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Contents

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Dear readers,

Welcome to the September 2015 issue of *Global Cement Magazine* - the world's most widely-read cement magazine. It's been a case of 'blink and you'll miss it' in the cement industry over the summer. Hot on the heels of the completion of the LafargeHolcim merger, the industry was suddenly reeling from another major combination: the acquisition of Italcementi by HeidelbergCement. The net result of this is that HeidelbergCement has expanded from a capacity of 129Mt/yr to controlling 200Mt/yr, with very limited overlap between markets. While it is still considerably smaller than LafargeHolcim, the German giant has thoroughly reinforced its second place in terms of multinational cement players and has put clear water between itself and third place Cemex.

HeidelbergCement appears to have played its cards very well but, of course, it knew that Lafarge was looking for a major merger partner before even Holcim - It was courted first. Its board worked out what would happen next, kept quiet and played its hand accordingly. The Italcementi deal now explains why HeidelbergCement was so quick to rule itself out of purchasing Lafarge and Holcim's divested assets back in November 2014. It had other targets all along. The many effects of the two deals are presented from Page 8 onwards in this issue, in which we have attempted to pin down the major changes in the global, regional and some national perspectives.

This month's national cement focus turns to Germany, Europe's 'economic powerhouse' albeit one that continues to be battered by regional headwinds. The LafargeHolcim merger, the HeidelbergCement / Italcementi deal and a separate Cemex / Holcim asset swap have all affected Germany. Although cement production fell slightly in 2014 compared to 2013, the industry has maintained its position as one of the highest users of alternative fuels anywhere in the world and remains one of the most competitive in Europe. Turn to Page 40 to find out more.

Elsewhere in this issue, we have a raft of technical contributions from around the industry. As well as the challenges of installing a unique waste heat recovery system in the Arabian desert (Page 14), this issue has articles on powder silo safety (Page 20), developments in the analysis of hexavalent chromium in cement (Page 26) and case-studies on conveying (Page 17), alternative fuel handling (Page 18) and air compression technologies (Page 24).

We hope you enjoy this issue of *Global Cement Magazine* - the world's most widely-read cement magazine!

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Global Cement articles

8 HeidelbergCement acquires Italcementi: Global, regional and national changes

HeidelbergCement has surprised the global cement industry by announcing the acquisition of a controlling 45% stake in Italcementi. We look at the effects this will have on global, regional and national cement industries.



14 Installation of a waste heat recovery plant at Sharjah Cement Factory

Min Wu from Nanjing Kesen Kesen Environment & Energy reports on a unique waste heat recovery installation project in the UAE.



17 Low rolling-resistance conveyor belts to save energy

Forech India's PS Bhawal reports on the installation and performance of a low rolling-resistance conveyor at an Indian cement plant.



18 Alternative fuels handling system at a cement plant in Turkey

Peter Erbel from FLSmidth Wadgassen describes a recent alternative fuels system that the company installed in Turkey.



20 Are powder storage silos 'disasters waiting to happen'?

Many powder storage silos put lives at risk and pose serious threats to the environment, according to Hycontrol's Managing Director Nigel Allen.



24 Extreme conditions prove hybrid air compression technology from Aerzen

Aerzener Maschinenfabrik GmbH reports on the use of its Delta Hybrid rotary series at the Rohrdorf cement plant in Germany.



26 Analysis of hexavalent chromium in cement

Ade Kujore of Cecil Instruments describes alternative methods for the analysis of Chromium (VI) in cement, with a focus on high performance liquid chromatography (HPLC).

28 Product and contract news

Holcim prepares for solid recovered fuel production in Vietnam; Gore® launches Low Emission Filter Bag; Fenner Drives to launch PowerTwist Wedge Belts in November 2015.

European cement

31 European cement news

LafargeHolcim launched; HeidelbergCement to buy Italcementi; Cemex to sell various European assets.



40 Germany - Slow and steady wins the race

Amy Saunders provides an overview of the steady German cement industry, including the major companies, plant locations and recent trends, as well as an industry outlook.

52 Global CemFuels focus: Southern Europe

Our series of articles on the uses of alternative fuels turns to the cement industries of Italy, Portugal and Cyprus.

Cement in the Americas

60 American cement news

Brazil gives six cement firms 30 days to pay combined US\$934m fines; Summit Materials reports strong results; Essroc acquires Holcim slag plant.

Asian cement

65 Asian cement news

CRH submits bid for LafargeHolcim's Indian assets; Dangote to start construction in Nepal; West China Cement sees 'significant decrease' in net profit.

Middle East and African cement

68 Middle East and African cement news

Two new cement plants in Mozambique; New Dangote plants; Cimerwa dry cement plant up-and-running.

Regulars and comment

71 Global cement prices

Cement prices from around the world: Subscribers to *Global Cement Magazine* receive additional information.

72 Subscription form for *Global Cement Magazine*

Use this form to subscribe to *Global Cement Magazine*, or subscribe online at www.GlobalCement.com.

73 The Last Word

This issue: Viking laws for the cement industry...

74 Advertiser Index & Forthcoming issue features

The list of this issue's advertisers and a preview of the editorial contents of the next two issues.



40



40



52



60



65



68



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Peter Edwards, Global Cement Magazine

HeidelbergCement acquires Italcementi: Global, regional and national changes

Just as the dust had started to settle after the completion of the LafargeHolcim merger on 15 July 2015, HeidelbergCement surprised the global cement industry by announcing that it had acquired a controlling 45% stake in the Italian cement producer Italcementi. The German firm, already the second-largest multinational producer by installed capacity, purchased the stake for Euro10.60/share on 28 July 2015. It has since begun a procedure by which it aims to acquire 100% of the shares in its Italian rival. Here, *Global Cement* looks at the effects this will have on global, regional and national cement industries.

The global cement industry has undergone significant changes in the past 18 months due to the announcement and completion of the Lafarge-Holcim mega-merger. In order for the merger to be approved, LafargeHolcim had to sell various assets around the world, the vast majority of which were acquired by Ireland's CRH in August 2015. This drastically altered the list of the Top 10 cement producers (See Figure 1).¹

Immediately after the completion of the deal, LafargeHolcim became the world's second-largest cement producer (~340Mt/yr of cement production capacity)¹ after China's CNBM (388Mt/yr). When considering only multinational cement producers (i.e.: without Chinese producers), Lafarge-Holcim is the world's largest cement producer. The second-largest multinational cement producer was Germany-based HeidelbergCement, with 129Mt/yr of cement production capacity.² It places fifth if one includes Chinese producers.

In fifth place in the list of multinational producers was Italcementi, with 71Mt/yr of cement production capacity. Unbeknownst to the rest

of the industry, Italcementi's 45% shareholder Italmobiliare was in the final stages of selling its stake to second-placed HeidelbergCement.

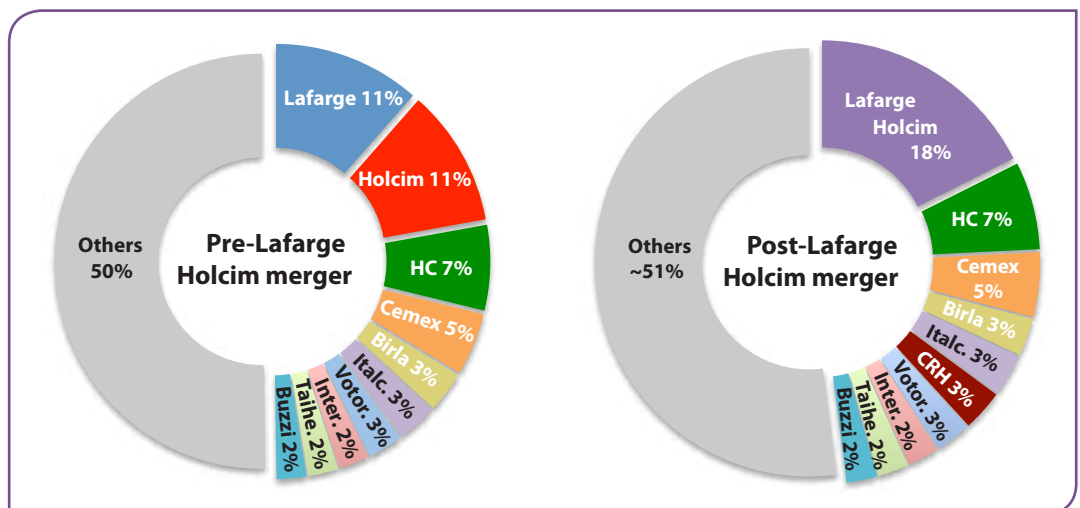
Announcement on 28 July 2015

The announcement by HeidelbergCement that it had acquired Italmobiliare's controlling stake in Italcementi took the cement industry by surprise. HeidelbergCement has initially bought the Italmobiliare stake for Euro1.67bn. The transaction remains subject to approval by competition authorities. HeidelbergCement will next offer the same price for each share held by outstanding investors, once the first transaction has been cleared. The price offered for each share is 61% higher than Italcementi's closing price before the deal was announced, a high but not unheard-of premium that it expects to ensure that it can reach 100% ownership of Italcementi.

The acquisition of Italcementi will expand HeidelbergCement's operations in Mediterranean countries such as Italy and Egypt as well as in France and Belgium, which combined represent Italcementi's largest market.

Right - Figure 1: Approximate proportions of global cement production capacity (integrated and grinding) held by multinational cement producers before (left) and after (right) the completion of the LafargeHolcim merger.

HC = HeidelbergCement.
Italc. = Italcementi.
Votor. = Votorantim.
Inter. = Intercement.
Taihe. = Taiheiyu.
Buzzi = Buzzi Unicem.





“With the market recovery gaining traction in southern Europe and the US, it is now the right time for us to accelerate our growth,” said HeidelbergCement CEO Bernd Scheifele. The deal gives the group the largest boost in the Middle East and Africa, doubling its market share in that region. The deal will be paid for in cash and is underwritten by Deutsche Bank and Morgan Stanley. Some of the financing will be repaid through asset sales, although none has yet been announced.

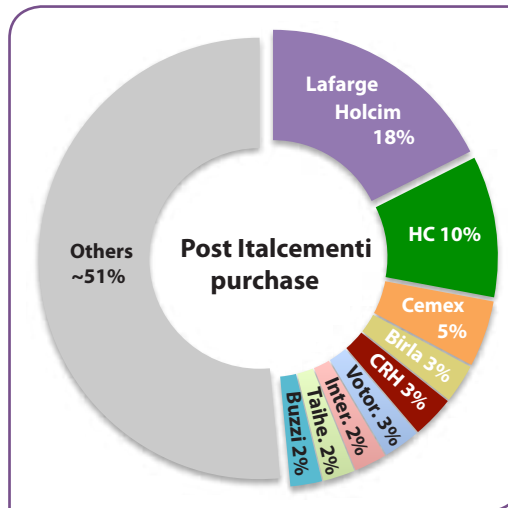
Global capacity implications

With this purchase, HeidelbergCement has reinforced its position in second place in the list of multinational cement producers. Italcementi’s 71Mt/yr of cement production capacity will bolster HeidelbergCement’s capacity from 129Mt/yr to 200Mt/yr, assuming no asset sales. This takes it into a clear second place in the global cement industry, behind LafargeHolcim (~340Mt/yr)¹ and ahead of Mexico’s Cemex, which has less than half of HeidelbergCement’s capacity at just 94Mt/yr.

Figure 2 shows the revised Top 10 cement producers, assuming 100% ownership of Italcementi and no asset sales. The rest of the Top 10 producers shuffle up around the void left by Italcementi.¹

Geographical complementarity

The countries in which HeidelbergCement and Italcementi have cement production capacity are shown in Figure 3. There is a high degree of complementarity in their assets. Of 43 countries, only six (Belgium, Canada, China, India, Kazakhstan and the USA) had both HeidelbergCement and Italcementi capacity prior to the deal. Going forward, it is



Left - Figure 2: Approximate proportions of global cement production capacity (integrated and grinding) held by multinational cement producers after the purchase of Italcementi by HeidelbergCement.

HC = HeidelbergCement.
 Votor. = Votorantim.
 Inter. = Intercement.
 Taihe. = Taiheiyu.
 Buzzi = Buzzi Unicem.

almost certain that no asset sales will be demanded by antitrust authorities in the 37 countries that have representation from only one of the two producers.

