier. Indeed, the land was located in a zone that floods during the monsoon season and has loose soil to a depth of 30 meters. To help solve the problem, the project management team put in extra effort, helped by the Cement Plant Performance & Technology Department and the Inter-Unit Technical Center working in conjunction with the Lafarge Research Center in France. In total, the Inter-Unit Technical Center put in 57,000 hours of work, and the construction site itself mobilized up to 2,400 people.

On the site, Lafarge had to employ heavy resources: 860,000 m³ of earth were banked over 24 hectares, and, constructed three meters above...
Building an enduring relationship with local communities

The well-being of local communities in India and Bangladesh which had to be displaced for the construction of the cement plant and the conveyor belt was key to the favorable outcome of the Surma project. In addition to the financial compensation that is normally given, Lafarge closely monitored and significantly contributed to the installation of the communities in new areas. “In Bangladesh, as well as new houses, we also built a small town center incorporating a school for eighty pupils and a medical dispensary staffed by a doctor and nurses,” says Cement Plant Manager Glyn Evans. Access to medical care for these extremely poor populations was seen as a priority investment for Lafarge. In their former villages, medical equipment and treatment was virtually non-existent. “Today, on the Indian side of the border, a mobile clinic makes weekly rounds of the nearby villages to deliver medical assistance, and in Bangladesh we have hired an ophthalmologist who goes to visit patients,” adds Evans. Lafarge has also put in place professional training schemes enabling residents to learn a skill. Finally, Lafarge has hired around sixty members of the Bangladesh community to work at the plant, chiefly performing security and catering tasks, as part of the 200 local operators and staff employed there.
In the end, Lafarge had to ship out 16,500 metric tons of construction materials from Kolkata (formerly Calcutta) in India, loaded on barges that traveled through canals – along with 3,000 metric tons of structural steel and equipment driven on trucks over mountain roads.

Lessons for the future:
in union there is strength!

When the cement plant kiln was finally powered up, on August 2 this year, a feeling of excitement mixed with pride took over the teams in attendance. The plant could finally move on to the production phase! Glyn Evans, Cement Plant Manager, is confident: “The equipment is cutting-edge and the employees are now operational.” However, recruitment and training of the operators and supervisors in charge of making the plant work had proved to be yet another challenge. “We are in a particularly poverty-stricken zone, which is located within a poor country. Bangladesh has no industrial tradition and nobody has received any training at all,” explains Evans. Once again, the Group had to adapt its action plan. “Engineers and trainers came from India, South Korea, Indonesia, Malaysia and Europe to lend a hand,” says Hidier. “Some employees were
One woman’s story

Nabizunna, age 50, is married with eight children and lives in the village of Noqrai in Bangladesh, near the cement plant.

“I have taken several training courses offered by the plant to learn craft skills. I particularly enjoyed learning how to paint on fabric and manufacture wax candles. This has really changed my life! Before I was a housewife.

Now I make objects that I can sell on the local markets. It has enabled me to earn some money and I can now help my two sons to set up a chicken farm.

With my new financial independence, I now get to have a say in the running of our family. For example, I was able to convince my husband to send our two eldest daughters on a training course organized by Lafarge and our boys to the little school that has opened near the plant. All the family now have access to medical care and I can at least have my cataract treated. Lafarge has hired an ophthalmologist who regularly comes from Dhaka to treat us.

There’s no denying that our life has truly changed – very much for the better!”

also trained for several months in other Lafarge plants in Asia and Egypt.”

So now that the cement plant is rolling out its first batches of cement, the time has come to assess the results of this colossal project. What lessons are to be learned?

What are the errors to avoid in the future? The answers to both these questions will be valuable to the teams working on similar projects in Asia, Latin America and Africa. “One thing we have learned is that Lafarge has to do more to supervise safety conditions under which operators and contractors work,” remarks Guillaume Roux, Group Executive Vice President and Co-President of the Cement business. Future Lafarge contracts will include penalty clauses if the Group safety rules, such as obligatory wearing of safety harnesses, are not complied with. “Thanks to the Surma project, we have also decided to strengthen the Lafarge teams who supervise the work and the contractors as well as the quality of the equipment delivered,” adds Roux.

In terms of good practice to be more widely used, all the teams unanimously cite the interest of systematically involving other plants and subsidiaries of the Group in terms of both training and technical expertise.

In union there is strength, as the saying goes, and Surma seems to be the proof.
How can product quality be made consistent worldwide?

Every time the Lafarge brand appears on a product, it always provides a guarantee of the highest level of quality. Yet the supply of raw materials depends on a wide variety of local sources. So how is it possible to guarantee quality? Crescendo looks at the cases of concrete and cement to bring us the answer.
Local concrete, worldwide guarantee

Depending on where each ingredient of concrete (water, sand, aggregates, cement) is sourced, there are major variations in the finished product. In order to organize the circulation of knowledge and processes over the 2,000 Lafarge sites around the world, the Group needs an extremely structured approach to Quality.

