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Holcim Lebanon S.A.L., Lebanon

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Duration of the study : July 2011 – March 2012

5.1 Objectives and organization of the pilot project

Standards are usually perceived as tools to help organizations optimize their internal processes, improve the effectiveness of cooperation between them by reducing transaction costs, and facilitate entry into markets through compliance with regulatory and customer requirements. Standards can also help organizations become more competitive and enhance profitability. They are also a means of developing and transferring good practices.

However, despite numerous studies aimed at demonstrating the benefits of standards at the micro-economic level of individual organizations or at the macro-economic level of national economies, consistent and reliable data on the impacts of standards and the economic benefits resulting from their use are still rare. To address this deficiency, ISO has developed the " ISO methodology ", a structured approach to assessing the economic benefits of standards from the perspective of individual organizations, with the objective of helping them develop a sound basis from which to determine those benefits.

The ISO methodology gives practical advice on the steps in the assessment process, the phases in pilot projects and methods to calculate the benefits of standards.

5.2 Introduction to the selected company

This section starts with an introduction to the real estate sector in Lebanon, gives an overview of the Lebanese cement industry, and introduces the company selected for the assessment : *Holcim Lebanon*, the national branch of Holcim in Lebanon, a global cement company headquartered in Switzerland.

5.2.1 History of Holcim Lebanon

HOLCIM Lebanon S.A.L. (HL) was incorporated in Lebanon in 1929 as a subsidiary of Switzerland-based HOLCIM Ltd., one of the largest cement producers in the world. The company produces and markets grey and white cement and other related concrete construction products. HL's main production facility is located in Chekka, around 50 km to the north of Beirut, where it operates the largest cement kiln in Lebanon. Company headquarters are situated in Antelias, some five km north of Beirut. HL currently has an estimated 45 % share of the Lebanese cement market and is the largest cement company in the country, measured by sales. Its annual cement production capacity is 2.5 million tons, with products distributed to customers throughout Lebanon and limited exports to neighbouring countries.

In addition to its grey cement plant, HL operates a white cement plant through its subsidiary in Chekka, Société Libanaise des Ciments Blancs (SLCB), the only producer of white cement in Lebanon. It also runs four concrete plants in Nahr El Mott, Kfarchima, Chekka and Tyr along with a grinding station located in Northern Cyprus.

The annual cement production capacity of the Chekka plant, which amounts to 2.5 million tons, is attributed to modern manufacturing equipment and a sophisticated kiln.

HL's raw materials are mainly procured from its quarry in Chekka, which is expected to provide supplies for the next 30 years at least, assuming a modest growth in HL's annual production capacity. HL has three different revenue sources:

- Grey cement
- White cement
- Ready mix concrete

Revenue at HL is dominated by grey cement sales which represented 84 % of revenue in 2009. The sales volume from white cement sales is much lower and amounted to 100 000 tons in 2009, compared to 1.98 million tons for grey cement. Revenue has been traditionally weighted towards local sales with international revenue driven mainly from markets in Syria, Iraq, and in Cyprus where the company's grinding facility is located. There were no export sales in 2010, since company capacity was concentrated primarily on meeting growing demand from the Lebanese market.

HL has intentionally limited exports as falling prices in Syria presented a less attractive market. Moreover, new cement producers have started to operate in Syria allowing buyers to avoid expensive shipping costs from Lebanon.

As a result of HL's hedging strategy, gross profitability margins were maintained at between 31 % and 33 % over recent years, despite spikes in oil prices and aggressive fluctuations in energy costs.

HL focuses on offering high quality products and enhancing its image to customers as an environmentally responsible organization.

The company achieves this by leveraging its relationship with the parent company and through quality and process improvements. In addition, HL follows basic risk management principles by avoiding too strong a reliance on a few customers, or on focusing too much on a particular geographical area.

Regular equipment and plant upgrades, using the most innovative production technologies, have enabled HL to produce high quality cement. In 2010, the company invested USD 4 million in a new filter to reduce emissions, and improved the quality of its products and the efficiency of the production process by lowering maintenance frequency and expenses.

Reducing the impacts of production on the environment is a major consideration for HL as it works towards the objective of sustainable development. The company has obtained ISO 14001 certification for its environmental management system, and focuses on:

1. Water management: The company uses a closed circuit cooling system to reduce water use and effluents, in addition to a metering system to monitor water consumption.
2. Treatment of waste water: A physical treatment of wastewater is conducted in a sedimentation pool before discharge into the sea.
3. Energy consumption and efficiency: The company is planning to invest in the near future in a waste heat recovery plant that will enable it to recycle the heat used in the kilns producing clinker, an essential element in cement manufacture. As a result, energy costs and CO_2 emissions into the atmosphere will be reduced. In addition, HL is studying the use of industrial by-products as alternative fuels and raw materials for clinker production, to reduce the consumption of fossil fuels.

By maintaining a diversified customer base of more than 200 clients, HL ensures optimal market reach and product availability.

In terms of customers and markets, HL covers all regions in Lebanon : Beirut and North and South Lebanon are the major regions in terms of demand, followed by Mount Lebanon and Bekaa. Future demand is expected to shift more towards Mount Lebanon where construction activity is peaking as Beirut becomes saturated. Through its facilities located in different Lebanese regions, HL is able to satisfy the demand for its cement-related products across the country.

5.2.2 Developments in the real estate sector and the cement industry in Lebanon

Real estate prices have been rising quickly since the end of the Israeli-Lebanon war in 2005-2006. The real estate market in Lebanon is unique since many Lebanese citizens living abroad wish to invest and buy a house in Lebanon. More than four million Lebanese live in Lebanon while around 15 million live abroad. Based on a report from Bank Audi, the real estate market grew by 23.5 % from 2006 to 2010 but now shows signs of contraction.

Before the Lebanese war, the economic and political situation had been very difficult, especially after the assassination of former Prime Minister Rafik Hariri on 14 February, 2005.

The cement market in Lebanon has grown at a Compounded Annual Growth Rate (CAGR) of 10.3 % over the past ten years, reaching 5.10 million tons per year in 2010. This growth accelerated in 2007 following the reconstruction of bridges and regions damaged during the war.