Possible implications of overlapping assets

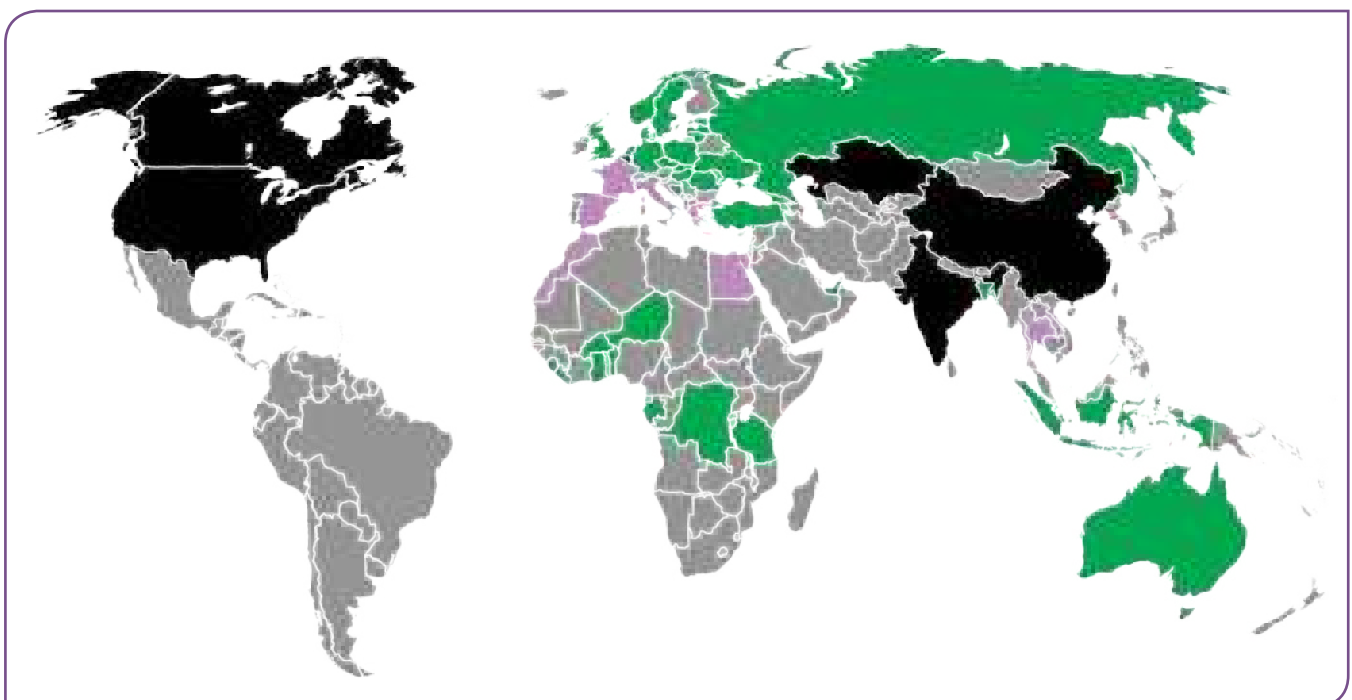
Below follows an analysis of the possible changes in the six countries that have both HeidelbergCement and Italcementi production sites.



Belgium: Italcementi owns Compagnie des Ciments Belges (CCB), which operates a 2Mt/yr plant at Gaurain. Meanwhile, HeidelbergCement operates the CBR Cement plants at Lixhe (1.5Mt/yr) and Antoing (1Mt/yr).³ Combined, this represents 4.5Mt/yr out of 6.2Mt/yr of capacity in the Belgian market. This equals 73% of the market by capacity owned, with LafargeHolcim the only other player in the market.¹

Below - Figure 3: Map of countries that have HeidelbergCement and Italcementi cement production facilities.

Green = HeidelbergCement
 Purple = Italcementi
 Black = Both





Because of this, the deal is likely to attract the attention of the European Commission (EC), especially as Belgium is the authority's own 'back yard.' However, no divestments have yet been requested.



Canada: Italcementi owns the Essroc Canada Inc plant at Picton, Ontario (0.9Mt/yr). This forms part of its much larger North American operations, which includes five plants in the US and Puerto Rico.³

HeidelbergCement operates two plants in Canada through its Lehigh subsidiary, which is also active in the US. Lehigh plants at Edmonton, Alberta (1.6Mt/yr) and Delta, British Columbia (1.3Mt/yr) give it a pre-acquisition Canadian cement capacity of 2.9Mt/yr. Combined with its new Italcementi asset, this rises to a total of 3.8Mt/yr out of 16Mt/yr of capacity in Canada. This is approximately 24% of Canada's cement manufacturing capacity. Given that LafargeHolcim now has 37% of Canadian capacity,¹ this is unlikely to attract the attention of the nation's competition authorities.



Right: The Norcem Kjøpsvik cement plant, part of HeidelbergCement Northern Europe, is the most northerly cement in the world

China: In China, Italcementi is a major shareholder in West China Cement, which has a total capacity of 24Mt/yr. It is also the 100% owner of Fuping Cement in Shaanxi Province. Meanwhile, HeidelbergCement operates as part of China Century Cement and Jidong HeidelbergCement Company.



All of these players are very small in relation to the overall Chinese market, which produced 2.5Bnt of cement in 2014.⁴ As a result the acquisition will have very little effect on the market. It is very unlikely to attract the attention of the Chinese authorities on competition grounds.



India: Italcementi owns 100% of Zuari Cement, which has 5.2Mt/yr of integrated cement capacity and 1Mt/yr of cement grinding capacity. HeidelbergCement operates two integrated plants in Madhya Pradesh (3.1Mt/yr and 1Mt/yr), one integrated plant in Karnataka (0.6Mt/yr) and two grinding plants that add a further 4.7Mt/yr.

Combining the above capacities gives a total of 15.6Mt/yr in India for HeidelbergCement after the deal, which is slightly over 5% of the >300Mt/yr Indian cement industry by installed capacity.³ This should not be a problem, especially given recent reports that India has as much as 100Mt/yr of cement capacity sitting idle.⁵

Kazakhstan: As part of the larger acquisition, HeidelbergCement will acquire the 1.2Mt/yr Shymkentcement plant, which is owned by Italcementi.³ Combined with the group's existing plants at Bukhtarma (1.6Mt/yr) and Shetpe (0.8Mt/yr), HeidelbergCement will have a capacity of 11.9Mt/yr in Kazakhstan, becoming the market leader with around 30% installed capacity. It is possible that this expansion by HeidelbergCement could attract the attention of anti-competition authorities in Kazakhstan, although, as elsewhere, no asset sales have yet been stipulated.



USA: Italcementi operates in the United States through its Essroc subsidiary, which has plants in Indiana (0.4Mt/yr), Pennsylvania (2Mt/yr), West Virginia (1.8Mt/yr) and Indiana (1Mt/yr), with a total of 5.2Mt/yr of integrated cement capacity.³

HeidelbergCement operates via its US subsidiary Lehigh Hanson. With plants in Alabama (0.9Mt/yr), California (0.8Mt/yr, 1.5Mt/yr and 0.8Mt/yr), Indiana (0.8Mt/yr), Iowa (1Mt/yr), Maryland (3.2Mt/yr), New York (0.5Mt/yr), Pennsylvania (0.14Mt/yr) and Texas (0.14Mt/yr and 1.4Mt/yr), Lehigh has a total of 11.2Mt/yr of cement capacity.

Combined with the assets obtained through the Italcementi acquisition, HeidelbergCement now has a US cement capacity of 16.4Mt/yr. This is around 14% of the country's 115Mt/yr capacity. This is enough to take the company up to second in the US behind LafargeHolcim with its 15% share of capacity.¹ This means that it has leap-frogged Cemex, which has a 12% share. It is unlikely that asset sales will be required here since HeidelbergCement's share of capacity is smaller than that of LafargeHolcim.

Implications in different global regions

Combined, the formation of LafargeHolcim and the acquisition of Italcementi by HeidelbergCement has had different effects on the distribution of cement capacity in various world regions. The effects in each of *Global Cement's* four global regions are summarised here.



Europe (excluding Russia): Europe was the continent most affected by the merger of Lafarge and Holcim due to the high degree of overlap between the two former rivals. Before the merger, Lafarge and Holcim shared a combined 71.9Mt/yr of integrated and grinding cement production capacity on the continent.³ After the merger, LafargeHolcim sold around 10.7Mt/yr of capacity to CRH, leaving it with 61.1Mt/yr of European capacity.³

Prior to its acquisition of Italcementi, HeidelbergCement had more than 46.4Mt/yr of cement capacity in Europe, enough to make it the largest producer in Europe by installed capacity. Following the formation of LafargeHolcim it briefly became the second-largest. Now, with the addition of Italcementi's 36Mt/yr, HeidelbergCement has retaken the position of Europe's number one cement producer due to its 82.6Mt/yr of European capacity.

The Americas: The effects of the LafargeHolcim merger and the purchase of Italcementi by HeidelbergCement on the North American cement industry has been covered above in separate sections for Canada and the USA.



Neither HeidelbergCement nor Italcementi have cement assets in Central or South America and so the LafargeHolcim merger is the only recent transaction to have had an effect on the cement market in this area. Across South America, LafargeHolcim has around 39.1Mt/yr of cement capacity, with Brazil the only country that required asset sales prior to

the merger. The largest players in the whole of South America are the Brazilian players Votorantim (52.5Mt/yr) and Interceмент (46Mt/yr).³



Asia: LafargeHolcim and the newly enlarged HeidelbergCement are both active in India and China, although their shares of these markets are all fairly small relative to the overall sizes of those two markets.

Across the rest of Asia, LafargeHolcim is the largest cement producer, with 137.7Mt/yr of cement capacity (including India). HeidelbergCement was always a fairly minor player in Asia. Its acquisition of Italcementi, with 10.3Mt/yr of capacity, takes HeidelbergCement to 30.2Mt/yr in total across Asia.

Middle East & Africa:



The African market has seen a massive transformation due to the LafargeHolcim merger and subsequent HeidelbergCement/Italcementi acquisition.⁶ Along with the expansion of Dangote Cement and PPC, Africa has gone from having a large number of national and regional markets to being a more homogeneous multi-player market in around two years.

LafargeHolcim controls 47.1Mt/yr of capacity in Africa, ahead of Dangote, which, according to its website, has 31.2Mt/yr of active capacity. With new capacity of at least 4Mt/yr coming on-stream in 2015, Dangote's total capacity will rise to at least 35.2Mt/yr.

After the Italcementi acquisition, HeidelbergCement has an African cement capacity of ~30Mt/yr. It will add strong positions in Morocco and Egypt to its existing strengths on the West African coast.

For its part, South Africa-based PPC currently has around 8Mt/yr of capacity in South Africa, Botswana, Zimbabwe and Ethiopia.

The Middle Eastern cement market has been broadly unaffected by the HeidelbergCement/



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GLOBAL CEMENT: KEYNOTE

Italcementi deal. The only market where either producer is present is the UAE, where HeidelbergCement owns 40% of Union Cement Norcem. This plant is one of 11 similarly sized integrated plants in the country. The LafargeHolcim merger also had limited effect on the market, with minor changes in the UAE.

Summary

The LafargeHolcim merger and acquisition of Italcementi by HeidelbergCement has changed the multinational cement industry landscape (Figure 4). There is overlap in notable large markets, including in North America, Russia, China, India, Indonesia and much of Europe. However, the majority of markets has either LafargeHolcim or HeidelbergCement cement production capacity.

LafargeHolcim and HeidelbergCement are present in 27 of the 85 cement manufacturing nations highlighted in Figure 4. LafargeHolcim is present in 40 countries that HeidelbergCement is not present in, predominantly in Central and South America, sub-Saharan Africa, the Middle East and the Far East.

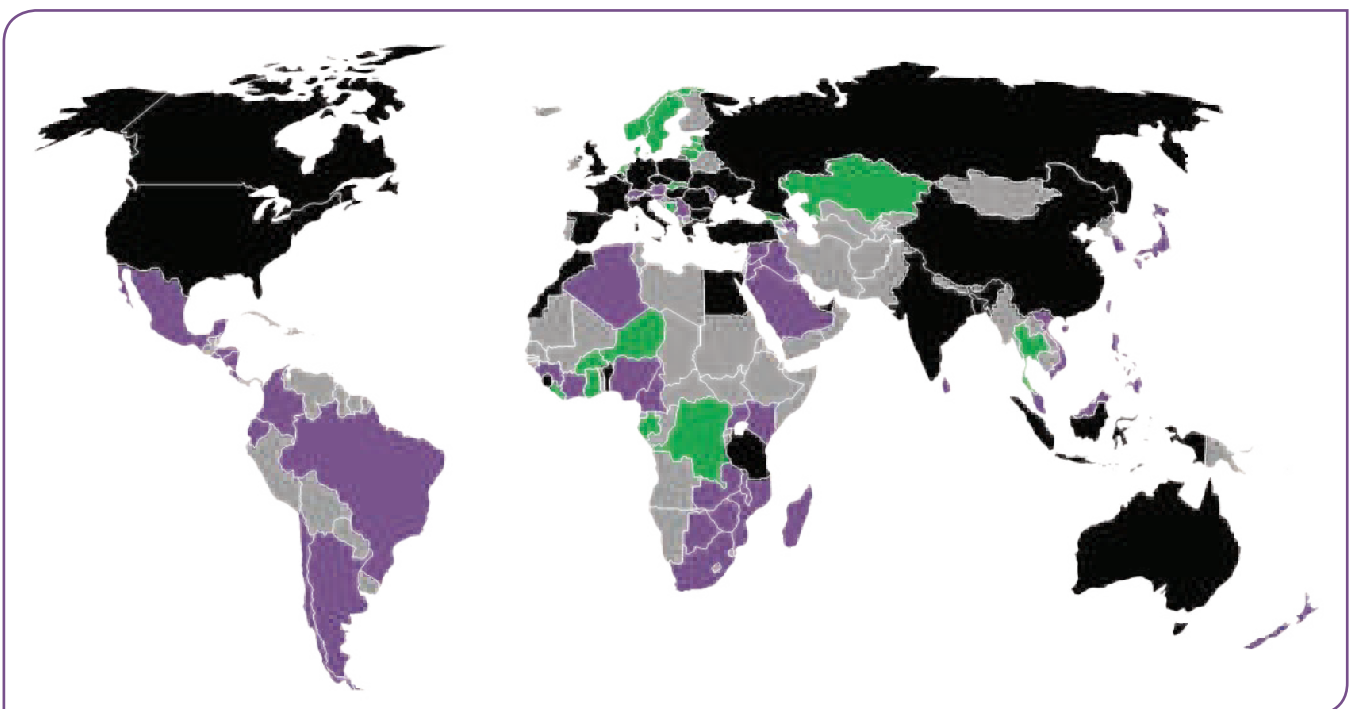
HeidelbergCement is present in 18 countries that LafargeHolcim is not. It has relative strengths in northern Europe and selected markets in western and central Africa, as well as in Kazakhstan and Thailand. 🌐

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Below - Figure 4: Map of countries that have LafargeHolcim and HeidelbergCement cement production facilities.