Like wine, concrete is a form of local produce. Aggregates and sand quarried in different places never resemble each other. Although the performance of concrete may vary because of this, it must also meet the specific needs of the local market and the requirements of each customer, while complyng with Group quality criteria. “We have to be capable of delivering products with the most regular performance possible to any place on Earth,” explains Denis Maître, Group Senior Vice-President, Research and Development.

To achieve this result, the Group relies on a three-level organizational structure for the Cement business. “At Division level, the Cement Performance Department (DPC) defines the Quality policies and internal standards common to the business,” explains Yves Guitton-Fumet, head

Working on a concrete sample in a 20°C water basin for compression strength testing at 1 or 2 weeks.
moving forward in our businesses

of Product Quality in the DPC. “The four technical centers and their regional laboratories located in Europe, Asia and North America provide assistance for the plants and support development projects, working in collaboration with the Quality departments of each Business Unit. In addition, Quality engineers and the 150 plant laboratories are responsible for monitoring the compliance of products with specifications on a day-to-day basis.”

Upstream, there is the research and expertise of the Lafarge Research Center. “We are developing global competences, after which it will be up to each of the local entities to adapt our formulations to the current standards and requirements of their own local markets,” adds Maître. “The Research Center transfers its knowledge and know-how to technical centers, which then cascade the information down to the Business Units’ sales forces and production departments.”

How is this done in the Concrete business? “The Center’s researchers operate directly on the ground to transmit know-how to the teams, often in pilot regions which are then tasked with cascading the information throughout the entire zone,” replies Maître.

One way or another, the Research Center develops technologies and tools before handing over responsibility to local resources which ensure the rollout and adaptation of knowledge. This is what happened with Agilia®, Lafarge’s range of self-compacting concrete. The product was developed through collaboration between the Research Center and the Group’s French Concrete Business Unit’s test center at Vitry-sur-Seine in the Paris suburbs, which cascaded the information to the other French regions. Next, the research teams presented the technology in the United States, Canada, the United Kingdom and Turkey. Other countries are currently targeted for the introduction of Agilia® on new markets.

To predict the performance of finished products correctly, the Lafarge Research Center is currently finalizing a formulation and simulation tool it calls the Concrete Productive Model (CPM). “It’s like a black box in which you enter all the parameters of concrete composition,” explains Maître. “The software then performs calculations which will ultimately allow us to evaluate the potential performance of concrete produced in a particular way.” The tool will be useful in standardizing practices and know-how over all sites, as well as helping sales forces deliver better advice to customers.

A high-quality product has to adhere precisely and regularly to certain characteristics. “The Quality system is based on three types of
specification: official norms, Lafarge-defined standards and, of course, customer specifications,” points out Guitton-Fumet. “The plants and their labs constitute our guarantee of compliance with these three levels of requirement. Dialogue between our customers and our marketing and sales teams is what allows us to define the correct product specifications, and is a cornerstone of our Quality policy.” Mastery of Quality requires, above all else, mastery of know-how on a day-to-day basis. The Cement Know-How Center (CKHC), a major player in distributing knowledge throughout the Lafarge Cement business, has set up a technical portal that can be accessed throughout the world and which constitutes a standard reference base for cement plants in terms of products and quality.

But with 150 cement plants, the distribution of good practice and knowledge cannot be left to an intranet portal! This is why Lafarge encourages networking between heads of plants and laboratories, engineers and Quality managers of BUs and product experts in the Technical Centers. “We have to spread the word, but also know how to learn from others and draw upon all local experience,” says Guitton-Fumet.

On a daily basis, this approach takes the form of a stringent monitoring of product quality as measured by a product quality indicator shared by all the plants. This evaluates the degree to which quality targets have been reached by comparing them against the stipulations in the customer contract. The ultimate target is that of complying with the specificities and fulfilling the requirements of each application.

Our customers’ expectations are clear

Dimitris Nikitakis, a customer of Heracles, the Group’s Greek Cement Business Unit, explains: “My greatest expectation is a quality product, whatever the material. Heracles must constantly update and improve the quality of its products and, consequently, the quality of mine. Then, it must ensure competitive prices. Finally, it must provide a quality service in addition to the products themselves. In short, my three basic requirements are quality solutions, good prices and always being top in terms of technical expertise.”
The quality of concrete partly depends on that of its components, so inspection of all materials has been systematized on all sites under the supervision of the laboratories attached to the plants. “We go as far as putting stringent contracts in place with our internal Group suppliers, particularly in the case of cement,” explains François Redron, Vice President, Marketing for the Concrete business. Adds the DPC’s Yves Guitton-Fumet: “In its cement

No stone is left unturned in the effort to satisfy the most rigorous quality standards: online analysis of regularity, physicochemical analysis, constant improvement of equipment, training and coaching of operators, introducing stages of quality control.

Customer control at the heart of the plant

The Saint-Pierre-La-Cour lab in France, part of Lafarge’s Cement business, is one of the pilot sites where different applications carried out according to formulations representative of customer needs are tested. The aim is to characterize product performance using ultramodern methods (rheology*, Rietveld x-ray diffraction**, ultrasound, etc.). As well as verifying that the prescriptive constraints applying to standard formulations have been respected, these tests make it possible to define specifications for cement that comply very closely with their behavior in real applications. Alert thresholds are determined, and should these be exceeded customers are contacted and warned of a risk. This approach, which has now been extended to all Lafarge’s cement plants in France, is almost like having the customer present at the very heart of the plant.