Since 2008, the main driver of demand for cement in Lebanon has been real estate generated by the increase in capital inflows mainly from expatriates and Arab businessmen wishing to diversify away from markets impacted by the financial crisis. Moreover, with the continuous growth of tourist activity and the need for higher capacity in hotels and resorts, investments in the tourism sector have also had a tangible effect on construction.

Concerns about potential growth in real estate construction increase together with the risk of oversupply in the upscale and luxurious residential segment inaccessible to much of the population. Accordingly, it is expected that the cement market will downsize slightly during the next few years unless the development of Lebanon's infrastructure through potential public/private partnership boosts demand for cement.

5.2.3 Structure of the cement market in Lebanon

The cement market in Lebanon takes the form of an oligopoly of three companies with the following market shares (see : BlomInvest Bank, report dated 6 December, 2010) :

- HOLCIM Lebanon (43 % – 45 %)
- Cimentrie nationale (39 % – 41 %)
- Ciment de sibline (16 % – 18 %)

5.3 Attitude of the company towards standardization

HL has extensive experience in standardization and considers participation in standards committees to be highly valuable. It not only ensures a competitive advantage, but is a pre-condition for applying up-to-date standards in its operations.

In addition to national and international technical and management standards, HL applies a very elaborate system of procedures, methods and requirements developed by the Holcim Group, implementation of which is mandatory throughout the various national companies.

Examples are the manuals for procurement, and for design and project management.

HL also applies ethical and social standards in its operations. This implies sensitivity and a responsible management of natural resources throughout the construction life cycle, including operations and maintenance. Long-term environmental concerns, whether related to the flow of materials or energy, are an integral part of any project.

The company is certified to two management system standards: ISO 9001:2008 for quality management and ISO 14001:2004 for environmental management, as well as technical standard NL 53:1999 which defines the composition of cement and has been mandatory in Lebanon since 2003.

5.4 Analysis of the value chain

5.4.1 Industry value chain

The following figure gives an overview of the cement industry value chain. The area marked with a dot dash line is the core of the cement industry, of which more details are given below. All these activities are covered by HL operations. It also shows the inputs HL purchases from its suppliers and the key customers that procure HL products.

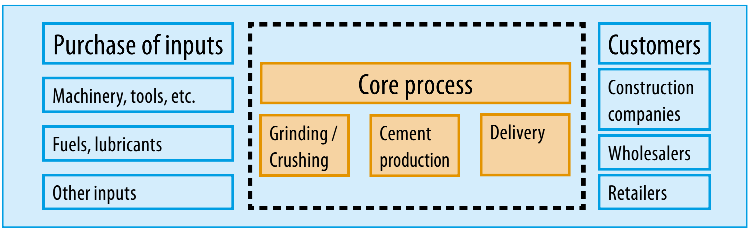

Figure 1 – The industry value chain

5.4.2 Basic process of cement production

The raw materials used in cement production are limestone, clay, shale, and silica sand.

Limestone is carefully blended before being crushed. Red mineral is added at the crushing stage to provide consistent chemical composition of the raw materials. Once these materials have been crushed and subjected to online chemical analysis they are blended in a homogenized stockpile. A bucket wheel reclaimer is used to recover and further blend this raw material mix before transfer to the raw material grinding mills.

The raw meal is fed into the top of a preheater tower equipped with four cyclone stages. As it falls, the meal is heated up by the rising hot gases and reaches 800°C. At this temperature, the meal dehydrates and partially decarbonizes. It then enters a sloping rotary kiln heated by a 1 800°C flame, where it is heated to at least 1 450°C to complete the burning process. At this temperature the chemical changes required to produce cement clinker are achieved.

The clinker discharging from the kiln is cooled by air to a temperature of 70°C above ambient temperature and heat is recovered from the process to improve fuel efficiency.

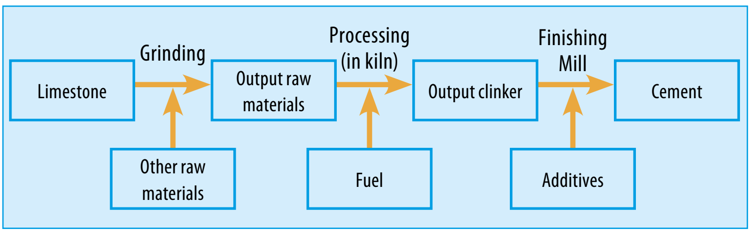

Figure 2 – Main stages in cement production

Figure 3 gives a process map of the main stages in the process of cement production from mining to delivery to the market:

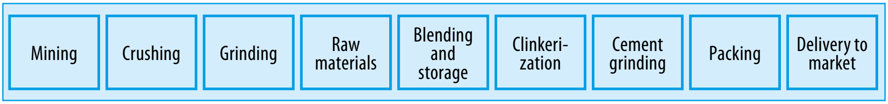

Figure 3 – Cement production: Process map

The full process as shown in Figures 2 and 3 is covered by HL operations.

5.4.3 Company value chain

The model developed by Michael Porter of Harvard Business School has been applied to the analysis of the company value chain. The business functions highlighted in the figure below have been chosen as the focus of the assessment.

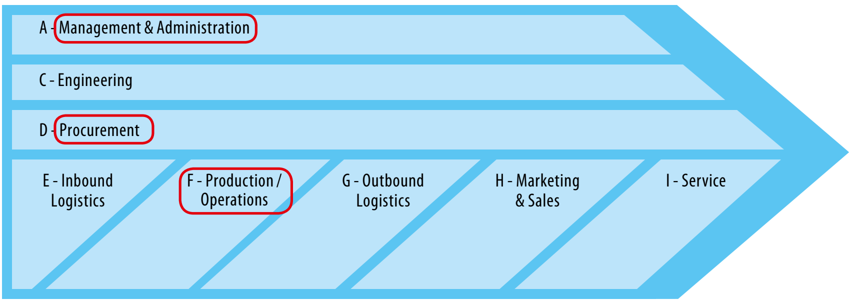

Figure 4 – Company value chain and selected business functions

HL's core businesses include the manufacture and distribution of cement and ready-mixed concrete. Those business functions subject to assessment of the impacts of standards are described below.