LafargeHolcim ■
HeidelbergCement ■
Both ■





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*"I learned
many things
and made
great contacts"
2014*



Min Wu, Nanjing Kesen Kenen Environment & Energy Co., Ltd

Installation of a waste heat recovery plant at Sharjah Cement Factory

Nanjing Kesen Kenen Environment & Energy Co., Ltd (NKK), China, has recently conducted a successful engineering procurement and construction project to build a waste heat recovery (WHR) power plant at Sharjah Cement Factory (SCF) in the UAE. NKK completed the installation of the plant on SCF's two production lines in association with UAE-based subcontractor Petron Emirates Cont & Mfg Co LLC in the first quarter of 2015.

In 2012 Nanjing Kesen Kenen Environment & Energy Co. Ltd. (NKK) was informed that Sharjah Cement Factory (SCF) intended to install a waste heat recovery (WHR) system at its plant in Sharjah, UAE. NKK sent its engineers to the site twice to communicate with the owner and take measurements of the kilns.

In July 2013, the owner travelled abroad to investigate the potential EPC candidates. It saw NKK's technology and reference projects as part of this process. NKK was the only Chinese WHR supplier on the shortlist, along with one European provider and one Indian supplier. NKK's strong references meant that it was awarded the EPC contract by SCF.

WHR specifications

During the initial stages of this project, measurements taken by NKK engineers at SCF (See Tables 1-3) formed the basis of the WHR design.

System process

The system designed for this project included two air-quenching chamber (AQC) boilers, two pre-heater (PH) boilers, one turbine (rated 9MW), one generator (rated 10MW), three air-cooler condenser (ACC) units, electrical equipment, automation control system and auxiliaries. Four key design features are as followed:

- The four boilers are all with dual pressure (high pressure (HP) 1.37MPa and low pressure (LP) 0.2MPa). The turbine works with supplementary LP steam.

Right - Table 1: Flue gas parameters.

Centre right - Table 2: Raw water parameters.

Below right - Table 3: Power supply parameters.

Below - Figure 1: An overview of the WHR installation at SCF.

	Line 1		Line 2	
Clinker production (t/day)	2233		4102	
Item	Pre-heater outlet	Cooler outlet	Pre-heater outlet	Cooler outlet
FG flow rate (Nm³/hr)	150,000	105,000	280,000	121,000
Temp. at boiler inlet (°C)	330	300	340	360
FG dustiness (g/Nm³)	100	50	100	50

Source	Well
Hardness (mg/L)	400-500
Conductivity @25°C (mS/cm)	6-7
pH @25°C	7.5
Chlorides (mg/L)	1700-1900
Chemical oxygen demand (mg/L)	125-170mg/L

Item	Value
Power distribution mid voltage	AC, 6.3kV, 50Hz, 3-phase, 31.5kA, 3s
Power distribution low voltage	AC, 400V, 50Hz, 3-phase (4 lines) Neutral solidly grounded; 50kA, 1s
Rated high voltage	6.3kV ±10%
Rated low voltage	400V ±10%
Frequency	50Hz ±2%
Rated control voltage	110V AC for motor control centre 24V DC for distributed control system





The PH boiler inlet tapping was installed after the high temperature (HT) fan and the raw meal inlet. The PH boiler on Line 2 has a typical design, in which the flue gas goes from the top to the bottom. To prevent ash accumulation on heat exchange tubes, a hammering system was used for the PH boilers.

Due to restricted space under the pre-heater and insufficient draft pressure at the bag-filter side, the PH boiler on Line 1 is designed in such a way that the flue gas goes into the boiler from an inlet at the bottom. It takes a U-turn at the top of the boiler and is exhausted from an outlet at the bottom, which is fitted with a booster fan. This boiler with the reversed U-shape flue gas routing is the first such reference for a PH WHR boiler anywhere in the world.

The turbine selected for this project is a single cylinder, direct air-cooled condensing turbine including casing, bearing, housing, rotor, seals, exhaust chamber, safety and governing control system, oil system and drainage system.

The ACC used in this project is the latest design from GEA with vertical delta-shape units. The erection quality directly affects the vacuum lever during operation and consequently the

Left - Figure 2: The PH boiler on Line 1 has an unusual U-shaped route, a world first for a PH WHR boiler.

The dual-pressure system maximises the use of waste heat and provides approximately 5% more power than a single-pressure system.

- Due to the geographical location of the site, ACC units were used to reduce water consumption compared with water-cooling condensers. This also accelerated the construction process.
- The cooling water for boiler sampling and turbo generator rotating equipment was designed as a closed circuit with an auxiliary cooling tower and make-up water tank. This also reduces water consumption.
- Considering that the available raw water at the site has a high mineral content, a two-stage reverse osmosis system was designed for the boiler water treatment plant. On-line sample water analysis systems are used to monitor the water quality and ensure the long-term safe operation of the boilers.



Left - Figure 3: Turbine assembly during the construction process.

power generation. The generator provided for this project is a box-type all-in-one generator with parameters as provided in Table 5 (overleaf).

Equipment selection

NKK's patented AQC boiler is designed with an internal dust collecting hopper, which saves on the cost of an external dust collector. The hot air from the cooler goes into the bottom of the boiler inlet and collects the clinker dust in a hopper. Heat is exchanged via bundles of tubes and used gas is exhausted from an outlet at the top. Anti-abrasion and guiding measurements are installed in order to maximise the service life of the boiler.

Equipment	Manufacturer
Boiler	Hangzhou Boiler Group
Turbine	Qingdao Jieneng Steam Turbine Group
ACC	GEA China
Generator	Nanyang Explosion Protection Group
High voltage panel	ABB China
Low voltage panel	Siemens China
Distributed control system	ABB China
Auxiliaries	Chinese makes

Left - Table 4: Sources of the main pieces of equipment for the SCF WHR project.



Item / Parameter	Value
Rated capacity (kW)	10,000
Rated voltage (kV)	6.3
Rated frequency (Hz)	50
Rated speed (rpm)	3000
Exciter	Brushless excitation system
Number of phases	3


Right - Table 5: Key generator data.

project manager from NKK requested that the boiler supplier remanufacture the piece.

Another problem was that the bolt holes of the feed water pump base plate were misaligned. The direction of the feed water pump outlet was different from the design, so the site team from NKK had to not only reconstruct the civil foundations, but also modify the layout of the feed water piping and adjust the alignment of the pumps.

Performance

On 23 March 2015 the performance guarantee test was carried out by NKK and witnessed by the owner. The test was completed to the satisfaction of the owner, with performance parameters as shown in Table 6.

The power generated is around 350kW more than guaranteed after consideration of the ambient temperature. The Provisional Acceptance Certificate was accordingly issued by SCF to NKK. 



Right - Figure 4: View of the ACC installations.

Installation milestones

The hydrotests and distribution commissioning for Line 1 and Line 2 were conducted in November 2014, with alkali cleaning and steam blowing conducted in December 2014 on Line 1 and January 2015 on Line 2. Synchronisation was carried out on 8 January 2015 on Line 1 and on 7 February 2015 on Line 2.

Right - Table 6: Performance test results from March 2015.

Typical problem in installation and solution

During the erection of the AQC boiler on Line 2, the piping from LP superheater header to LP superheater outlet header collided with the downcomer from the HP drum to the HP evaporator inlet header. The

Below - Figure 5: View of the generator.



	Guarantee value	Test result
Duration of test (hr)	24	24
Ambient temperature (°C)	27.00	28.89
Gross power output (kW)	8500	8742
Power consumed by auxiliary tasks / equipment (%)	12.50	7.48
Net power output (kW)	7437.50	8088.09

Below - Figure 6: Performance test certificate.





PS Bhawal, Forech India Ltd

Low rolling-resistance conveyor belts to save energy

Over the past two decades a considerable amount of progress has been made to optimise the power consumed to move a belt over the idlers and pulleys. Here, PS Bhawal from Forech India reports on the installation and performance of a new low rolling-resistance conveyor at a cement plant in India.

An integrated cement plant in India had installed a long belt conveyor system to transport uncrushed limestone from its quarry to the primary crusher. The conveyor belt was a steel cord reinforced troughed belt with a width of 1000mm and a strength of 1400kN/mm (width). The back cover of the belt had low rolling resistance properties. This is defined as the viscoelastic MRC (rolling resistance coefficient) criteria at 2% strain, 10Hz would not exceed:

$$RRF = 0.1 \text{ at } 0^\circ\text{C}$$

$$(Where RRF = E_L / (E_S)^{4/3})$$

E_L = Loss modulus and E_S = Storage modulus).



The specific energy consumed in kWh/Mt of the material transported was measured by means of a calibrated energy meter for a normal general purpose back cover belt as well as for a belt with low rolling resistance properties. The average energy saving was determined to be 25% at different loading configurations for a specified conveyor length of 2500m.

Forech India initiated the study by installing four data loggers into the conveyor electrical control panel for continuous recording of: 1. Ambient temperature; 2. Belt speed; 3. Tonnage at the weigh scale; 4. Wattmeter reading on the drive motor.

Data was accumulated for two months. The power saving was evaluated and determined. The power required to operate a typical conveyor belt has been

studied from a theoretical and dynamic test equipment approach by researchers at the University of Hannover. They have categorised the frictional resistances into six major components:

1. Indentation rolling resistance;
2. Bearing resistance of the idler;
3. Flexing of the belt;
4. Acceleration of the load onto the belt;
5. Flexing of load between idlers;
6. Friction due to plows, scrapers and other devices.

According to this study, the indentation of the pulley cover as it passes over the idler creates the largest loss in power for long horizontal belts. The rubber passes through a hysteresis cycle that absorbs power. It has been estimated that on long centre horizontal conveyors the rolling resistance power loss due to the indentation effect can reach as much as 62% of the total system power.

For a simplified analysis of the energy loss due to indenting of a belt cover layer by a roller as the belt passes over it, the following assumptions are necessary:

- The cover compound is visco-elastic;
- The indentation of the belt is small compared to the cover thickness;
- The contact length with the idler is small compared to the idler diameter;
- Energy U loss per unit volume of rubber is proportional to the maximum energy stored per unit volume.

The initial investment in a low rolling-resistance belt is only marginally more than the huge combined benefits of reduced power, cash savings and collection of carbon credits. As in other applications, an energy optimised belt makes a lot of sense to the community as a whole.

Left: Low rolling-resistance conveyor belt at a cement plant in India.



Peter Erbel, FLSmidth Wadgassen GmbH

Alternative fuels handling system at Çimentas Trakya in Turkey

FLSmidth is a leading provider of cement equipment and know-how, with more than 130 years of experience. For more than 25 years the company has offered solutions for dosing and handling of solid alternative fuels. Here Peter Erbel from FLSmidth Wadgassen describes a recent alternative fuels system installed at Çimentas Trakya in Turkey.

In this case study, refuse derived fuel (RDF) with a typical density of 0.15t/m^3 is delivered to the plant in compressed bales. It is ultimately burnt in the calciner to reduce the consumption of conventional fossil fuels. The pressed and compacted RDF bales are bound with ties and are also completely wrapped in foil, making them weather-proof. Consequently, they can be stored outside.

All bales are loaded into an automatic bale opener, which cuts and separates the ties and foil. After this first processing step, the RDF bales remain compact and must be deagglomerated. This is achieved by using specially-designed screw conveyors with a throughput capacity of 40t/hr. In the downstream process, a KOCH® Drag Chain Conveyor feeds a large single storage box. This storage box is equipped with an automatic stacking and reclaiming system, called KOCH Feedex™.