* Rheology: a branch of physics that studies viscosity, plasticity, elasticity and material flow.
** Diffraction: phenomena whereby light waves, radio waves, sound waves, etc. can sometimes bend around obstacles.
Cement makes a commitment to Concrete...

Cement is one of the principal components of concrete, which explains the need to develop synergies between these two key activities. Lafarge’s determination to do this now sees a firm commitment made by the Cement business to the Concrete business. “This approach was first used in France. It takes the form of a formal internal contract to supply cement with stipulated characteristics, failing which penalties will be invoked. This is particularly true for the Agilia® range, which imposes very specific criteria in terms of physical chemistry and behavior in use,” remarks Yves Guitton-Fumet. In addition, to test performance characteristics and get as close as possible to what the end-user wants, concrete is tested in the laboratory several times a week on the basis of a “micro-concrete” sample. This verifies that the performance required by the customer has been achieved.

Beyond formulation, another factor plays a capital role in Quality: the production process itself. “To deal with this problem we are constantly improving the equipment of plants, which are becoming increasingly sophisticated and automated,” notes Redron. “We also dedicate major resources to training plant operators, who play a key role. Finally, we have set up stages of finished product quality control so we can better anticipate variations in production and correct them.”

Coming at the end of the process, the vital link that logistics forms has not been forgotten. Delivery drivers are trained and made aware of quality problems. “And for some very high-tech products such as decorative concrete, we only work with Lafarge-approved suppliers who have been selected by us according to extremely strict criteria,” concludes Redron.

In a ready-mix concrete plant, quality first of all entails very stringent monitoring of supplies. The laboratory is tasked with controlling incoming raw materials at least twice a week.

“Other important parameters include the upkeep of machines and respect of specifications requested by customers,” remarks Plant Manager Laurent Léger, “but also the skill of the drivers who deliver the end-product to building sites. They have a crucial part to play, because even if the concrete leaving the plant is of irreproachable quality, their know-how is critical in transporting the product while preserving its integrity.”
moving forward in our businesses

Is social responsibility key to performance?

Reconciling corporate social responsibility with the quest for competitiveness is a key ambition for Lafarge, even though at first sight it may appear a source of dilemma. It is in the field rather than at Group level that we find ways of achieving it. We look at a number of solutions deployed in the four corners of the globe. Each one, in its way, is proof that social improvement can go hand-in-hand with economic performance.
What led you to engage a policy of corporate social responsibility in South Africa?

Frédéric de Rougemont: Following the example of what the Group has done in the 76 countries where it is established, we took as our starting point the principle that you cannot financially establish a company successfully for the long term on a market without taking account of local social reality. Understanding of societal and environmental problems and implementation of affirmative action policies are two absolute conditions for sustainable growth. From this starting point, we also looked at how we could work with various government and community partners on the major issues facing South African society, namely ethnic diversity and the fight against HIV/AIDS.

Although the apartheid regime came to an end in 1994, South Africa is still going through a difficult period when it comes to relationships between the country’s various ethnic groups. What was your approach to this highly sensitive issue?

F. de R.: Our starting point was to try and decode the situation and not limit the problem of discrimination to an opposition between Black and White citizens, but to include the country’s entire spectrum of ethnic diversity (Indian, Colored, etc.). We then worked to develop a Human Resources policy that would encourage and accelerate diversity, particularly at managerial level. The policy was adapted and deployed through recruitment, internal promotion and training. The result is that 30% of our managers today are Black, Colored or Indian, as compared to 2% in 2002! Lafarge occupies an important place in the South African construction market. We are convinced that in order to successfully meet increasing demand, deliver...
moving forward in our businesses

high-quality services and remain competitive, it is vital to be integrated into the culture of the country and take account of its needs in an appropriate manner. The ethnic diversity that you talk about is part of this approach. You can’t conceive of growth in this post-apartheid nation with teams that are more or less all-White. Divergence from social reality would have been prejudicial to development.

Lafarge has also worked on divesting part of its capital to Black-run companies as part of the “Black Economic Empowerment” program. How has this worked out?

F. de R.: In 2004, the South African government passed a law obliging companies in the mining industry to open their capital to Black companies by 2009. We are well ahead of this requirement, because in October 2005 we divested 12% of our shares to Black investors – three years ahead of the legal deadline! Furthermore, the structure of the Black consortium made it possible to direct a large share of dividends to a fund that is set aside for the education of underprivileged Black communities. This type of initiative on the one hand demonstrates our confidence in the market, and on the other our full participation in the process of economic transformation which the country so badly needs.

The fight against HIV/AIDS forms part of the basic commitment Lafarge has made. What actions have you put in place?