5.4.3.1 Business function : Management and administration

Quality and environment

To manage and monitor its operations better, HL implemented ISO 9001 in 2003 and ISO 14001 in 2004 across all its functions.

Since it is a part of the HOLCIM Group it has environmental commitments which exceed the requirements stipulated in Lebanese legislation.

HL is required to comply with the policy of the HOLCIM Group and its commitment to environmental responsibility. For this purpose, it has taken measures to reduce the consumption of key resources such as water and fuel, and it is also recycling and reusing parts of the waste it generates.

This commitment is intended to reflect positively on the reputation of the company and to strengthen its brand. It is HL's objective to continuously improve its environmental performance and to provide positive contributions to the business.

Cement manufacture is a resource- and energy-intensive process. With the objective of becoming and remaining eco-efficient, HL undertakes to preserve non-renewable natural resources and privileged material recycling through the following measures :

- Monitoring of stack emissions
- Dust reduction
- Modernization of the power plant
- Waste management

HL places a high priority on the safety of its employees. For this reason, the Holcim Group has developed a management system that aims at ensuring health and safety.

In order to apply the principles of its sustainable development strategy and manage its commitments strategically, HL has dedicated resources in different departments. Roles and responsibilities are clearly defined to ensure that efforts are effective and coordinated, and that internal and external stakeholders are adequately involved.

The Group strategy and approach to value creation integrates economic, environmental and social impacts – the three elements of the triple bottom line.

HL has integrated assessment tools and management systems into its business processes and supports their implementation with appropriate training. Managing the company's environmental impact focuses on identifying and assessing levels of impact, setting targets to reduce them, and a commitment to continuous improvement as part of its organizational policy-making.

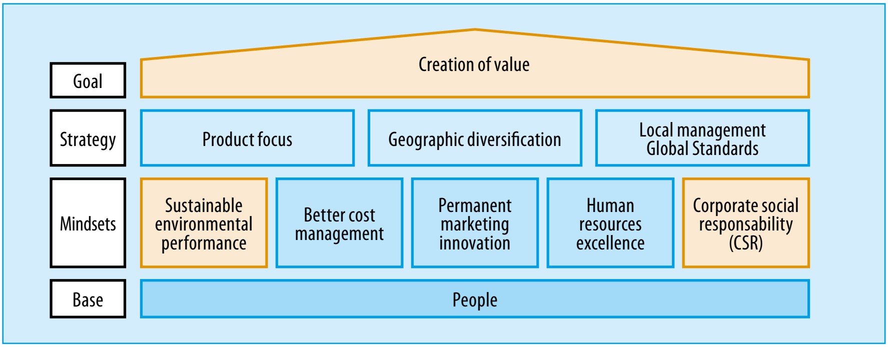

Figure 5 – HOLCIM strategy and the triple bottom line

A basic component of the HOLCIM approach to environmental management is the Plant Environmental Profile (PEP). PEP is an internal monitoring and reporting tool. Applying this self-assessment tool environmental performance can be studied and quantified through measurements and calculations, thus presenting the stakeholders with objective information. The purpose is to assess progress and to provide a benchmark across a range of environmental impacts. Obtaining accurate results requires intensive training for plant personnel, and regular evaluation reports to management.

As a resource and energy intensive process, higher eco-efficiency during the process of cement production is achieved through minimizing waste materials (reuse and recycling) and by reducing fuel and water consumption. The figure below shows the environmental impacts that occur during the stages of cement production :

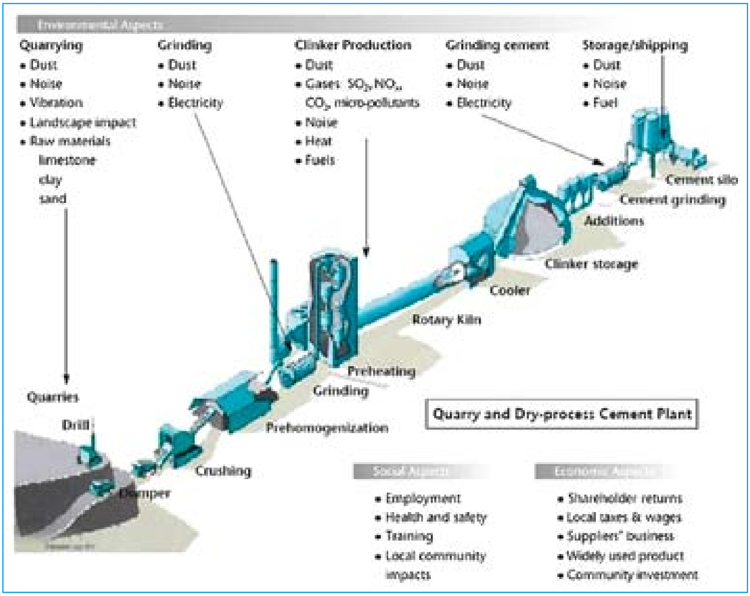

Figure 6 – Stages in cement production and its environmental aspects

Source : World Business Council for Sustainable Development "Cement Sustainability Initiative : Our Agenda for Action", courtesy by R. Rivet

HL recognizes water as a fundamental natural resource, and the need to deal with growing water scarcity. Its water management strategy incorporates protection of water resources, control of water consumption, surface water management, and wastewater treatment.

Occupational Health and Safety (OH&S)

HL places high importance on ensuring health and safety by striving for zero risk for its employees, sub-contractors, third parties and visitors. The company applies OH&S standards and guidelines, and provides the resources and training to measure its performance. In making safety a top priority, the commitment to OH&S extends from top management to every worker.

5.4.3.2 Business function : Procurement

This function comprises supplier assessment, the selection of suppliers, negotiations and contracting, and purchasing of raw materials. It also covers management of sourcing and the relationship with suppliers.