KOCH Feedex overhead reclaimer

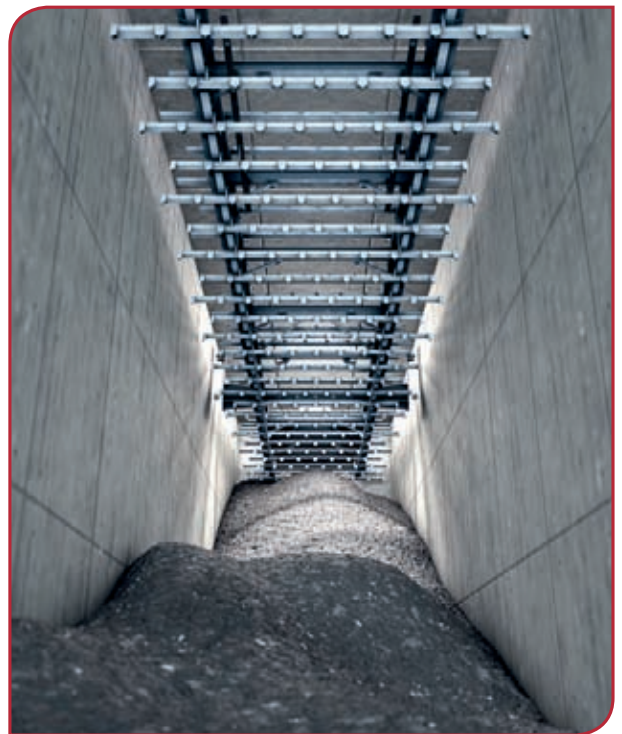
The Feedex overhead reclaimer (See Figure 1) is a storage system for solid alternative fuels and biomass that is mounted inside a closed bunker, usually made of concrete. Compared to its compact, rectangular footprint of around 30m x 6m, it offers a large storage capacity of 1250m^3 of fuel.

The Feedex reclaimer consists of a heavy-duty frame and utilises a robust, drop-forged link conveying chain. It is suspended by round-link chains from two independent hoisting winches located at the top of the bunker. The Feedex can therefore be lifted and lowered to follow the material level inside the bunker. As a result, the Feedex ensures full use of the storage space, optimum distribution and homogenisation of the fuel within the bunker as well as the discharge of fuel to the downstream conveyor.

Due to this operational principle, bridging inside the storage box is efficiently avoided. In case more than one storage box is available, different types of fuel with different

specifications can be blended from each bunker in order to achieve the required homogeneity and to reduce fluctuations of the calorific value (among other properties) to ensure a smooth combustion process.

Right - Figure 1: Storage box for RDF with the Feedex reclaimer overhead.



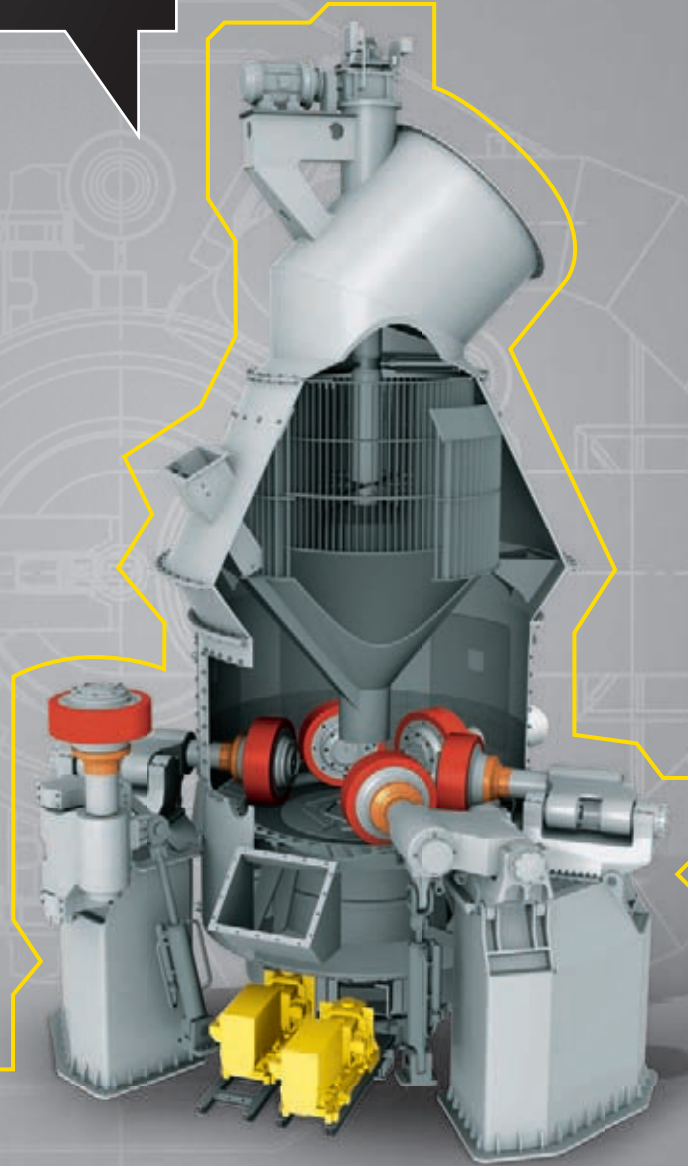
Right - Figure 2: View of the Pfister dosing building with storage box in the background and KOCH Pipe Conveyor on the left hand side.





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At Çimentas Trakya

In the case of the Çimentas Trakya plant in northern Turkey, the customer decided to start its operation with one storage box, with the option for a second storage box open due to the flexibility of the modular design. The Feedex is controlled via an automatic control system that features different modes of operation. As the unit operates from the top, it provides a much better reliability, lower energy consumption and easier maintenance than systems that work from the bottom of a bunker.

In the process at the Turkish cement plant, the Feedex extracts the RDF into a double-shaft screw conveyor with a throughput capacity of 13t/hr, which is installed at the bunker outlet. The variable speed drive of the screw conveyor allows dosing the RDF to the following KOCH Drag Chain Conveyor, which feeds the material to a FLSmidth Pfister Rotor Weigh-feeder. This weigh feeder doses the RDF precisely before it is discharged into downstream conveyors.

KOCH Pipe Conveyor®

For the transfer of the fuel from the storage area to the calciner tower, a KOCH Pipe Conveyor has been installed, as this was easily integratable into the existing facilities. The pipe conveyor's key benefits include the ability to accommodate unique curves, bypass buildings and cross roads and other infrastructure features. It provides dust-free, long-distance transport for materials like alternative fuels.

The KOCH Pipe Conveyor is a closed belt conveyor, which transports the RDF over a complete distance of 128m (See Figure 2). This is a small distance compared to one of the longest pipe conveyors in the world which is 8.2km long and was built by FLSmidth in Lima, Peru.

In order to receive the material, the belt has an open loading area similar to a conventional belt conveyor. After feeding the RDF to the conveyor belt, special rollers form the KOCH Pipe Conveyor into an enclosed tube, which permits horizontal and vertical travel, as well as three-dimensional curves. This allows the plant to avoid the construction of additional transfer towers and closed conveyor gantries.

Thanks to its transport principle (See Figure 3), the conveyor is able to achieve steep inclination angles, significantly exceeding the limits of a conventional belt conveyor. Other benefits of the KOCH Pipe Conveyor are the protection of the environment from dust emissions and odours, as well as protecting the RDF against additional humidity.

Calcliner feeding system

At the Turkish cement plant, the KOCH Pipe Conveyor feeds the fuel to the downstream drag chain conveyor, which is located inside the preheater tower and ends in front of the




Above - Figure 3: The transport principle of the KOCH Pipe Conveyor.

combustion chamber. To keep the process conditions inside the preheater unaltered, a rotary air lock is used. As an additional measure against fire hazard, FLSmidth uses a specially-designed triple slide gate system (See Figure 4). The result is a stable process and safe operation with the newly-installed alternative fuels handling system.

Conclusion

In this project FLSmidth provided the full range of services starting from process- and plant engineering and finishing with construction and commissioning. From the automatic bale opener to the calciner tower FLSmidth delivered a 'One Source' service solution for alternative fuels handling.

After this successful implementation of this alternative fuels processing system, the plant has reached a fuel substitution rate of 17%. The designed daily clinker production rate in this plant is 3000t/day. Taking into consideration the burning of waste oil, the total substitution rate has increased to 21%. 



Left - Figure 4: Rotary feeder with triple slide gate system.



Nigel Allen & Mark Stevenson, Hycontrol

Are powder storage silos 'disasters waiting to happen?'

The level measurement specialist Hycontrol has been designing specialist silo protection systems for over 20 years, giving it extensive experience of the potential problems that exist on sites in the cement and quarrying sectors. According to Hycontrol's Managing Director Nigel Allen, many powder storage silos are 'disasters waiting to happen,' putting lives at risk and posing serious threats to the environment.

“Our findings are worrying to say the least,” says Hycontrol’s Managing Director Nigel Allen. “The photos we have taken speak for themselves. Companies don’t seem to understand the consequences of poorly-maintained protection systems. It’s quite frightening that operators accept pressure blow outs via the pressure relief valves (PRV), erroneously thinking, *‘It’s OK - the PRV is doing its job.’* This couldn’t be further from the truth - PRVs are there as a last resort.”

“If the silo protection system is working correctly and is fitted with an automatic shut-off feature to prevent over-filling, the PRV should never be used. If a PRV blows then there’s an inherent problem with the system or the filling protocol, and corrective action must be taken.”

“Material in and around a PRV is a tell-tale sign that there’s something wrong and a catastrophic blow-out is waiting to happen,” continues Allen. “The material blown out from the silos will almost certainly solidify over time. This will, at best, prevent the PRV from working correctly and, at worst, completely clog it up. Unfortunately, many maintenance engineers just don’t realise the potential dangers that lurk beneath. They often think that simply cleaning off the material on and around the PRV is good

enough. They don’t realise that if the PRV doesn’t lift next time an ‘event’ occurs, the over-pressure could easily rupture the silo or eject the filter housing from the top. On an ATEX-rated silo, the over-pressure could be sufficient to simulate an explosion and open the protective blast panels, resulting in costly loss of product and the silo contents being left open to the elements.”

With regard to filter housings, Hycontrol engineers have witnessed another worrying practice at a number of sites. Companies have fitted chains to prevent the housing being blown off the top of the silo. This is tantamount to accepting blow-outs as an inevitability.

What causes over-pressurisation problems?

Silo protection systems are designed to prevent the damaging and potentially dangerous consequences of silo over-filling or over-pressurisation when powdered material is being transferred pneumatically from road tankers to silos. Unfortunately, perched on the top of silos, such protection systems are all too often ‘out of sight, out of mind’ – until a major problem occurs.

Problems during the filling process usually arise through a problem with the silo protection system or the air filtration system on top of the silo. Problems can also occur through tanker driver and/or operator error. Delivery tankers are pressure-tested vessels typically capable of withstanding up to 2 bar (29psi). Storage silos, on the other hand, are only designed to withstand the weight of material stored in them and can rupture at pressures as low as 1-2psi above atmospheric pressure. The possible consequences of over-filling or over-pressurisation include: Serious or fatal injury to workers and the public; Catastrophic silo damage; Loss of material and production; Harmful environmental pollution and; Damage to company reputation.

A key issue with many silo protection systems is that, without adequate ground level testing capabilities, operators don’t know if they will work when needed. Working-at-height restrictions limit silo top

Below: Material in and around a PRV is a ‘tell-tale sign’ that something’s wrong.



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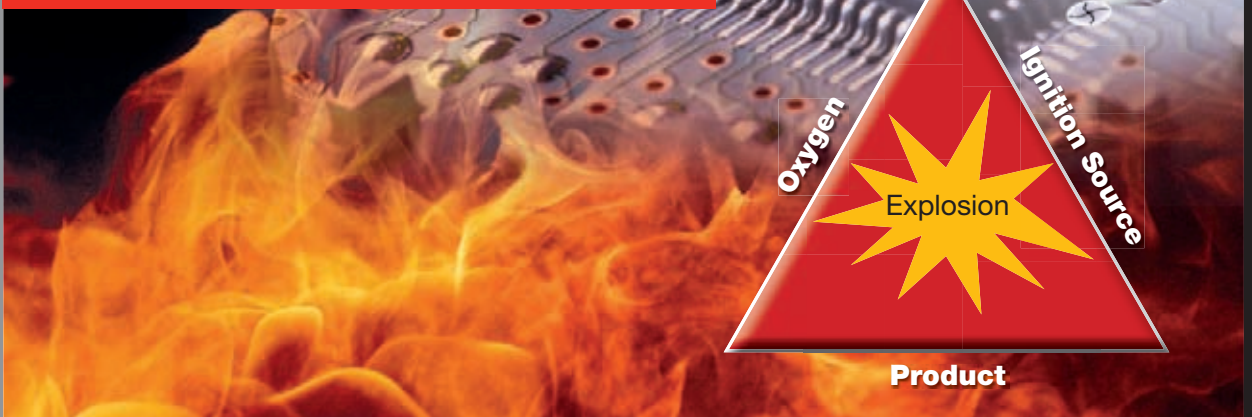
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Above: Hycontrol recommends that the PRV, pressure sensor and high-level alarm be testable from ground level prior to every fill.

inspections and maintenance, especially in adverse weather conditions. However, the main questions are: What can engineers actually do when they are at the top of a silo? How do you physically test a relief valve or pressure transmitter unless you remove them?