F. de R.: The fight against HIV/AIDS is a public health priority but also a financial imperative. With 21% of its population HIV-positive, every year South Africa loses 5% of its workforce. To help stem the pandemic, we first evaluated the proportion of our employees affected by the virus at 10%. In view of this, we doubled our initiatives: training and information programs on each site and financing of antiretroviral treatments and medical supervision in partnership with a South African company that runs a network of doctors throughout the country. We have set aside €1.1 million over five years to combat HIV/AIDS. We have calculated that without this policy, AIDS would cost our company €1.7 million. Clearly, we are ahead. But let me emphasize that beyond the strict economic reality of these figures, our policy is fully in line with Lafarge values. This is what we wanted to demonstrate to the other economic players. We want to show that more often than you might think, economic performance and corporate social responsibility cannot be separated.

A quality analyst in the laboratory of the Lichtenburg cement plant in South Africa.
The construction of the Tula cement plant, in northern Mexico, will not be easily forgotten! The plant, which has an annual production capacity of 600,000 metric tons, produced its first cement in March 2006, four months before the contractual date, on budget and with what is seen as the best start-up curve in the last twenty years. This spectacular result was in large part due to the priority given to safety. “Throughout the 20-month construction process, we applied a ‘zero tolerance’ principle,” explains Máximo Dolman, Managing Director of Lafarge Mexico between 1999 and January 2006. The strategy paid dividends, enabling the site to achieve a level of excellence in safety: the number of accidents was 11 times lower than Mexico’s national average. “Our safety management at Tula perfectly illustrates how Lafarge relies on a policy of active social responsibility to boost performance,” comments Dolman. “This project has proved that good safety and operational excellence go hand in hand. Furthermore, improving professionalism and discipline thanks to the safety policy avoids human suffering and can form the focus for performance improvement.” In Mexico, Lafarge has managed to make Tula one of the region’s most competitive cement plants by focusing on safety. To ensure its development in a fast-growing but fiercely competitive domestic cement market, the plant has opted to address an issue which has allowed Lafarge to improve performance and to prove the rule: “A clean plant is a safe plant... and a profitable plant.”
For Dung Van Anh, Chief of the Lafarge Beijing Representative Office, “economic success on a market the size and complexity of China is not possible without taking time to understand the societal and environmental problems involved.” China may represent the world’s biggest market for the construction industry, but working conditions and other social norms leave a lot to be desired. As soon as Lafarge came to China in 1994, it founded its local strategy on a policy of corporate social responsibility in line with the Group’s Principles of Action, which advocate respect for the individual. “The Group has invested massively in training programs, assistance for local communities and improving safety in the workplace, which was one of our priorities in this country,” notes Van Anh. Today, this policy places Lafarge’s standards not just above those required in China but above the practices of most of its competitors. “Although these actions have a high cost, they are profitable in the long term. They strengthen Lafarge’s corporate image and make it easier to set up operations at local level. They also have a beneficial impact on the motivation and operational efficiency of our employees.”

But not everything is so straightforward. “In a country the size of China, the policy we are operating needs continuous close attention over the long term,” continues Van Anh. Meanwhile, new priorities are emerging. “We are one of the first companies in China to have taken the measure of the HIV/AIDS pandemic and launched a prevention campaign. In addition, we have pursued a strong policy of external growth through 2005. Now our management systems must be transferred to all the new Lafarge sites.”

The Lafarge policy will nonetheless shortly be further justified by the action of the Chinese government, which is making corporate social responsibility one of its priorities. “We are seeking to become a benchmark in terms of management and corporate governance,” says Van Anh. “Thanks to the encouragement of local authorities, our example is gradually trickling down through the construction sector.”

Social responsibility with a Chinese flavor

With 11 years of experience in China and operations in four business areas, Lafarge aims to achieve lasting success on the world’s largest cement market by employing an exemplary social responsibility policy.
Development, not exploitation

An interview with Marion Hellmann, assistant general secretary of Building and Wood Workers International (BWI)

What does an organization like the BWI expect from major corporations as far as social responsibility is concerned?

Marion Hellmann: Our aim is to encourage companies to commit themselves concretely to policies which place social issues at the heart of their strategy. The BWI then signs what we call “Global Company Agreements” with them, in which they pledge to respect workers’ rights as defined by the International Labour Organisation. They also commit themselves to pay their employees decent wages and to ensure optimal working conditions with regard to safety.

How do you judge Lafarge’s policies on social responsibility and competitiveness?

M.H.: Its approach is going in the right direction and is based on a common sense principle according to which the competitiveness of a company is not based on it “exploiting” the workers, but, on the contrary, on it allowing them to develop. Lafarge’s results are a perfect demonstration of how profits and social responsibility feed on each other.

In what way does the social variable impact the competitiveness of companies?