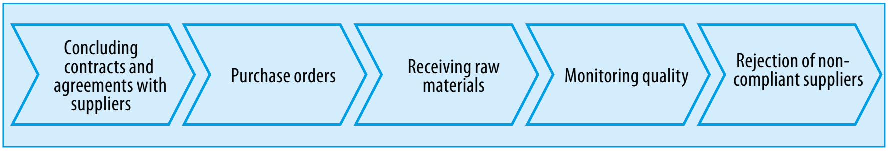

Figure 7 – Activities in the procurement function

Through the implementation of an ISO 9001-based quality management system, suppliers are assessed to ensure that only those meeting specific quality requirements are selected, and those not complying are rejected.

5.4.3.3 Business function : Production

The production process for cement, as operated by HL, has been described under 5.4.2. The main HL products are :

- Grey cement
- White cement
- Ready mix concrete

5.4.4 Key value drivers

The definition of " value driver " in the ISO methodology is the capability that creates a competitive advantage for an organization. The following aspects have been identified as value drivers at HL :

Know-how leadership: Being a member of the Holcim Group, HL has access to technological and procedural know-how that it would otherwise have to generate internally or purchase on the market. Much know-how is communicated from the Holcim headquarters in Switzerland to all national companies in the form of group management systems and group-wide operational and design manuals. Access to knowledge is therefore readily available as needed for the national companies.

Reputation and image: HL has a high reputation as representing one of the world's leading cement producers with a commitment to high-level environmental, health, safety and quality objectives.

Supplier and customer relationship: HL has a wide network of suppliers as well as a large number of customers throughout the country.

Production capability: The main value drivers in production can be summarized as:

1. Operational excellence,
2. Ability to optimize costs
3. High and flexible production capacity to respond to shifts in market demand

5.5 Scope of the pilot project assessment

Following several rounds of interviews at HL, it was decided to focus the study on the following three business functions:

- Management and administration
- Procurement
- Production

5.6 Use of standards in the company value chain

Table 1 lists the most important technical and management system standards used by HL in its different business functions. As mentioned earlier, HL is certified in conformity with ISO 9001:2008, ISO 14001:2004 and NL 53:1999.

Business function	Activities	External standards (currently used)	Year when HL started using these standards (possibly an earlier edition than that currently used)
Management and administration		ISO 9001:2008 ISO14001:2004	2003 2004
Procurement		ISO 9001:2008 ISO14001:2004	2008 2004
Production	Quarry and preparation of raw material	EN 197-1 : 2004 NL 53:1999 ISO 9001:2008 ISO 14001:2004	2004 1999 2003 2004
Production	Clinker production	NL 53:1999 ISO 9001:2008 ISO 14001:2004 ASTM D 388:1999 ASTM C 465:1999	1999 2003 2004 2011 2011
Production	Grinding	ISO 14001:2004 ISO 9001:2008	2004 2003

Business function	Activities	External standards (currently used)	Year when HL started using these standards (possibly an earlier edition than that currently used)
Production	Laboratory	EN 197-1:1999	2004
		NF EN 196-1:2006	2006
		NF EN 196-2:2006	2006
		NF EN 196-3:2006	2006
		NF EN 196-5:2006	2006
		NF EN 196-7:1990	2005
		NF EN 196-8:2004	2005
		NF EN 196-9:2004	2005
		NF EN 196-10:2005	2005
		NL 53:1999	1999
		prEN 932-1:1996	1996
		ISO 9001:2008	2003
		ISO 14001:2004	2004
		ASTM D 388:1999	2011
		ASTM C 465:1999	2011
		Syrian specifications	
Outbound logistics	Expedition	NL 53:1999	1999
		ISO 9001:2008	2003
		ISO 14001:2004	2004
		ASTM D 388:1999	2011
		ASTM C 465:1999	2011
Marketing and sales		NL 53:1999	1999
		EN 197-1:2004	2004
		ISO 9001:2008	2003

Table 1 – List of standards used at HL

Following interviews with HL staff, it was determined that the most important and widely used standards were the following:

ISO 9001:2008, *Quality management systems – Requirements*

This International Standard specifies requirements for a quality management system where an organization needs to demonstrate its ability to consistently provide products that meet customer, applicable statutory and regulatory requirements. Effective application of the system aims at enhancing customer satisfaction, achieving continual improvement and providing assurance of conformity to requirements.

HL implemented ISO 9001 in 2003 to enhance customer satisfaction by meeting customer requirements. By implementing the quality management system all functions and departments are linked together thereby facilitating the transfer of information.

In procurement HL follows a purchasing process which ensures that purchased products conform to specified purchase requirements, and that suppliers are evaluated and selected based on their ability to supply in accordance with HL requirements.

ISO 14001:2004, *Environmental management systems – Requirements with guidance for use*

This International Standard specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives which take into account both legal and other requirements to which the organization subscribes, as well as information on significant environmental aspects. It applies to those environmental aspects the organization deems it can control and influence.

The standard can be used as an audit tool, or to specify and evaluate objectives, or specify the elements and tools that must be in place for an environmental management system to be complete and effective.

NL 53:1999, *Cements – Portland Cement Type P, Portland Composite Cement Type Pa with Additives, Composite Cement Type C*

NL 53 is the main standard in Lebanon which contains definitions for different compositions of cement. Based on the European Standards EN 197-1 and EN 196, it was published in 1999 and was made mandatory in 2003.

NL 53 describes the properties of cement constitutions and the combinations necessary to produce different cement types and classifications. It also describes the mechanical, physical and chemical requirements applied for these types and classes, and defines the rules of the evaluation of conformity to certain specifications.

Details of NL 53 and its impact on the cement industry in Lebanon are discussed in section 5.8.

5.7 Selection of operational indicators to measure the impacts of standards

The following set of operational indicators in **Table 2** has been developed by the project team on the basis of interviews and discussions with HL staff members. The column on the right indicates whether or not a calculation was possible, either on the basis of data available from the company, or on the basis of estimations by HL staff.