Even if the protection system does its intended job and prevents a major incident, companies rarely investigate the root cause of the problem so that remedial work can be carried out to prevent the situation re-occurring. Important near-miss events



Right: It should not be possible to make 'sand castles' from the material at the top of a cement silo.

such as PRV lifts, high level events and high pressure events are routinely not recorded and can be 'conveniently dismissed.' Hycontrol has clear evidence that there are more near-misses than realised.

Filter housings on top of silos are designed to vent the silo during filling, while preventing dust escaping into the atmosphere. These are fitted with some form of self-cleaning system to keep filters clear, usually mechanical shakers or reverse jet systems. Although filter manufacturers give recommended check routines and filter replacement schedules, in practice it appears these are regularly ignored. Faulty operation can be caused by a range of issues, including blockages and the fitting of unsuitable or wrongly-sized filters. Of course, cement hardens when it mixes with water vapour, further exacerbating the problem.

Effective silo protection

In the UK, the Mineral Products Association (MPA) publishes comprehensive guidelines for silo protection systems in quarries and cement works. However,

in some jurisdictions regulations and guidelines may be lacking. Even in the UK, there are few or no such recommendations for powder silos used in a broader range of industries, including food and beverages, chemicals, water treatment and plastics.

Optimum solution


Even with guidelines in place, the benchmark for the effectiveness of any silo safety protection system can only relate to the last time all the components were fully tested. The only effective solution is to take an integrated approach to silo protection design whereby the PRV, pressure sensor and high level alarm can *all* be tested at ground level, prior to *each* fill. Only when the devices have passed the checks should the safety interlock allow the silo inlet valve to open and the delivery to commence.

An effective protection system can serve as an extra powerful predictive maintenance diagnostic tool to record critical near-miss events that occur during the filling process. This information allows managers to carry out effective predictive maintenance by means of a logical step-by-step root cause analysis (RCA) to understand why problems arise. For example, high pressure and PRV lift events may be due to filter problems, prompting questions such as: Are the filters the right size? Is the filter cleaning regime fully operational? Have the filter bags/cartridges been changed as per recommendations? The logs will also indicate if the tanker drivers are routinely over-pressurising during the fill process.

Conclusion

In summary, the optimised silo protection system should incorporate: Pressure sensor, high alarm level sensor and PRV testing (essential); A simple one-button press to test all components; Silo filling auto shut-off control; Pneumatic cleaning of the pressure sensor; The ability to record incidences of over-pressure; The ability to record PRV lifts and opening; The ability to record the number of events of high level probe activation; Filter ON / OFF output option to check the filter status and; Filter air supply monitoring alarm (optional).

There is strong empirical evidence that many silos are indeed 'disasters waiting to happen.' The practical reality is that powder storage silos can split or rupture at pressures as low as 1-2psi above atmospheric pressure. Malfunctioning filter housings can and have been ejected at similar pressures.

Simply relying on visual inspections of silo protection equipment is woefully inadequate. It is therefore imperative that any installed safety system must be capable of providing reliable protection that can be easily verified by testing critical components before each and every delivery – without having to climb to the top of the silo. This approach will provide total silo safety; protecting assets, the environment and most importantly site personnel and the public. 

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Extreme conditions prove hybrid air compression technology from Aerzen

Until recently oil-free compression of air to pressures of 1.0-1.5bar g (15-22psi g) was somewhat challenging. Rotary lobe blowers operating above 15psi were not reliable and using screw compressors designed for higher pressure ranges as an alternative was often too costly. Screw compressors are fit for higher pressures of 2.0-3.5bar g (30-50psi g). This technically more complex, oil-free compressor required much higher investment costs. To fill this gap, Aerzener Maschinenfabrik GmbH offers its Delta Hybrid series, which combines the advantages of rotary lobe blower and a screw compressor. Here, the company discusses an installation at the Rohrdorf cement plant in Germany.

Aerzen Delta Hybrid's rotary lobe compressors have flow rates of 10-70m³/min (350-2500cfm) with pressure ranges of -0.7 to 1.5 bar (-21 in. Hg to + 22psi g). Tested under harsh conditions, they have proven effective in a variety of industrial applications including at Südbayrisches Portland Zementwerk's 1Mt/yr plant in Rohrdorf, Bavaria, Germany.

Compressed air at Rohrdorf cement

While compressed air finds many uses in the cement manufacturing process, the 'heart' of the process is the rotary kiln. The raw meal is first heated to 1000°C and then fired at about 2000°C. Pulverised coal is the primary fuel at the Rohrdorf plant. The coal dust is stored in two parallel silos and is transported pneumatically in two independent pipes to the rotary kiln. The plant switches regularly between one and the other parallel coal storage and conveying systems.

The coal dust comes out of the silo system through a dust filter, a weigh feeder and a transfer pump and is then pneumatically conveyed with the help of pressurised air at 1.5bar g (22psi g) through a 65m pipe to the rotary kiln. The volume of material transported

amounts to approximately 75t/hr. Prior to contacting Aerzener, the plant used a screw compressor to generate the air flow required in each conveying line. A third unit, available as a back-up system in case of a disrupted pipeline, could be turned on in case of failure. All three air-cooled machines are located in a central air conveying station and operated via a central control system. Operating data transmitted via profi-bus can be monitored on screen and/or printed.

The Aerzen Delta Hybrid series

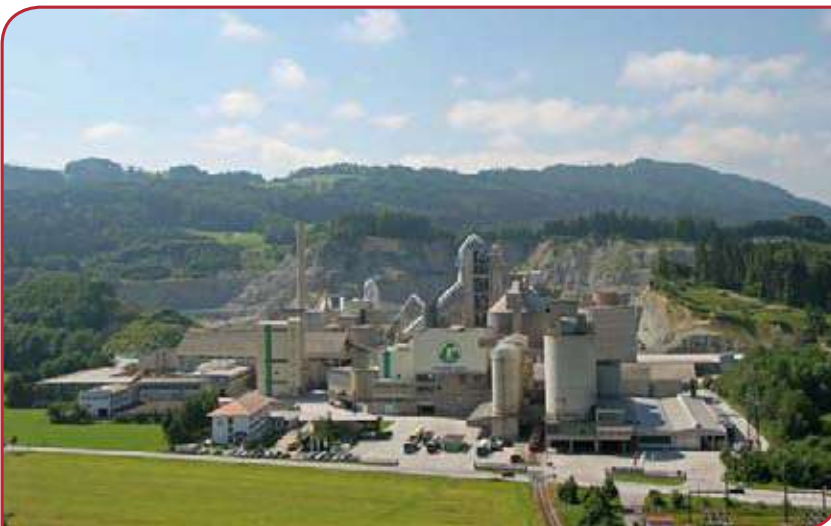
The Aerzen Delta Hybrid series is a unique and innovative idea. Conventional rotary lobe blowers previously only reliably achieved pressures of up to 1bar (15psi). Previous practice meant that single-stage screw compressors, which can achieve maximum pressures of up to 3.5bar, were used for this range. Thanks to their design, they are almost 'too efficient' for reaching pressures of 1 - 1.5bar and presents unnecessary capita and ongoing costs. The Delta Hybrid series circumvents these issues.

An Aerzen Delta Hybrid rotary lobe compressor was installed at the Rohrdorf cement plant. This unit delivers 43.9m³/min (1550cfm) of air at a pressure of 1.5bar g (22psig). This unique series combines the advantages of a rotary screw compressor and of a positive displacement blower in a ground-breaking 'blower-compressor concept.' Significant compromises were previously necessary to exceed pressures of over 1bar (15psig) so this new symbiosis is the ideal conveying air producer. Once installed, the new Delta Hybrid produced all the air and pressure needed for this coal conveying line and the screw compressor could be decommissioned.

Under extreme conditions

In cement plants, the Aerzen machines must work under extreme conditions, due in part to the high content of cement dust in the air. It is for this reason that only the most robust machines are able

Below: The Südbayrisches Portland Zementwerk factory in Rohrdorf, Bavaria, Germany.





costs; robust bearing design (rated for 60,000hr, even at maximum capacity); low air-outlet temperatures and very wide control range (25-100%).

Robust and saving energy

The new Delta Hybrid unit in Rohrdorf's cement plant now constantly supplies 43.9m³/min (1550cfm) of air at up to 1.5bar g (22 psig). "As soon as one of our existing screw compressors needs to be replaced or undergo a major repair, we will immediately install a second Delta Hybrid instead of a conventional compressor," said Reiter. "Despite a trying environment, the machine has convinced us of more than just its robustness and reliability in its years of operation; the rotary lobe compressor uses 5-8% less electrical energy than a comparable screw compressor despite the fact that we oversized the system."

Left: The Aerzen Delta Hybrid system at the Rohrdorf cement plant is used to transport pulverised coal to the kiln.

to survive in the industry. Despite very adverse conditions, since its installation, the Delta Hybrid has proven itself to be exceptionally resilient and reliable.

The Rohrdorf plant switches between its two pulverised coal storage and conveying systems every four weeks. During the four week period each system will operate 24 hours per day, seven days a week, without interruption. Every year, the Delta Hybrid completes 12 four-week phases of nearly 700hr of work under load. This results in 8000hr/yr of operation.

An experienced practitioner, the plant's mechanical maintenance manager Peter Reiter confirms the suitability of Aerzen's Delta Hybrid design. "We need air at a pressure of 1.5bar g to transport the coal dust. We had to use screw compressors previously, which, in comparison to a blower, are much more expensive. This is why we embraced the idea of a machine that could combine the advantages of a blower and a compressor. Thanks to this combination, Aerzen's Delta Hybrid is the ideal machine to produce more challenging pressures that exceed 1bar g (15psig)."

In addition to the advantage of its pressure range, the Delta Hybrid system has an attractive price-value ratio that is well below the investment, energy and maintenance cost of a comparable turbo or screw compressor; significantly improved power efficiency with energy savings of up to 15% compared to conventional systems; low maintenance and service

"Right-sizing would allow us to use less air and a smaller motor and reduce electrical demand even further. The plant is currently equipped with a 110kW motor. According to the latest calculations, a 55kW motor would have sufficed. The unit would be equipped with a smaller motor and a lower belt drive transmission ratio. This motor change is entirely unproblematic in the new belt-driven Delta Hybrid. That type of change would be problematic in a direct-coupled system."

Low energy costs are of central importance in the selection of a blower or a compressor because they can amount to 90% of the total cost. The initial investment and maintenance costs account for the remaining 10%. "It seems clear that the new Delta Hybrid is the answer for pressures of up to 1.5 bar," concludes Reiter.



Left: The back of the Aerzen Delta Hybrid system.



Ade Kujore, CECIL Instruments Limited

Contents

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Ad Index

Analysis of hexavalent chromium in cement

The analysis of hexavalent chromium in cement is commonly performed with a UV/Visible spectrophotometer. However, analysts may like to consider the use of other techniques, particularly when speciation is required. Here, Ade Kujore of Cecil Instruments describes alternative methods, with a focus on high performance liquid chromatography (HPLC) with UV/Visible detection and sample derivatisation.

Introduction

Chromium exists in two main forms; trivalent chromium (III) and the less common hexavalent chromium (VI). At high temperatures or under alkaline or oxidative conditions, trivalent chromium will oxidise to hexavalent chromium:



Trivalent chromium complexes are relatively stable and are not readily water-soluble. The trivalent form is found in quarried materials, making such complexes common in cement. Trivalent chromium is required in small quantities for biological processes; at low concentrations it is therefore considered safe.

Hexavalent chromium is a water-soluble, unstable, very strong oxidising agent. It is therefore considered toxic. One of its derivatives is chromium (V), a known carcinogen, which lodges in tissues to form cancerous growths and may have other toxic effects. The main documented potential health effects of workplace exposure to hexavalent chromium are lung cancer, asthma, bronchitis, damage to nasal epithelia, eyes and contact dermatitis.

Hexavalent chromium is used industrially in anti-corrosive paint and primer agents and as pigments in plastics, paints, inks and dyes.

Chromium in the cement industry

Hexavalent chromium may be unintentionally added to cement during the manufacturing process via:

- Presence in raw materials;
- Presence in additives (clay, gypsum, slag, fly ash, volcanic ash);
- Presence in metal alloy parts used in the milling processes;
- Contact with chromium-containing kiln fuels;
- Contact with chromium-containing refractory brick kiln linings;

The actual kiln conditions also play a part in the formation of hexavalent chromium from trivalent chromium, as high temperatures, high pHs and oxidation occur within the kiln.

Often additives are used for cement production to reduce the levels of hexavalent chromium. Ferrous sulphate, stannous chloride, stannous sulphate, manganese sulphate and zinc salts are all commonly used. These reducing agents are known to function under certain temperatures for a given period of time. If a reducing agent has been used, then a suggested use by date and storage conditions are mentioned on the cement packaging.