M.H.: The principal benefit is to ensure competitiveness over the long term by enabling companies to get closer to their markets and to develop relations of trust with their employees, suppliers and customers. In our opinion, competitiveness therefore results from the art of combining technological development with development of the workforce through training programs and working conditions that respect employees.
contri
Designing and producing building materials means contributing to the legitimate expectations of people everywhere for housing, mobility, health and education, as well as for infrastructure projects essential to economic growth and social progress. What industry could be more rewarding? Attentive to ever-changing needs, Lafarge continuously innovates to ensure that, throughout the world, its materials contribute to improving the quality of life and to building a more sustainable world for all.
contributing to a sustainable world
excavators are busy in Cosmo City in the outskirts of Johannesburg, where 3,000 small houses are being built. A father contemplates the construction site. “We're soon going to move into a real house,” he says, hardly able to believe it. He and his family have qualified for the South African government’s program for low-cost housing. This allows the most disadvantaged, who are classified into three income bands for the purpose, to benefit from either a ready-built house or from subsidized loans to enable them to build their own home. “We are focusing on the intermediate income band (between 1,500 and 7,000 rand) to begin with, through three projects in which all four of our businesses are involved. Once we have demonstrated our expertise, we will then move on to the two other segments,” explains Gerald Gietzen, Marketing Manager of Lafarge South Africa.

Construction, training, distribution
The first of the projects is Cosmo City, where Lafarge has formed a partnership with a local developer. A contract for 1,014 houses of 50 m² has been agreed and 20,000 m³ of concrete will be poured to build them. The second project, jointly led with the National Home Builders Registration Council (NHBRC), a body that regulates the construction industry in South Africa, is based on a training offer (see right). Finally, Lafarge is working on a project that aims to distribute construction materials to a number of municipal authorities, which will in turn allocate them to families living a long way from traditional distribution networks. The entire domestic construction package has been totally reinvented to meet the needs of disadvantaged populations. And this is only a beginning.

A construction site in Cosmo City, in the outskirts of Johannesburg.

Coping with a lack of training in building skills
Because of the years of apartheid, South Africa has today to cope with a chronic deficit in building skills training which is putting a brake on its economic growth. Recently, Lafarge and the NHBRC signed a partnership that will provide a solution. The agreement specifies that Lafarge will train young workers on low-cost housing sites in construction techniques and compliance with safety regulations. In the short term, the aim is to set up professional training that will serve as a benchmark throughout the country.

Confronted with an acute housing crisis, the South African government has launched an extensive affordable housing program for the most disadvantaged. This calls for the construction of 650,000 homes.
contributing to a sustainable world
When planning for a single year, plant rice; for ten years, plant trees; and for a hundred years, educate people." The Chinese proverb sums up the thinking behind “Schools for a living planet”, a project run by Lafarge Perlmooser and WWF in Austria. Over an 18-month period, schoolchildren aged between 9 and 13 will be made more aware of biodiversity and the ecological footprint concept. This has entailed distributing 15,000 educational brochures to schools, running WWF workshops, arranging over 45 excursions to the Mannersdorf and Retznei quarries and three WWF sites and even providing a week-long stay at a WWF summer camp for winners of a competition to find the best project for conserving a plant or animal in a rehabilitated quarry!

Helping make sustainable development a reality

The initiative has had a strong impact on the schoolchildren, and, through them, it has struck a chord with their teachers and parents. “It’s very satisfying for WWF, because the challenges of biodiversity are played out over the long term, and will have to involve the adults of tomorrow. We have a productive relationship with Lafarge: our opinions differ sometimes, but our joint work sessions enable us to think up new initiatives,” stresses Thomas Kaissl, Corporate Relations Manager at WWF Austria. “‘Schools for a living planet’ is the result of a five-year collaboration with WWF,” adds Lafarge Perlmooser’s Eva Palischek. “We started out by setting up a biodiversity index together (see right). This is the first time that one of our projects has been on such a vast scale. We hope to involve 100,000 people and so help to change mentalities... while setting an example to construction industry professionals.”

Measuring biodiversity in the quarries

One of the tangible results of the worldwide partnership between Lafarge and WWF is the design of an index to measure biodiversity. The computer-calculated Long-term Biodiversity Index, or LBI, will make it possible to make a digital biodiversity assessment in various parts of a rehabilitated quarry. The prototype system developed at Mannersdorf, Austria, is now being piloted in France and Spain. Once it has been optimized, the LBI will be deployed in all the Group’s quarries.

A group of children observing biodiversity in the wetlands of the rehabilitated Mannersdorf quarry.
contributing to a sustainable world
The Georgia Aquarium, the largest indoor aquarium in the world, opened its doors in Atlanta in November 2005. More than 100,000 species of aquatic creatures, from white whales to jellyfish and from penguins to piranhas, swim around in gigantic tanks. At the heart of the aquarium visitors look through ten-meter high Plexiglas walls and pass through transparent tunnels that are 30 meters long and up to 6 meters below the surface. A whale shark can practically brush against a small child perched on your shoulders!

Complying with a tough specification
Behind the thrills, 30 million liters of water, constantly filtered and frequently salty and corrosive, flow through the tanks. There were also technical constraints called for by the architectural structure. “If it hadn’t been for Agilia® concrete we wouldn’t have been able to construct this aquarium as it stands. There was no way we could have managed to vibrate traditional concrete between the Plexiglas panels and such highly complex pipework. The fluidity of Agilia® enabled us to meet the contractor’s specifications,” explains Roy Keck, Marketing Manager for the Southeast region of Lafarge Building Materials in North America. “There are more than 5,500 m³ of Agilia® in the tank walls,” points out his colleague, Kirk Deadrick, Quality Assurance Manager for the Southeast region. “We worked alongside partner Grace Construction Products to incorporate anti-corrosion additives into the concrete so that it would have high resistance to sea water. But I’d say the biggest problem we faced,” adds Deadrick with a smile, “was convincing the owners of the fish that Agilia® entailed no risk to them!”