No.	Business Function	Operational indicators	Explanation of the operational indicators	Data available ?
1	**Procurement**	Evolution of the number of (" active ") suppliers over recent years	Evolution of the number of active suppliers. Key question : Has this number been reduced due to the application of ISO 9001, resulting in more efficient supplier management ?	YES
2	**Production**	Clinker factor	Cement produced with lower clinker factor sold at an established market price (regular Portland cement) resulting in higher profit margins	YES
3	**Production (laboratory)**	Average rejection rate of supplies (raw material) due to nonconformity	Calculation of the average rejection rate of supplies due to nonconformity and savings from not accepting nonconforming raw materials	NO
4	**Production (laboratory)**	Number or percentage of prevented nonconforming product	The number or percentage of prevented nonconforming products due to identification of deviation from specifications during the production process	NO
5	**Management and administration (environment)**	HL's environmental performance in relation to current legal requirements in Lebanon • HL's own internal environmental objectives		NO (only qualitative evaluation)
6	**Management and administration (environment)**	Use of key resources	Calculate the reduction in the use of certain key resources, such as : • water • fuels and relate the savings per ton of output to the environmental management system HL has introduced (ISO 14001)	YES (no financial aspects yet)

No.	Business Function	Operational indicators	Explanation of the operational indicators	Data available ?
7	**Management and administration (environment)**	Reuse of waste/recycling	Check whether the reuse/recycling of waste, although small, can be seen as an impact of the EMS standards (and other standards that HL may use to monitor its environmental performance, such as NF N 14181 for emission monitoring)	YES
8	**Management and administration (environment)**	Reputation (for environmental performance)	Is it possible to calculate an economic value for the " good environmental image " of Holcim due to ISO 14001 implementation ?	Qualitative
9	**Management and administration (Occupational Health and Safety)**	HL's OHS performance in terms of • number of major internal accidents • cost of lost work time (due to staff injuries) • cost of medical treatment • cost of insurance	Are there any external standards applied in HL's measures regarding OH&S ? Is the decrease in the indicators (for example, major internal accidents, cost of lost time, etc.) due to the introduction of the OHSAS 18001 standard or equivalent ?	YES

Table 2 – Operational indicators considered to determine impacts of standards at HL

5.8 The impact of standards on cement production

There are several impacts of standards which will be outlined in this section. However, the main area of economic impact can be found in the production of new types of cement related to the influence of Lebanese standard NL 53 on cement production. This impact is complex and only partially a result of the technical content of the standard. Its impact is more in shaping the cement market in Lebanon on the producer and supplier side for companies such as HL, as well as for cement customers. To understand the impact of NL 53 better, this section is devoted to a review of how this standard impacted the cement market in Lebanon.

5.8.1 Cement standards in Lebanon and their implications for HL

In Lebanon, the key cement standard is NL 53:1999, *Cements – Portland Cement Type P, Portland Composite Cement Type Pa with Additives, Composite Cement Type C*. This standard was published in 1999 by the Lebanese Standards Institution (LIBNOR) and became mandatory on 11 March 2003 through Lebanese legislation. Similar to, and influenced by European standards (in particular EN 197), NL 53 allows different compositions of cement through different clinker factors (that is, a higher or lower proportion of clinker). NL 53 describes seven different compositions of cement with six different clinker factors ranging from 95 % to 100 % of clinker as a maximum, to between 35 % and 64 % as a minimum. Irrespective of the different composition of cement due to different clinker factors, the performance and durability of cement for specified purposes is ensured so that there is no difference in terms of usability and functionality of the cement for the end-user.

In the late 1980s and 1990s, HL – as with other cement companies in Lebanon and abroad – produced traditional Portland cement with a clinker factor of around 95 %. In the late 1990s, however, HL started to produce new types of cement in line with some of the options in NL 53 allowing a lower clinker factor. The reduction of clinker results in the increase of other additives in cement such as slag, pozzolana or limestone. Although the market prices for these additives vary over time, it can be stated, as a general principle, that the reduction in the amount of clinker resulted in lower production costs for cement as well as improved environmental performance (due to a decrease in CO_2 emissions during the production process). This resulted in an increased profit margin because HL continued selling cement at the original prices established and accepted by the domestic market in Lebanon.

The contribution of NL 53 can be seen from two perspectives, that of the cement market as a whole and that of HL :

1. NL 53 contributed to a change in the cement market in Lebanon by altering the perception of customers who began accepting other types of cement with lower clinker factor as being equivalent in performance and functionality to traditional Portland cement. This led to a growing market acceptance for these types of cement.
2. Although HL had the technology to produce cement with lower clinker factor before the publication of NL 53, the fact that the standard came into existence significantly reduced HL's risk in introducing new types of cement to the Lebanese market. HL could refer to NL 53 as a standard developed through consensus by stakeholders in Lebanon, and one based on a widely accepted European standard. It could use NL 53 as an assurance of equal performance between different types of cement. To achieve market acceptance for the production of more profitable types of cements with lower clinker factor without NL 53, HL would have had to rely exclusively on its reputation as one of the world leaders in the cement industry (Holcim Group), but would most likely have had much more difficulty in gaining customer acceptance in the Lebanese market. Furthermore, the risk of being held liable by customers for accidents or damage would have made the decision to introduce the new types of cement to the Lebanese market much more difficult for HL, in spite of the perspective of higher profits.
3. Another factor which has become increasingly important is conformity with environmental regulations, in particular in the context of mitigat-

ing climate change. However, environmental law that reflects climate change, for example, in the form of carbon taxes, is still in an early stage of development in Lebanon, so that there are only limited economic benefits for HL from implementing higher environmental standards. On the contrary, higher environmental performance requires significant investment, which HL undertakes in compliance with the policy of the Holcim Group and its commitment to environmental responsibility. Nevertheless, it is likely that better environmental performance will become an increasingly important economic factor in Lebanon in the next few years, leading to legislation that will have an impact on market prices and therefore on economic decisions of companies.

In summary, it can be concluded that NL 53 has contributed to a shift in market acceptance in Lebanon for cement with a lower clinker factor, as well as stimulating cement companies to introduce new types of cement, since the standard has significantly reduced the risk of doing so.