As cement is often used in non-enclosed systems, people who use it may be exposed to hexavalent chromium. Due to its toxicity and its ability to prompt allergic reactions, the levels of hexavalent chromium in cement should be as low as possible. Many countries have banned the use or placement on the market of cement or cement formulations, such as mortars, grouts and tile adhesives, which contain, when hydrated, more than 2ppm (2mg/L or 2,000µg/L) of soluble hexavalent chromium. Consequently, testing for hexavalent chromium in cement or cement formulations is important.



Right - Figure 1: A Cecil Instruments isocratic Adept high performance liquid chromatography (HPLC) system.



Left - Figure 2: A *CECIL* UV/Visible spectrophotometer, which may be used to analyse hexavalent chromium in cement.

Detection methods

A wide variety of techniques can be used to detect hexavalent chromium, including UV/Visible spectrophotometry, liquid chromatography inductively coupled plasma mass spectrometry (LC/ICP-MS), wet chemistry and high performance liquid chromatography (HPLC). It is important to be able to differentiate between hexavalent chromium and trivalent chromium and at the same time, to not convert trivalent chromium to hexavalent chromium. This conundrum presents complications in sample preparation and analysis.

UV/Visible spectrophotometer methods are relatively low priced and easy to use. The standard method involves filtering a cement mortar and treating an aliquot of the filtered liquid with 1,5-diphenylcarbazide, followed by acidification. In acidic solution, hexavalent chromium forms a maroon-coloured derivatised complex which absorbs at 540nm. Although the UV/Visible spectrophotometer methods are not overly-sensitive, they are sufficiently sensitive to detect around 20µg/L levels. However, these methods are subject to inference from iron (II) compounds.

Inductively coupled plasma atomic emission spectroscopy (ICP-AES) methods are able to detect and quantify both hexavalent and trivalent chromium. However, these methods require relatively-expensive equipment and specialist user skills.


High performance liquid chromatography, inductively coupled plasma mass spectrometry (HPLC/ICP-MS) and inductively coupled plasma, mass spectrometry (ICP-MS) methods are able to detect and quantify whole groups of analytes of interest within the same chromatographic run, so derivatised hexavalent and trivalent chromium

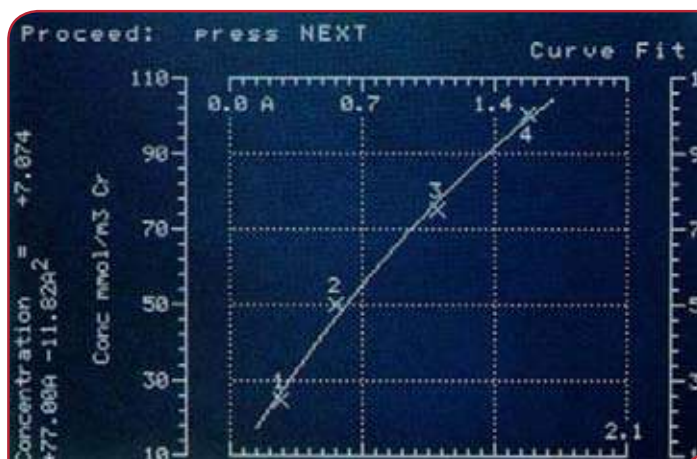
can be detected and quantified. Again, these methods require relatively expensive equipment and highly specialist user skills. In addition, the three latter techniques are overly-sensitive for cement determinations with very low µg/L detection levels.

HPLC can be an easy to operate, fast, accurate, reproducible, reliable, specific, sensitive and moderately medium-cost technique, where whole groups of analytes can be determined within the same chromatographic run. Isocratic HPLC with UV/Visible detection at around 540nm, using an alkaline solution then post column 1,5-diphenylcarbazide derivatisation methods exist, but many appear to oxidise trivalent chromium to hexavalent chromium.

New derivatisation methods

There have been attempts to use other derivatising agents under different pH conditions, such as methyl morpholine-4-carbodithioate, so that both the hexavalent and trivalent chromium in the original sample is unchanged. Here, the filtrate from a cement mortar is pre-column derivatised at pH4 with methyl morpholine-4-carbodithioate, then extracted into chloroform. The chloroform extracts are then dried and made up into an acetonitrile/water solution. The resulting solution is run on an isocratic HPLC system for UV/Visible detection at 330nm.

Although the method is not entirely satisfactory as hexavalent chromium can also form complexes similar to those of trivalent chromium, two separate and well-resolved chromatography peaks occur for samples that contain mixtures of both hexavalent and trivalent chromium. The development of this method is promising, as a simpler isocratic HPLC system is required compared to that used for post column derivatisation, without compromising on high sensitivities. The use of standard addition calibration techniques, where the presence of trivalent chromium in original samples is negated, may also render this method more acceptable for measuring levels of data of both hexavalent and trivalent chromium. 



Left - Figure 3: A typical calibration curve for chromium analysis with a UV/Visible spectrophotometer.



Contents

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Ad Index

US: Fenner Drives to launch PowerTwist Wedge Belts in November 2015

In November 2015, Fenner Drives will launch PowerTwist Wedge Belts, a long-lasting upgrade to rubber wedge belts.

As the only twist-lock belt available in a wedge profile, PowerTwist Wedge Belts are engineered to combine the performance of a rubber wedge belt with the added-value design of link belting. PowerTwist Wedge Belts will be available in SPA and SPB profiles. The link design of PowerTwist allows for simple inventory management with easy, fast installation, even on captive or fixed centre drives. With a high resistance to abrasion and shock loads, PowerTwist is constructed to withstand extreme temperatures and is unaffected by oil, grease, water and common industrial solvents. PowerTwist Link Belting is the proven choice for a variety of industrial power transmission applications, including cement, mining, aggregate, metal manufacturing, forestry and any wedge or V belt applications.

US: Gore® launches Low Emission Filter Bag

W. L. Gore & Associates has announced the launch of the GORE® Low Emission Filter Bag, a new seam-taped filter bag that provides extremely high filtration efficiency, resulting in extremely low dust emissions. Using proprietary materials and construction techniques, the GORE Low Emission Filter Bag enables cost-effective compliance with the strictest particulate emission requirements, including the new National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations.

“Not only have the limits for both existing and new plants become extremely low, the need for continuous parametric monitoring systems makes the new regulations difficult to meet while trying to maintain the existing bag life,” said Chris Polizzi, applications engineer at Gore.

Laboratory testing of used filter bags from the cement industry showed dust leakage through stitch holes as early as a few months into their life. Field testing confirmed emissions spikes with each pulse of the cleaning system. Eliminating the emissions spikes will help extend bag life under the continuous emissions monitoring regime.

The new GORE Low Emission Filter Bag starts with a filter bag already proven to provide extremely low emissions and adds a newly engineered and patented high-temperature, high-durability seam tape covering all stitches on the filter bag.



Vietnam: Holcim prepares for solid recovered fuel (SRF) production in Vietnam



Work is underway to commission a solid recovered fuel (SRF) plant for Holcim in Vietnam. It will process footwear production waste from the country’s main shoe factory to create a fossil fuel substitute for Holcim’s local cement kiln.

Holcim ordered a single-step SRF solution from shredding specialist UNTHA. The system comprises an anti-explosive ATEX-specification XR3000 Cutter waste shredder with two 113kW motors, conveyor, over-band magnet, control room and water-powered fire suppression technology. It can process 10t/hr to produce an 80mm fuel with high (15-20GJ/t) calorific value. Metals will be extracted for recycling.

The SRF plant was pre-assembled in Salzburg, Austria for acceptance testing by Holcim Vietnam. Holcim observed that the equipment exceeded the 95%, <80mm performance requirement, with 97% of materials consistently achieving the required particle size. The continuous rotor speed during the tests also demonstrated that the system was robust. The plant has now been shipped to Vietnam by sea and is expected to be fully operational in September 2015.

“This footwear production waste is an incredibly difficult product to shred due to the mixture of notoriously tough materials contained within sports shoes. We’re tackling rubber, textiles, plastics, metals, sponge, reinforcements and more. However, we extensively configured, re-engineered and trialled our flexible XR waste shredder using Holcim’s own material until it was perfectly suited to this application,” said Christian Lanner, UNTHA’s head of engineering and product management.





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Europe: LafargeHolcim launched

On 10 July 2015 the LafargeHolcim merger was completed. The new board of directors and executive committee with Eric Olsen as CEO thus became effective.

"Today's closing is an historic event, not only for our two founding companies, but also for the industry as a whole. LafargeHolcim has a unique business portfolio, is the industry benchmark in research and development and offers its customers the widest range of innovative and value-added products, services and solutions, from small-holders to large enterprises and most complex projects," said Wolfgang Reitzle, co-chairman (statutory chairman) of the board of directors of LafargeHolcim.

"This new company is built on the rich history and culture of Lafarge and Holcim and its teams. The merger has not only resulted in a larger and more global company, but brings about a unique set of complementary capabilities to capitalise on. Under the leadership of Eric Olsen, the new group will foster a new operating model and create more value for all our stakeholders," said Bruno Lafont, co-chairman of the board of directors of LafargeHolcim.

"As a new company we have hit the ground running," said Eric Olsen, CEO of LafargeHolcim. "A team of 200 senior leaders of LafargeHolcim met recently to align on priorities, targets and initiatives to drive the integration process. It is a great team. We have launched a set of synergy acceleration activities covering areas such as capital expenditure, procurement, cement industrial performance, network optimisation and commercial transformation. We expect to see the first tangible results in all areas by the end of 2015."

Following the re-opening of the public exchange offer, LafargeHolcim held 278,131,864 Lafarge shares, representing 94.41% of the share capital and at least 95.25% of the voting rights. Having surpassed the necessary 95% threshold in the share capital and voting rights, LafargeHolcim said that it would request that the French Financial Markets Authority (AMF) implement a squeeze-out procedure pursuant to the general regulations for Lafarge shares not tendered to the public exchange offer.

In August 2015, LafargeHolcim completed its Euro6.5bn asset divestment package to CRH, except for its assets in the Philippines, which are expected to close in the third quarter of 2015. The assets included businesses in Canada, Europe and Brazil. Following Lafarge's July 2015 acquisition of the 50% share in Lafarge Tarmac held by Anglo American for Euro1.4bn, the divestment to CRH also included UK-based Lafarge Tarmac, with the exception of the Cauldon and Cookstown plants and certain non-operational properties. The Cauldon and Cookstown plants now operate as part of LafargeHolcim's Aggregate Industries. CRH has rebranded Lafarge Tarmac as Tarmac, Lafarge Zement (Germany) as Opterra and Holcim (France) as Orsima. LafargeHolcim has said that it will not sell any assets other than those that were negotiated with the EC.




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2015 Entrant: 'Flame on' - Lloyd Arsen S Balbas, Holcim Philippines, Inc.

Location: La Union Plant, Philippines.

Comment: Every year, probably the happiest moment in the plant is during the flame on after the scheduled plant shutdown. In this picture, the happiness brought about by the kiln firing is even more profound as the plant had just come off a record 75 day shutdown wherein we replaced the cooler and burner.

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PHOTOGRAPHY COMPETITION 2016

Global Cement Magazine invites entries for the *Global Cement Photography Competition 2016*. The winning photos will be showcased in the January 2016 issue of *Global Cement Magazine*. The winner of the competition will also receive US\$250 as a cash prize

and the runner up will receive US\$125. Anyone can enter and each individual may enter up to five cement-related photographs. Every entry to the *Global Cement Photography Competition 2016* must be accompanied by a separate MS Word document stating: Photographer's name, company, email and postal address; Location of the subject. Entry is simple and free: Please send your entry (digital only, JPG, RAW or Tiff format) by email to rob@propubs.com. The subject line must be as follows: '*Global Cement Photo Competition*.' Files must be above 500kb but must be below 5Mb in compressed size. **GOOD LUCK!**

DEADLINE: 18 December 2015



Switzerland: Holcim's sales volumes down

In the first half of 2015, Holcim generated higher cash flow from operating activities and increased net income supported by the gain from the divestment of its minority stake in Siam City Cement in March 2015. However, lower than anticipated demand in some markets caused cement volume declines. Positive dynamics in the UK, the US, Mexico and the Philippines were not able to compensate.

In the first half of 2015 cement sales volumes fell by 2% year-on-year to 67.6Mt. Like-for-like net sales were almost unchanged, but net sales fell by 3.1% to Euro8.12m. Operating earnings before income, taxes, depreciation and amortisation (EBITDA), adjusted for merger-related costs of Euro80.8m, fell by 3.7% to Euro1.46m, while operating EBITDA fell by 7.8% to Euro1.38m. Operating profit adjusted for merger-related costs fell by 5.5% to Euro857m and operating profit fell by 12.3% to Euro777m. Net income increased by 4.9% to Euro648m, mainly from the sale of Holcim's Siam City Cement stake. Cement volumes declined in all regions except North America and Latin America. Like-for-like financial performance in Indonesia, India, Switzerland and France was notably unfavourable.