Thanks to the thick Plexiglas walls of the world’s largest indoor aquarium, visitors can journey to the center of the aquatic universe.

In under a year, three million visitors have come to view the denizens of the world’s largest indoor aquarium. The fluidity of Lafarge’s Agilia® concrete has contributed enormously to the success of this large-scale architectural project.

Agilia®, free-flowing fluidity
High-performance Agilia® concrete met the needs of the Georgia Aquarium on a number of levels. Not only in terms of appearance with the quality of its finish but also at the level of its ease of application. The concrete structure has to both integrate the complex pipework required by the aquarium’s water filtration systems and hold the Plexiglas panels in place. The self-compacting concrete required no vibration and therefore entailed no risk to the elements it encloses.
contributing to a sustainable world
An embryonic building, derelict for three decades, has suddenly become a major monument – that is part of the marvel of the Firminy church,” French architect Jean-Louis Cohen tells Crescendo. The structure, begun in 1973 and halted through lack of funds, has been completed and the audacious masterplan of Le Corbusier has now been brought to life in the Firminy development. Far from standing on its own, the structure blends into an urban ensemble designed by the architect. Apartment blocks, swimming pool, sports arena and cultural center seem to have been patiently waiting for their companion piece to arrive. Behind the project from the outset, architect José Oubrerie, once a junior in Le Corbusier’s office, is now directing the project. The construction encountered multiple technical and financial obstacles. The unfinished edifice was listed as a building of historic interest in 1996, which probably contributed to the decision to go ahead with its final completion in 2004, with principal funding from the St Etienne Metropolitan authority. “The challenge was turning a religious building into a cultural one, and getting Le Corbusier’s original project to meet current safety standards, using the latest technical innovations,” remarks Cohen. “The building is gentler and less brutal than Le Corbusier probably imagined it.” Lafarge played a role in the renovation of the standing concrete, and supplied Agilia®Formes and Agilia®Vertical, both products formulated from very high-strength Lafarge cement, for the conical roof shell. Particularly suitable for complex forms, the fluidity and self-compacting properties of Agilia® meant the 400 m$^3$ of concrete required for the external shell could be poured easily. An operation that would have been more problematic in Le Corbusier’s day!

Le Corbusier and the concrete revolution

Acknowledged as the head of the modern architectural movement, Le Corbusier was both self-taught and multi-talented. Not only an architect and town planner, he was also a writer, poet, painter and sculptor. But his architectural and urban planning work has had the most impact. A strong believer in simplicity, functionality and building on a human scale, he believed in master plans that were “in harmony with nature – sun, space, greenery.” He was fascinated by concrete. Le Corbusier’s legacy is some 75 masterpieces scattered around the world, now all carefully preserved.

40 years after Le Corbusier’s death, the concrete cone of the church of Saint-Pierre finally rises into the skies of Firminy in central France. The 1,000 m$^2$ floor space of the two lower stories accommodates a collection of modern art.
contributing to a sustainable world
Training young people to build their country

Active involvement in the development of neighboring rural communities near the Lafarge plants in India is the philosophy behind “Project Employability”. The scheme gives young people from rural communities the opportunity to train as masons.

“A genuine opportunity!” “The boost that has made all the difference to me!” “A godsend I could never have hoped for!” The 184 young people who took part in the “Project Employability” program in India cannot conceal their enthusiasm. The ambition of the project launched in 2004 by Lafarge in conjunction with the Indian Institute of Engineers “wasn’t to provide the umpteenth charity project, but to give neighboring rural communities the means to ensure their long-term development,” explains Uday Khanna, CEO of Lafarge India.

A double challenge

For the past two years, Lafarge has organized two-month training courses in masonry leading to the award of a certified qualification. The program is aimed at young people from rural areas who experience high unemployment and low level of literacy. A solution for these people can come from finding work in the construction sector, which is currently booming – annual growth averages over 10%. “Primarily we are providing training that will lead to jobs for unemployed young people,” notes Khanna, “but at the same time we are supporting the growth of local building contractors, who are suffering from a lack of qualified labor.” The strategy has paid off. To date, 140 young people have found work, and their pay of €68 per month higher than the average wage in India. The program will continue and is to be stepped up. By 2008, 650 young people will have benefited from the initiative.

A life insurance scheme for masons

Masons are product specifiers, and as such they constitute a strategic community for Lafarge. To establish closer relations, Lafarge India offers them a life insurance package. Developed in partnership with the Life Insurance Corporation of India, this free insurance policy supplements masons’ poor social security cover, providing them with a lump sum in the event of an accident. 2,000 masons have already signed up to the scheme, which should soon be extended to 10,000 building professionals.

Young masons are trained to lay bricks. The swastika-like design is one of the oldest symbols known to man. Frequently found in both Hindu and Buddhist cultures, it is considered a good omen.