5.8.2 Comparison between EN 197-1 and NL 53

NL 53 is based largely on the European Standard EN 197-1, *Cement – Part 1: Composition, specifications and conformity criteria for common cements*, concerning the composition of cement in particular. EN 197-1 was first published in 1992 as ENV 197-1:1992, and is now available in the 2011 edition. It contains a list of 27 different compositions of cement used in various countries. These compositions exist unchanged since the 1992 edition.

As shown in the table in **Annex 1,** NL 53 covers part of EN 197-1, but excludes compositions with the lowest clinker factor. Since NL 53 has mandatory status in Lebanon, this means that companies do not have the option to choose the most cost-efficient types of cement composition even though a lower clinker factor results generally in lower production costs (as well as better environmental performance).

5.8.3 Estimate of the economic benefits of producing lower clinker cement types

As mentioned above, the reduction in clinker in the composition of cement generally results in cost savings during production, as well as reduced environmental impacts such as reduced CO_2 emissions. Following the increase in market acceptance of cement with lower clinker factors in Lebanon, HL began production of such types in 2002 and decreased the clinker factor steadily in subsequent years, reaching an average of 85.5 % between 2003 and 2006, the subject of this estimate. This is consistent with cement type CEM II in NL 53.

Table 3 shows HL's development of the clinker factor and the total production volume of grey cement. The changes over the years reflect shifts in market demand. Only the period from 1999 to 2006 has been used in calculating the economic benefits of standards derived from a reduction in the clinker factor. This is because the role of NL 53 in changing the perceptions of the market players in Lebanon, and in reducing the risk for cement companies in introducing cement with lower clinker factor, had been exhausted by that time. Although the clinker factor was further reduced from 2007 to 2011, this can no longer be attributed to the impact of NL 53, since by that time the principle of cement with lower clinker factor had been widely accepted in the domestic market in Lebanon.

Years	Clinker factor (average)	Total volume of production of grey cement (in tons) (averages)
1999-2000	91 %	1 200 000
2001-2002	88 %	1 250 000
2003-2006	85 %	1 650 000
2007-2011	82 %	2 000 000

Table 3 – Development of the clinker factor at HL (1999 – 2011)

As already mentioned, the prices of raw materials for cement production vary over time. For this reason, the calculations below have been simplified for guidance only.

If we assume that the production cost per ton of cement decreases with a lower clinker factor, and if we apply an average cost of **100** for clinker in one ton of cement and a total average cost of **50** for the other raw materials (mineral components substituting clinker in a ton of cement), then we can conclude that for an average decrease of 5 % in clinker factor the cost for cement production per ton of cement (clinker cost + mineral component cost) decreases by 2.5 %.

Therefore we conclude that HL could have made possible savings estimated at USD **1 300 000** annually from 2003 to 2006, due to producing cement with a lower clinker factor [1)].

5.8.4 Summary : Impacts of NL 53 on the cement market in Lebanon

As stated in 5.8.1, the function of the NL 53 standard was not to enable HL technically to produce cement with lower clinker factor, but to reduce the risk to the company in doing so, and to contribute to the market acceptance of such cement as having performance and reliability equal to traditional Portland cement. It is therefore assumed that NL 53 had a significant impact on the cement market in Lebanon, and for HL in particular, in the early years after market acceptance of the new types of cement started to emerge.

Additional savings would be possible for cement companies in Lebanon if NL 53 could be brought further in line with EN 197-1 by including the possibility of producing cement types with even lower clinker factors than currently permitted (see **Annex 1)**.

1) 1 LPB – 0.0006 USD.

A lower clinker factor would also be beneficial for environmental reasons, and lead to a reduction in emissions and other environmental impacts.

5.9 Impacts of standards in the selected business functions

5.9.1 Business function : Management and administration (environmental aspects)

According to HL staff interviews, the implementation of ISO 14001 has been a key contributor to achieving environmental improvements.

Year	2006	2007	2008	2009	2010	2011
CO_2 (kg / ton of cement)	803	821	782	739	727	717

Note : The main factor determining the amount of the CO_2 emission is the clinker factor applied in cement production.

Table 4 – Environment

Year	Percentage of substitution	in USD
2007	1.02	242 689
2008	0.05	25 092
2009	0.08	71 988
2010	0.26	21 937
2011	0.45	27 450
Annual average saving		USD 77 831

Note : The increase in the year 2009 is due to changes in the price of fuel.

Table 5 – Reuse of waste fuel (oil and waste fuel)

Year	Percentage
2009	10 %
2010	10 %

Table 6 – Recycled waste (tons per year)

5.9.2 Procurement

It was possible to obtain information about the number of suppliers between 2006 and 2011. However, no clear trends could be identified. It was not possible to translate the changes in the number of suppliers into financial impacts.

Year	2006	2007	2008	2009	2010	2011
Number of active suppliers	345	423	398	429	407	368
Total number of purchase orders	3614	4312	4664	5468	6518	7465

Table 7 – Procurement

5.9.3 Production

The calculation in this section is based on the general relationship between a lower clinker factor and the cost of production. It is an estimate intended to give an overall impression of the approximate extent of the savings, but does not apply precise costing for all factors of production. The cost estimations are based on average prices for 2003 to 2006 (as stated in section 5.8.3). Details of how this calculation was made can be found in **Annex 2.**

Year	Total cement production	Clinker factor	Percentage of reduction of clinker factor	Savings due to lower clinker factor
1999	1 200 000	91 %	0 %	-
2000	1 200 000	91 %	0 %	-
2001	1 250 000	88 %	-3 %	USD 492 424
2002	1 250 000	88 %	-3 %	USD 492 424
2003	1 650 000	85 %	-6 %	USD 1 300 000
2004	1 650 000	85 %	-6 %	USD 1 300 000
2005	1 650 000	85 %	-6 %	USD 1 300 000
2006	1 650 000	85 %	-6 %	USD 1 300 000
Average annual savings 2001 – 2006:				**USD 1 030 808**

Table 8 – Savings due to lower clinker factor

5.10 Calculation of the economic benefits of standards

The table below lists the data collected about the impacts of standards on the selected business functions :