Holcim expects that in 2015, the global economy will continue its gradual recovery. Key construction markets of Holcim in countries like the USA, India, Mexico, Colombia, the UK and the Philippines are expected to be the main growth drivers. Cement volumes should increase in all group regions in 2015 with the exception of Europe, Africa and the Middle East.

France: Lafarge's sales volumes fall

Lafarge has reported lower cement volumes but higher sales for the second quarter and first half of 2015.

In the second quarter of 2015, cement volumes fell by 3% year-on-year due to lower exports. Domestic sales volumes increased by 2% while cement prices fell by 0.5%. Volumes were supported by positive trends in markets such as Romania, the Philippines, Egypt and Canada, while adverse weather limited growth in the US. Some markets faced challenging economic and/or political environments, such as France, Brazil, Iraq and Syria. During the quarter, Lafarge's sales grew by 5% to Euro3.54bn. Earnings before interest, taxes, depreciation and amortisation (EBITDA) grew by 1% to Euro820m while operating income fell by 3% to Euro608m. Results were impacted by one-off items from the LafargeHolcim merger. Excluding one-off items, Lafarge's net income was Euro210m in the second quarter of 2015, down by Euro27m from the same period of 2014.

For the first half of 2015, Lafarge reported a 4% year-on-year drop in cement sales to 54.7Mt, while its sales grew by 5% to Euro6.32bn. Its EBITDA grew by 6% to Euro1.22bn and its operating income grew by 8% to Euro813m.

In 2015, Lafarge expects cement market growth of 1-4%. Cost inflation should continue, albeit at a slower pace than in 2014 given the evolution of fuel oil prices. This should result in higher prices overall. Lafarge should also benefit from more favourable exchange rates.



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News in brief

Russia: New Eurocement plant

Eurocement has launched a 1.3Mt/yr, Euro255m dry-process cement plant in Sengiley, Ulyanovsk. The plant will create about 500 direct jobs and 1000 further indirect jobs.

UK: New director named

Aggregate Industries' new cement division will be led by Joe Hudson as managing director of cement and concrete products. He joins Aggregate Industries from Lafarge.

Spain: Net sales up for Cementos Portland Valderrivas

Cementos Portland Valderrivas' net sales grew by 11.3% to Euro289m and its cement sales grew by 4.1% in the first half of 2015. However, it also reported a Euro39.9m loss, up from Euro31m in the first half of 2014.

Turkey: Bolu Çimento completes Ankara upgrade

Bolu Çimento has converted its Ankara grinding facility to a fully-integrated cement plant. It started operations in July 2015.

Russia: Anhui Conch to build cement plant in Ulyanovsk

Anhui Conch plans to build a 2Mt/yr capacity cement plant in Ulyanovsk, Volga for Euro274m.

Poland: Cement production up

Polish cement production grew by 1.6% year-on-year to 1.65Mt in July 2015, while cement sales were up by 1.7% to 1.71Mt, according to Poland's Cement Producer Association. Year-to-date cement production grew by 2% to 8.84Mt and year-to-date cement sales rose by 2.3% to 9.04Mt.

Spain: Cementos Molins to invest Euro127m in 2015

Cementos Molins plans to invest Euro127m in 2015 to boost its expansion, including Euro10m in Spain. Its main project abroad will be the construction of a kiln at its San Luis plant in Argentina. In the first quarter of 2015, its consolidated profit was Euro15.1m.

Italy/Germany: HeidelbergCement to buy Italcementi for Euro3.7bn

Germany's HeidelbergCement plans to buy Italy's Italcementi for Euro3.7bn. HeidelbergCement has initially bought Italmobiliare's 45% stake for Euro10.6/share or Euro1.67bn total in stock and cash. The transaction was initiated on 28 July 2015 and is subject to approval by competition authorities. Trading in Italcementi shares was temporarily suspended due to an excessive rise on 29 July 2015 after the buyout announcement. The share price, which closed at Euro6.59, would have shot up by 50.9% had trading not been suspended.

Once the first transaction has been cleared, HeidelbergCement will offer the same price for each share held by outstanding investors. The price offered for each share is 61% higher than Italcementi's closing price before the deal was announced.

The acquisition will expand HeidelbergCement's operations in Mediterranean countries like Italy and Egypt, as well as in France and Belgium. "With the market recovery gaining traction in southern Europe and the US, it is time for us to accelerate our growth," said Bernd Scheifele, HeidelbergCement's CEO. The deal gives the German producer the greatest boost in the Middle East and Africa, doubling its market share in that region to a similar level to Dangote Cement.

HeidelbergCement expects to achieve synergies of Euro175m/yr by 2018 from the acquisition. The deal will initially be financed through cash and fully underwritten bridge financing of Euro4.4bn by Deutsche Bank and Morgan Stanley. That will partially be repaid by Euro1bn in asset sales and new debt sales. As a result of the takeover, HeidelbergCement expects its revenue to hit Euro20bn by 2020, with earnings before interest, taxes, depreciation and amortisation of more than Euro5bn. HeidelbergCement's 2014 revenue was Euro12.7bn, while Italcementi generated Euro4.2bn.

The speed of the deal was allegedly due to competition from Dangote Cement, which also expressed an interest in Italcementi, but did not make a formal offer. According to unnamed sources, the talks between HeidelbergCement and Italcementi began four months ago.

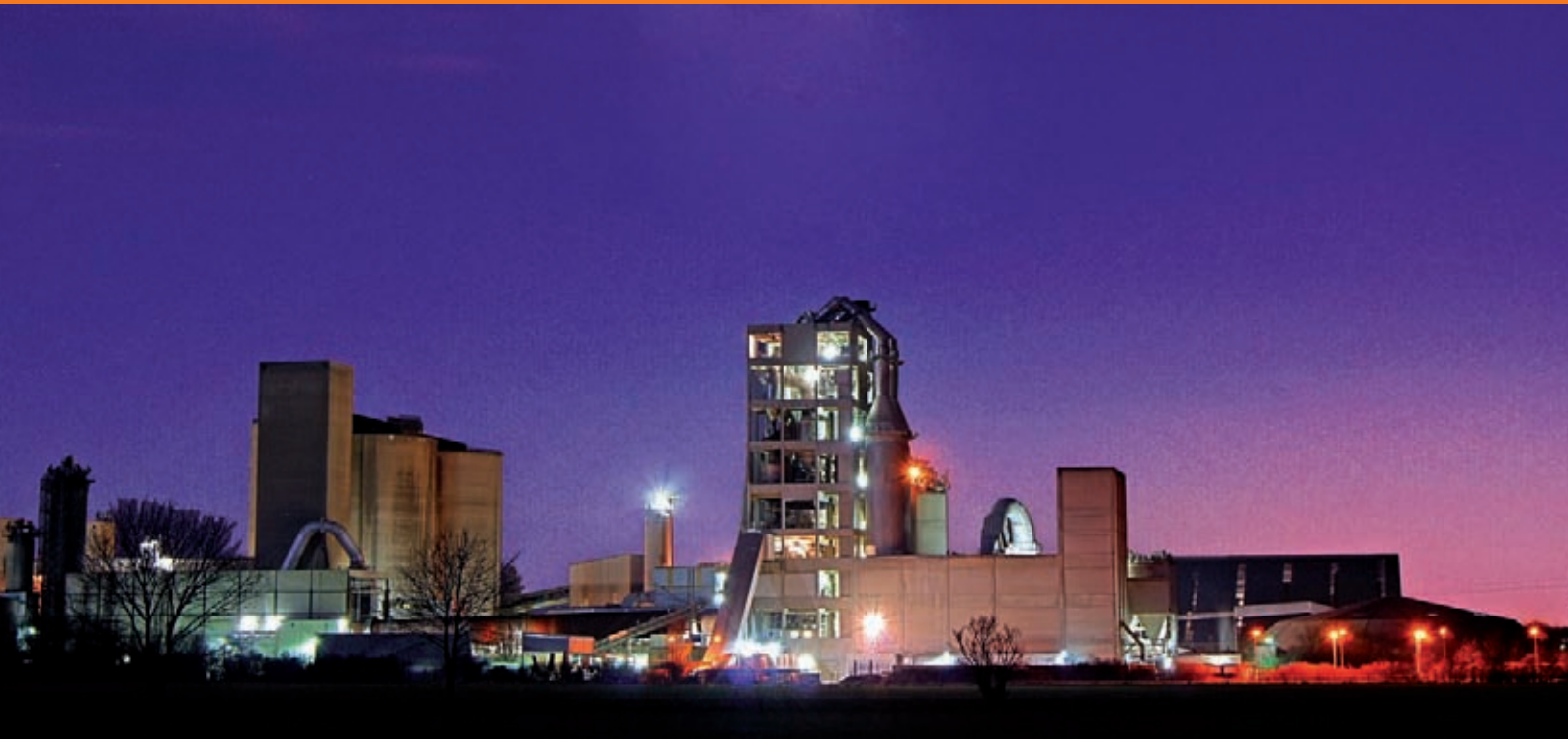
Analysts have cited concerns that HeidelbergCement may return to unsustainable debt, while Italy's political party Northern League leader Matteo Salvini said that the takeover 'represents a form of military occupation.' Salvini said that the purchase fitted with the strategy of what he suggested was a 'German-led Eurozone takeover of Italy.'

Europe: Cemex to sell European operations

Cemex has agreed to sell a number of its European operations. Its assets in Croatia, Bosnia and Herzegovina, Montenegro and Serbia will be sold to Hungary's Duna-Dráva Cement, part of Germany's HeidelbergCement, for Euro231m. The assets include three cement plants (1.66Mt of cement sold in 2014), two aggregate quarries and seven ready-mix plants with net sales of Euro124m in 2014.

Its assets in Austria and Hungary will be sold to Rohrdorfer Group for Euro160m. The Austrian operations consist of 24 aggregate quarries and 34 ready-mix plants and had Euro217m of net sales in 2014. The Hungarian operations consist of five aggregate quarries and 34 ready-mix plants and had Euro42.2m of net sales in 2014.

The proceeds will be used for debt reduction and general corporate purposes. The deals are subject to the satisfaction of standard conditions, which includes authorisation by regulators. Cemex currently expects to finalise the transactions in the fourth quarter of 2015.



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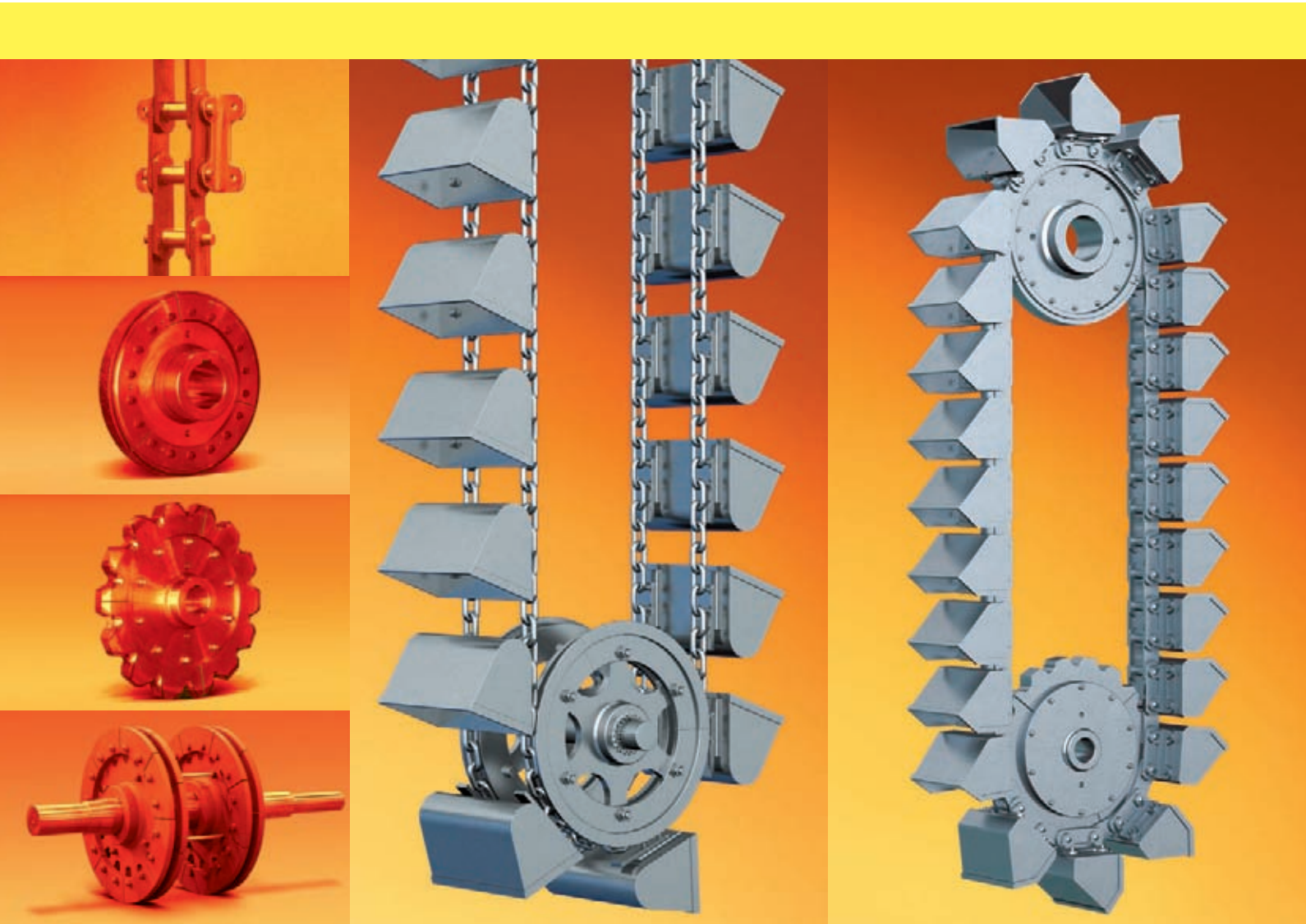
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UK: Francis Flower acquires Scunthorpe GGBS plant from Hanson Cement

Mineral Resources company Francis Flower has announced the acquisition of the 500,000t/yr capacity ground granulated blast furnace slag (GGBS) grinding plant in Scunthorpe from Hanson Cement. The plant supplies customers in the Midlands and north of England. GGBS complements Francis Flower's existing range of powdered minerals, which originate as by-products from various industries.