India
contributing to a sustainable world
Since 1971, nature has come back to its own in a former Lafarge quarry in Kenya, just outside Mombasa. Through exemplary rehabilitation and eco-friendly practices “that other industries might do well to copy,” according to Wangari Maathai, Kenyan Minister of Environment and winner of the Nobel Peace Prize, which have already seen a million trees replanted, Haller Park is now a refuge for local wildlife. Classified as a nature reserve, every day the site receives tourists from all over the world and schoolchildren. Dozens of monkeys scamper along the edges of the trails where only 40 years ago trucks brought loads of limestone to the cement plant. This protected environment has given rise to a highly unusual friendship between a tortoise and a hippopotamus – a friendship made possible by the enormous amount of work that has gone into recreating an entire ecosystem here.

Good companions
In December 2004, fishermen rescued an orphaned baby hippo washed up on the shores of the Kenya coast in the aftermath of the tsunami. He was named Owen, after his rescuer. The problem was how to release him back into nature. To complicate matters, hippopotami are not good at adoption. The obvious solution seemed to be Haller Park, managed by Lafarge Eco Systems. The baby hippo was loaded onto a flatbed and transported to the nature reserve. Once there, to everyone’s stupefaction, Owen made straight for the most unlikely resident, a 130-old male giant tortoise, who promptly adopted him. The tortoise is called Mzee, which, appropriately enough, means “old sage” in Swahili. Under the watchful eye of the reserve wardens, a close friendship has arisen. Owen and Mzee eat, swim and play together. For many years, hippos have felt at home in the environment of Haller Park, but Owen seems to have found himself a real companion.

Two media stars
Type Owen & Mzee into Google and you get over 76,000 hits. There are several hundred blogs, photos, newspaper articles and various sites, including www.lafargeecosystems.com, which give continual news updates on the two friends. A book on the friendship is currently on the New York Times bestseller list and a film about it has been screened at the Tribeca festival in New York. The list of media interested in the Owen & Mzee story – CNN, NBC, the BBC, National Geographic, etc. – is growing longer every day. Evidently the media spotlight is not reserved for humans!
Amazing objects from a world made of concrete

Lafarge has sponsored “Bétons: étonnez-vous!” (Concrete: it's amazing!), an exhibition at the Paris Arts et Métiers Museum which has turned the spotlight on concrete – a material as familiar as it is extraordinary. We take a look round.

Lafarge is exclusive sponsor of the exhibition

This natural partnership forms part of Lafarge's policy of promoting building materials and the world of architecture. Highly proactive in the process of determining the building materials and processes of tomorrow, Lafarge is a leading-edge R&D player in this specialty. Its research center near Lyons is the world number one research laboratory for building materials.
The first thing the visitor sees is the traditional stone walls of the museum. However, going through the entrance to the exhibition is like stepping into a time machine. In a display case an ordinary concrete cinderblock stands alongside bottles of perfume and contemporary jewelry. Farther along, in a dark alcove, a 3-meter long boat made of reinforced cement in 1849 comes into view. And it is all concrete! The visitor embarks on a strange journey to the core of a material that has been much reviled, despite its many versatile applications – a “liquid stone” that is dazzling in its modernity.

Journey to the core of concrete

Higher, stronger… and ever more innovative could be the motto of the models, documents and films that unfold in front of the visitor showing where the history of concrete, scientific research and technical achievements intersect. There is the roof of the CNIT exhibition center at La Défense, the largest single concrete shell in the world; a footbridge in Seoul designed by architect Rudy Ricciotti where walkers tread on a sheet of concrete only 3 cm thick! Further on, the model of the Hypergreen tower opens a window onto a near future, in which tall buildings will be environmentally friendly – food for thought. The visitor’s mind begins to wander as he lingers over the exhibits. The exhibition layout is not confined to showcases, but is designed as a whole, honoring this unique material which can now even be made translucent.

Ductal®, one of the latest ultra high-strength concrete products, has been used for many of the display areas. The very smooth floor tiles, the yellow, taupe and rose-colored walls, the dazzling white benches will surprise the visitor even further and waft away any remaining prejudices. A fitting end to the exhibition visit are some even more astonishing designer objects, such as a bath, an armchair, lamps and vases – all made of concrete!

2. A designer object in Ductal®.
3 and 4. The main exhibition space and adjoining room displaying alternative uses for concrete (concrete pouffes).
5. The components of concrete.
7. Lambot’s boat built in 1849 of reinforced cement.
90 different nationalities contribute every day to accelerating our performance.

35% increase in priority patent applications filed in 2006 compared with previous year.
2006, a year of acceleration towards excellence.

Focused on its strengths and benefiting from a more efficient organization, Lafarge is working on all fields to reach excellence.

Its ambition is to be the best in its sector, which means acting in the best interests of its shareholders by ensuring them valuable investments, and being ranked among the world’s most effective industrial groups in terms of employee health and safety, protection of the environment, social responsibility and corporate governance.
January 2
Bruno Lafont becomes Chief Executive Officer of the Group and announces his new management team

Lafarge presented a mixed-use, environmentally responsible tower building developed for the world’s mega-cities by French architect Jacques Ferrier, in partnership with Lafarge, in Shanghai then at the MIPIM (the international real estate market event in Cannes, France).