No.	Business Function	Operational indicators	Financial impacts of the indicators (annual savings)
1	Procurement	Evolution of the number of (" active ") suppliers over recent years	–––
2	Production	Decrease in clinker factor (estimation)	USD 1 030 808
3	Production (laboratory)	Average rejection rate of supplies (raw material) due to nonconformity	–––
4	Production (laboratory)	Number or percentage of prevented nonconforming products	–––
5	Management and administration (environment)	HL's environmental performance in relation to : • Current legal requirements in Lebanon • HL's own internal environmental objectives	Legal emission limits in Lebanon are consistently observed and performance is significantly below these legal limits. Due to lack of legislation to encourage additional steps towards improved environmental performance (for example, through a taxation scheme), financial impacts, in the form of cost savings, do not exist.
6	Management and administration (environment)	Use of key resources : • Water • Fuels	–––
7	Management and administration (environment)	Reuse of waste fuel	USD 77 831
8	Management and administration (environment)	Reputation (for environmental performance)	–––
9	Management and administration (Occupational Health and Safety)	HL's OH&S performance in terms of: • Number of major internal accidents • Cost of lost work time (due to staff injuries) • Cost of medical treatment • Cost of insurance	–––
Total impacts of standards (period 2001 – 2011) :			**USD 1 108 639**

Table 9 – Financial impacts of the use of standards

The estimated **USD 1 108 639** contribution of standards occurred over the period 2001 to 2011. However, the two factors that caused this impact – the reduction in the clinker factor and the increase in the reuse of waste fuel – did not occur in parallel but in sequence, the first between 2001 and 2006, and the second from 2007 to 2011.

Annex 3 gives an overview of HL revenue and EBIT (Earnings Before Interest and Taxes) **between 2001 and 2010** on the basis of published annual reports for these years which can be found on the HL website.

The contribution of standards, as identified in this study, is **0.84 % of the average annual revenue** and **2.3 % of the average annual EBIT** calculated as averages over the whole period.

Savings in the period **2001 and 2006** – when the impact of NL 53 facilitated a reduction in the clinker factor in cement production – amount to **about 1 % of average annual revenue** and **2.5 % of the average annual EBIT** for the period.

The other measurable impact of standards – an increase in the reuse of waste fuel attributed to the use of ISO 14001 – is significantly lower and amounts to **0.05 % of average annual revenue and 0.14 % of average annual EBIT** for the period **2007 and 2011**.

5.11 Qualitative and semi-quantitative considerations

Through stringent requirements concerning the purchase of supplies, it can be assumed that HL makes a positive impact on the performance and quality of its suppliers in the domestic market in Lebanon. However, no specific information related to standards could be found to support this statement in more detail.

As an environmentally responsible company and an environmental leader, it is likely that HL also influences other companies in the Lebanese cement and construction industry.

Finally, HL's commitment to social responsibility has an impact on the local community as well as on employee attitudes and, together with its environmental performance and high quality of products, contributes to the high reputation of the company – key factors that support its strong market position.

5.12 Evaluation of the results

The most visible impact from standards is from NL 53 which played an important role in the introduction of cement with lower clinker factor to the Lebanese market. As described in section 5.8, the financial impacts stated in this report present an estimation intended to give an overall impression of the approximate size of the savings, but not a comprehensive calculation applying precise costing for all factors of production. However, it became clear that the main function of the standard was to help change the perception of market players to new types of cement and, for HL, to help reduce the risks of introducing such cement types to the market. Thus the main impact of the standard was not in providing technological know-how new to HL, but in contributing to changes of the perceptions of the market players in Lebanon and to risk reduction for HL.

At the outset of the assessment it had been assumed that impacts of standards could be found in other business functions, such as procurement. However, HL operates a comprehensive system of internal procedures, methods and approaches that have been developed in close cooperation with and under responsibility of Holcim headquarters in Switzerland, and which are used throughout the group and its national subsidiaries. It turned out to be very difficult or even impossible to relate certain procedures to specific standards and impacts. It is most likely that standards are a key source of many of Holcim's internal procedures, but they have been extended, integrated and combined with Holcim-internal know-how to form the Holcim set of procedures. This was very evident, for example, with regard to Holcim's OH&S management system, which can be related to OHSAS 18001. However, it exceeds the operational health and safety management system standard to such an extent that a direct link between this standard and Holcim's OH&S performance could not be established.

The Holcim Group and HL itself have taken many measures towards improving environmental performance, including the introduction of ISO 14001. However, due to the lack of respective legislation in Lebanon, economic benefits from the introduction of these measures still do not exist. Nevertheless, in addition to the benefits of these initiatives for HL's reputation, and the need to comply with Holcim Group policies, the steps taken by the company can also be seen as proactive measures in anticipation of future legislation containing financial incentives to improve environmental performance. In that event, the measures taken may contribute to further strengthening of HL's competitive position.

Identifying impacts from the introduction of ISO 9001 and ISO 14001 was also difficult, in particular because HL has implemented parallel measures of reorganization, making it hard to distinguish between the impacts from those management systems and from other internal measures.

5.13 Conclusions

The assessment has shown that standards have a visible impact on HL's operations and contribute to 0.84 % of average annual revenue (and to 2.3 % of EBIT). However, the key impact of standards, which is through NL 53, has been to change the perceptions of the market players, and in reducing the risk for cement companies like HL that used the standard for their benefit. For HL, the standard did not provide technological know-how which it did not already possess.

Due to the comprehensive management systems developed by the Holcim Group, which acknowledge and exceed existing standards and combine them with other sources, it has not been possible to identify and quantify the impacts of particular standards, except in the case of the clinker factor in cement production (NL 53) and reuse of waste fuel (ISO 14001).

Annex 1 : Comparison between the 27 cement products in EN 197-1 and those permitted in NL 53:1999 (highlighted in table)

Main Types	27 Products		Clinker	Slag	Silica	Pozzolana		Fly ash		Burnt shale	Limestone		Minor additives
						natural	natural claimed	siliceous	calcareous				
			K	S	D	P	Q	V	W	T	L	LL	
CEM I	Portland Cement	CEM I	95-100										0-5
CEM II		II/A-S	80-94	6-20									0-5
		II/B-S	65-79	21-35									0-5
		II/A-D	90-94		6-10								0-5
		II/A-P	80-94			6-20							0-5
		II/B-P	65-79			21-35							0-5
		II/A-Q	80-94				6-20						0-5
		II/B-Q	65-79				21-35						0-5
		II/A-V	80-94					6-20					0-5
		II/B-V	65-79					21-35					0-5
		II/A-W	80-94						6-20				0-5
		II/B-W	65-79						21-35				0-5
		II/A-T	80-94							6-20			0-5
		II/B-T	65-79							21-35			0-5
		II/A-L	80-94								6-20		0-5
		II/B-L	65-79								21-35		0-5
		II/A-LL	80-94									6-20	0-5
		II/B-LL	65-79									21-35	0-5
		II/A-M	80-88	12-20	12-20	12-20	12-20	12-20	12-20	12-20	12-20	12-20	0-5
		II/B-M	65-79	21-35	21-35	21-35	21-35	21-35	21-35	21-35	21-35	21-35	0-5

Main Types	27 Products		Clinker	Slag	Silica	Pozzolana		Fly ash		Burnt shale	Limestone		Minor additives
		III/A	35-64	36-65									0-5
CEM III		III/B	20-34	66-80									0-5
		III/C	5-19	81-95									0-5
CEM IV		IV/A	65-89										0-5
		IV/B	45-64										0-5
CEM V		V/A	40-64	18-30									0-5
		V/B	20-38	31-49									0-5

ANNEX 2 : Calculation of production cost savings from applying lower clinker factors

Year	Total cement produc-tion	Clinker factor	Percentage of reduction of clinker factor	Savings due to lower clinker factor	Savings as a percentage of production costs	Calculation of savings based on average savings for the period 2003-2006	Savings per ton of cement
1999	1 200 000	91 %	0 %	USD 0	0		
2000	1 200 000	91 %	0 %	USD 0	0		
2001	1 250 000	88 %	-3 %	USD 492 424	1.5		
2002	1 250 000	88 %	-3 %	USD 492 424	1.5		
2003	1 650 000	85 %	-6 %	USD 1 300 000	3	USD 433 333	USD 0.26
2004	1 650 000	85 %	-6 %	USD 1 300 000	3		
2005	1 650 000	85 %	-6 %	USD 1 300 000	3		
2006	1 650 000	85 %	-6 %	USD 1 300 000	3		
Average annual savings 2001 – 2006:				**USD 1 030 808**			

Explanation of the calculation : As stated in 5.8.3, a decrease in the clinker factor of 5 % is estimated to result in a reduction of 2.5 % in the costs of cement production (clinker cost + mineral component cost). The annual reduction in production costs between 2003 and 2006 was USD 1 300 000. On this basis, the calculation above assumes that a decrease of 1 % in the clinker factor results in a decrease in production costs of 0.5 %. Using 1999 as the base year (clinker factor was 91 %, reduction = 0 %), the clinker factor was reduced by 6 % (from 91 % to 85 %) in the period between 2003 and 2006, which translates into a decrease in production costs of 3 %. The savings as a consequence of the lower clinker factor amounted to USD 1.3 million during this period (= 3 %). 1 % of these savings – USD 433 333 and USD 0.26 – is the average saving per ton of cement (= 433 333 / 1 300 000). This figure of the per-ton-saving (on the basis of the average savings for the period 2003-2006) is the basis for calculating the savings in 2001-2002 (USD 0.26 × 1.5 % × 1 250 000t) on the basis of the following formula: (Per-ton-savings × Savings as a percentage of production costs × Total amount of cement produced). It should be noted that this calculation is a) that it is based on averages and b) on constant prices during the period 2003-2006, which limits its precision. However, it is evident that significant savings must have occurred.

ANNEX 3: Annual revenue and EBIT of Holcim Lebanon 2002 – 2010

The following information is based on HL Annual Reports available on HL's website at: www.holcim.com.lb. The historical exchange rates from Lebanese Pound (LBP) to US Dollar (USD) at year end have been obtained from www.oanda.com.

Year	Revenue of HL (in LBP)	EBIT of HL (in LBP)	LBP – USD exchange rate (end of year)	Revenue of HL (in USD)	EBIT of HL (in USD)
2002	120 812 557 000	54 167 188 000	0.0006	72 487 534	32 500 313
2003	117 300 157 000	58 048 600 000	0.0006	70 380 094	34 829 160
2004	148 446 138 000	40 526 726 000	0.0006	89 067 683	24 316 036
2005	241 590 857 000	96 485 896 000	0.0007	169 113 600	67 540 127
2006	179 785 166 000	74 760 979 000	0.0006	107 871 100	44 856 587
2007	205 279 292 000	67 628 858 000	0.0006	123 167 575	40 577 315
2008	251 088 540 000	79 679 890 000	0.0007	175 761 978	55 775 923
2009	260 651 054 000	87 000 829 000	0.0007	182 455 738	60 900 580
2010	278 946 844 000	103 952 767 000	0.0007	195 262 791	72 766 937
Avg:	**200 433 400 556**	**73 583 525 889**		**131 729 788**	**48 229 220**

ANNEX 4 : Bibliographic references

Bank Audi, Sector research : *Lebanon Real-Estate Sector* (4 July, 2011)

BlomInvest Bank, *Holcim (Liban)*, Report dated : 6 December 2010, at : www.blominvestbank.com/Library/Files/Uploaded %20Files/Holcim %20Liban %20Equity %20Report.pdf, downloaded on 27 March 2012

CemWeek, Cement Industry Surveys (December, 2011), *Middle East, Africa, Cement, Business, Sentiment Survey*

Holcim Lebanon, *Annual reports of Holcim Lebanon*, 2002 – 2010, see : www.holcim.com.lb

Holcim Lebanon, *Sustainable development reports*, 2006 and 2009, see : www.holcim.com.lb

Zawya Report, *Holcim Liban*, Report dated : 6 May, 2011, at : www.zawya.com/cm/profile.cfm/cid4816, downloaded on 27 March 2012

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