March 2
Lafarge among the Global 100 Most Sustainable Corporations in the World
Selected for the second year running, Lafarge is the only building materials company to be included in the 2006 version of the list of the 100 multinationals most committed to sustainable development. The list was launched in 2005 by Corporate Knights Inc. and Innovest Strategic Value Advisors Inc.

March 9
A sustainable tower building for mega-cities
Lafarge presents “Hypergreen”, a tower building concept for more sustainable cities. Convinced that its commitment towards environment and society should extend beyond its own industrial sites, approach, this chair will further high-level, innovative materials research, opening up vast new prospects for new construction techniques that are more respectful of the environment, people and the planet.

March 20
Safety: the Group’s number 1 priority
Already the sector leader in safety, the Group’s goal is to rank among the world’s best performing industrial groups for safety. For Lafarge, safety is where its humanist values and its performance culture intersect. A wide-ranging action plan has been launched to reach this target.

March 22
Studying sustainable construction
Lafarge has joined forces with two of France’s leading engineering schools, École des Ponts and Ecole Polytechnique, to set up the world’s first chair in the Science of Materials for Sustainable Construction. Promoting an interdisciplinary approach, this chair will further high-level, innovative materials research, opening up vast new prospects for new construction techniques that are more respectful of the environment, people and the planet.

March 29
Energy self-sufficient buildings by 2050
In the context of an initiative of the WBCSD (World Business Council for Sustainable Development) led by Lafarge and United Technologies Corp., an alliance of leading global companies has been formed. Its purpose? To determine how buildings can be designed and constructed to use no energy from external power grids, be carbon neutral and be built and operated at fair market values.

April 10
Reducing carbon emissions
Lafarge’s second CDM (Clean Development Mechanism) project is approved. Following its wind farm in Morocco, the Group’s CDM project to substitute alternative, biomass energy sources for fossil fuels in two of its cement plants in Malaysia has been officially approved. This project complies with Lafarge’s voluntary commitment to reduce its net CO₂ emissions throughout the world.

April 27
A state-of-the-art cement plant in Mexico
This ultra-modern plant, equipped with the latest technology and complying with the Group’s environmental standards, reinforces Lafarge’s participation in the growth of the Mexican cement market. Low cost and strategically located, it is one of the most competitive cement plants in the area, and will rapidly create value for the Group.

May 17
Lafarge North America becomes 100% Lafarge
Benefits include financial savings and organizational simplification in line with the Group’s business-focused structure, with the aim of streamlining processes, speeding up decision-making and optimizing efforts to pursue the development of Lafarge throughout North America.
Preserving biodiversity
With several decades of commitment to its credit, Lafarge marked the International Day for Biodiversity by hosting events at its aggregates quarries. Conscious of the impact of its activities on the environment and convinced of the need to protect the ecosystems and biodiversity of its quarries during and after their use, Lafarge rehabilitates its quarries and has developed innovative tools to preserve biodiversity.

Concrete: it’s amazing!
Lafarge is the exclusive sponsor of an exhibition at the Arts et Métiers Museum in Paris, which has been extended until March 2007. Lafarge has again shown its desire to contribute to the development of building materials and determine the building processes of tomorrow, benefiting the world of architecture and the whole construction sector.

Renewable energy award
Lafarge has been rewarded for its commitment to using renewable energy sources in its production sites. The award also takes account of the numerous initiatives taken by the Group to promote the use of renewable energy. Presented by the Syndicate for Renewable Energy, this accolade highlights Lafarge’s wind farm, which provides electricity to one of its largest cement plants in Morocco.

“Excellence 2008” targets long-term leadership
The Group launches an ambitious strategic plan. Focused on its strengths, committed to realizing its ambitions and benefiting from a more efficient organization, the Group’s new strategic plan, called “Excellence 2008” reflects its determination to be the best in its sector for its customers, shareholders, employees and all its stakeholders.

A stronger position in India
The Group is more than doubling its production capacity on one of the world’s most attractive cement markets. In the Eastern region of India, where Lafarge has already developed a strong presence, a new production line is to be built in our Sonadigh plant. Meanwhile, Lafarge is planning a new venture in the Northern region of India, where it is to build a cement plant expected to be operational in 2010. In all, the Group’s production capacity in the country will increase from 5.5 million to 12 million metric tons of cement, placing it strongly to keep pace with growth in India.

Very strong first-half figures
The positive forecasts made for 2006 have been confirmed. All the key financial figures rose in the first half of 2006: sales were up 21%, current operating income was up 41%, and earnings per share were up 48%. There has also been strong organic growth, fueled by the Group’s solid positions on growth markets.

September
Bruno Lafont, advisor to the Mayor of Chongqing
Chongqing is the world’s largest city, with 34 million inhabitants, and is situated in Southwest China. Lafarge has established itself as the local leader in cement: number one for production, respect for the environment and worker safety. The company’s record in Chongqing has been exemplary.

August 2
Very strong first-half figures
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May 22

May 31

June 22

September 26