"We are absolutely delighted and very excited to announce this new acquisition. GGBS is an excellent fit to our existing product range and will help further our long-standing relationships in this sector," said Adrian Willmott, chairman and CEO of Francis Flower. "We have a proven track record of making the most of mineral resources, reducing the need for mineral extraction as well as landfill and delivering sustainable solutions for our customers. We are very much looking forward to working with the team in Scunthorpe and developing the opportunities in the GGBS market as the UK construction sector continues to grow."

Turkey: Biberici Insaat orders Loesche mill for new plant

Biberici Insaat has ordered a Loesche LM 56.3+3 vertical roller mill for clinker grinding at its first cement plant in Konya, Turkey. Biberici Insaat specialises in infrastructure works including road construction, interchanges, water conduction lines, sewerage, natural gas and other energy transfer lines.

The mill, which was one of Biberici Insaat's first investments for the plant, will produce 200t/hr of Ordinary Portland Cement (OPC) at 3800 Blaine. The gearbox is planned with a capacity of 5400kW. Delivery is scheduled for the third quarter of 2015.

Italy: Sika acquires Addiment Italia from Buzzi Unicem

Sika has acquired the remaining shares of Italian-based Addiment Italia from its joint venture partner Buzzi Unicem. Addiment Italia produces cement grinding aids and concrete admixtures. The transaction will strengthen Sika's business in Italy and increase its market presence. Addiment Italia generated sales of Euro14m in 2014.

"The acquisition will allow us to further build upon the successful partnership between Buzzi Unicem and Sika in the admixture business worldwide and strengthen the operational footprint in Italy. We welcome the new employees on board and look forward to developing the business together," said Paul Schuler, head of Europe, the Middle East and Africa.

Russia: Plant upgrades

Eurocement bought the debt-ridden Mordovcement plant in December 2014 and has since invested heavily in maintenance and upgrades. The plant has now been integrated into Eurocement.

"Since the acquisition, a large project to increase operational efficiency has been undertaken. All of Mordovcement's debts have been resolved, while refurbishment and major repairs of the main equipment have been made," said Mikhail Skorokhod, president of Eurocement. "Eurocement is also executing complex measures to reduce the specific consumption of fuel and gas and increase equipment capacity."

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Effects of the LafargeHolcim merger in 62 countries!

Italy: Italcementi swings back to profit

Italcementi has reported a profit of Euro3.8m in the first half of 2015 compared to a loss of Euro79m in the same period of 2014. Its revenue rose by 6% year-on-year to Euro2.17bn, while earnings before interest, tax, depreciation and amortisation (EBITDA) increased by 5% to Euro324m. The company expects a slight improvement in its operating results in the entirety of 2015.

Czech Republic: Ceskomoravsky Cement's sales grew to Euro102m in 2014

Ceskomoravsky Cement's profit rose by 25% year-on-year to Euro27.2m in 2014, while its revenues grew by Euro3.69m to Euro102m. Total cement consumption in the Czech Republic grew by 4% to 3.34Mt in 2014, mainly thanks to the revival of the construction sector and favourable weather conditions.

"The value of public contracts increased by 6.7% in 2014, so we can view 2015 with slight optimism," said Ceskomoravsky Cement's board chairman Jan Hrozek. Ceskomoravsky Cement, part of Germany's HeidelbergCement, mainly supplied its products for the modernisation of the D1 motorway in 2014.

Russia: Lipetskement plans plant upgrade

Under instructions from the Rosprirodnadzor environmental watchdog, Lipetskement has started to install electrostatic precipitators to reduce air pollution with cement dust. The precipitators are mounted on the third production line's kiln. Cement dust emissions were registered at the plant during the start-up and commissioning of the plant. As such, it received new instructions to strengthen its environmental controls with laboratory measurements of air quality.

Ireland: High Court overturns rulings against CRH in Goode Concrete case

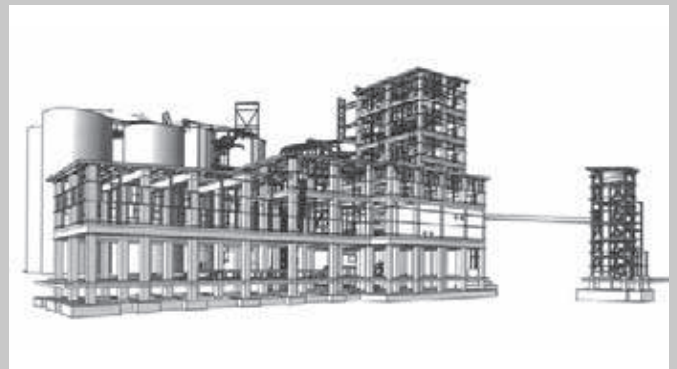
The Supreme Court has overturned rulings made by a High Court judge in proceedings by Goode Concrete against CRH on grounds of alleged objective bias as the judge held Euro135,000 in CRH shares.

Chief Justice Susan Denham said that, if the judges held shares directly in a company involved in litigation before them, in contrast with shares held in a pension plan or unit fund over which they have no control, then the judges should 'generally' not hear the action.

The disputed rulings, all unfavourable to the Goode side, were made in 2010-2012 by Justice John Cooke, who has since retired, on pre-trial matters in Goode Concrete's action over alleged uncompetitive practices by CRH. The issues will now be reheard before a different High Court judge.

By a four-to-one majority, the Supreme Court granted Goode's appeals against the rulings after finding that Justice Cooke erred in law in hearing the applications due to reasonable apprehension of objective bias due to his CRH shareholding. Justice Cooke held the shares himself; they were not in a trust or any other type of fund.

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Greece: Titan posts 26% growth in net profit

Titan Cement posted a 26% year-on-year rise in its net profit to Euro17.6m for the first half of 2015. Its sales increased by 25.8% to Euro389m, boosted by higher demand for building materials and a stronger US Dollar. Titan Cement postponed its 2014 dividend payment, due on 1 July 2015, because of a bank holiday announced by the government on 28 June 2015.

Germany: HeidelbergCement lifted by recovering UK and North America

HeidelbergCement reported a rise in revenue and earnings as its sales volumes benefited from a continued market recovery in North America and the UK, offsetting concerns about weakness in Indonesia.

Its net profit for the second quarter of 2015 rose by 16% year-on-year to Euro271m, while its operating income before depreciation grew by 15% to Euro752m. HeidelbergCement's revenue jumped by 10% to Euro3.64bn, fed by the weak Euro and low fuel costs.

"The recovery in our mature markets, particularly in the UK and the US, has made a significant contribution," said CEO Bernd Scheifele. However, a delayed start of infrastructure projects in Indonesia led to a decline in sales volumes in the Asia-Pacific region.

World: Compton Greaves signs global supply agreement for electrical motors with Lafarge

Avantha Group's Compton Greaves (CG) has signed a global supply agreement with Lafarge for electrical motors. This positions CG as one of Lafarge's few preferred global suppliers.

CG has developed unique slip-ring, twin drive slip-ring and double squirrel cage motors, as well as low maintenance, energy-efficient motors designed for the cement industry, which deliver high starting torque, low noise and low vibration.

"We are extremely pleased to have entered into this agreement and have CG as a preferred partner for large motors. CG's ability to provide flexible designs, high quality and cost-effective solutions were key factors that Lafarge considered while making this decision," said Michel Edmont, senior vice president of international sourcing at Lafarge.

"Our sincere thanks to Lafarge for reposing their trust in CG's expertise in this sector, as one of the leading players in industrial motors. This agreement is a perfect fit for both companies to leverage the growing demand in infrastructure the world over," said CG's CEO and managing director Laurent Demortier.

Romania: HeidelbergCement merges its three subsidiaries in Romania

HeidelbergCement will merge its three subsidiaries in Romania, Carpatcement Holding, Carpat Beton and Carpat Agregate, to form a single company called HeidelbergCement Romania. The internal reorganisation process will end in December 2015. HeidelbergCement has invested Euro500m in Romania to date.

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Amy Saunders, *Global Cement Magazine*

Germany - Slow and steady wins the race

The Federal Republic of Germany comprises 16 states, spans 357,127km² and is located in central Europe. With 80.9 million inhabitants, Germany is the second most populous European country behind Russia. It has Europe's largest economy and the world's sixth-largest economy, with a GDP of Euro3.39tn in 2014. Here *Global Cement Magazine* provides an overview of the German cement industry, including the major companies, plant locations and recent trends, as well as an outlook for the industry.

Economy

Germany, which has one of the strongest economies in Europe, experienced 1.6% GDP growth to Euro3.39tn in 2014, up from 0.5% in 2013.¹ Its 2014 GDP/capita was Euro39,758, up from Euro39,312 in 2013. Inflation fell to 0.9% from 1.6% in 2013.

The German economy has a strong manufacturing sector and is one of the world-leaders in iron, steel, chemical, automobile and machinery production. In 2014, industrial production grew by 1.3%, much improved upon a 0.3% contraction in 2013. Germany is the world's fourth-largest exporter and importer. In 2014, some Euro1.38tn of goods were exported, up from Euro1.35tn in 2013, while Euro1.18tn of goods were imported, up from Euro1.12tn in 2013.

As in many advanced economies, a large proportion (73.8%) of the 44.8 million-strong labour force works in the service sector, while industry and agriculture account for the remaining 24.6% and 1.6% respectively. The long-term sustainability of the German economy is under close scrutiny due to its

shrinking population, which has been falling steadily since 2004. The population shrank by 0.18% in 2014, which is attributed to a birth rate of 8.42/1000, a death rate of 11.29/1000 and a net immigration rate of 1.06/1000. Germany's unemployment rate is one of the lowest in all of Europe and continues to fall modestly, at 5% in 2014, down from 5.3% in 2013.

Cement industry overview

Industrial cement production in Germany began in 1877 and in 1878 the first Cement Standard was established.² The German cement industry grew steadily until the 1950s, when the post-war building boom resulted in a large increase in domestic cement demand. The following years were characterised by improved efficiencies, with wet cement kilns closed between 1960-1970 to reduce energy consumption. By the 1970s, average cement kiln capacities had grown from 350t/day to 2400t/day. In 2015, almost all of Germany's cement kilns use the more energy-efficient dry process and all new cement plants are

Right - Figure 1: Heidelberg is the fifth-largest town in Baden-Württemberg. Located in south-west Germany, it is a popular tourist destination due to the picturesque Heidelberg Castle, the Neckar River and its baroque-style old town.



constructed exclusively as cyclone preheater kilns with calciner, tertiary air duct and grate coolers. Germany's cement producer association, the Verein Deutscher Zementwerke (VDZ), said that Germany had 41 kilns with cyclone preheaters, six kilns with grate preheaters and eight shaft kilns in 2013.³

German cement consumption grew by 2.2% year-on-year to 27.1Mt in 2014. This followed a 1.1% fall to 26.5Mt in 2013, which was attributed to bad weather limiting construction sector activity.⁴ Domestic cement demand was almost completely covered by German manufacturers in 2014. Just 1.2Mt, or 4%, was imported during the year. Cement and clinker exports fell slightly year-on-year to 6.2Mt.

"Significant catch-up effects from 2013 and mild weather really bolstered cement consumption, particularly in the first quarter of 2014," said the VDZ president Gerhard Hirth. However, the generally reserved economic climate had a mild dampening effect on construction investment over the rest of the year. "We experienced considerable increases in demand all year, mainly in housing," said Hirth. "In addition, due to the advantages of concrete construction in multi-storey buildings, cement manufacturers have managed to further increase their market share over recent years." Hirth said that the German cement industry has started 2015 with a positive outlook. "Due to the dynamic overall economic development and the continuing high demand for new housing, we are expecting growth of around 1% in cement consumption to about 27.3Mt in 2015."

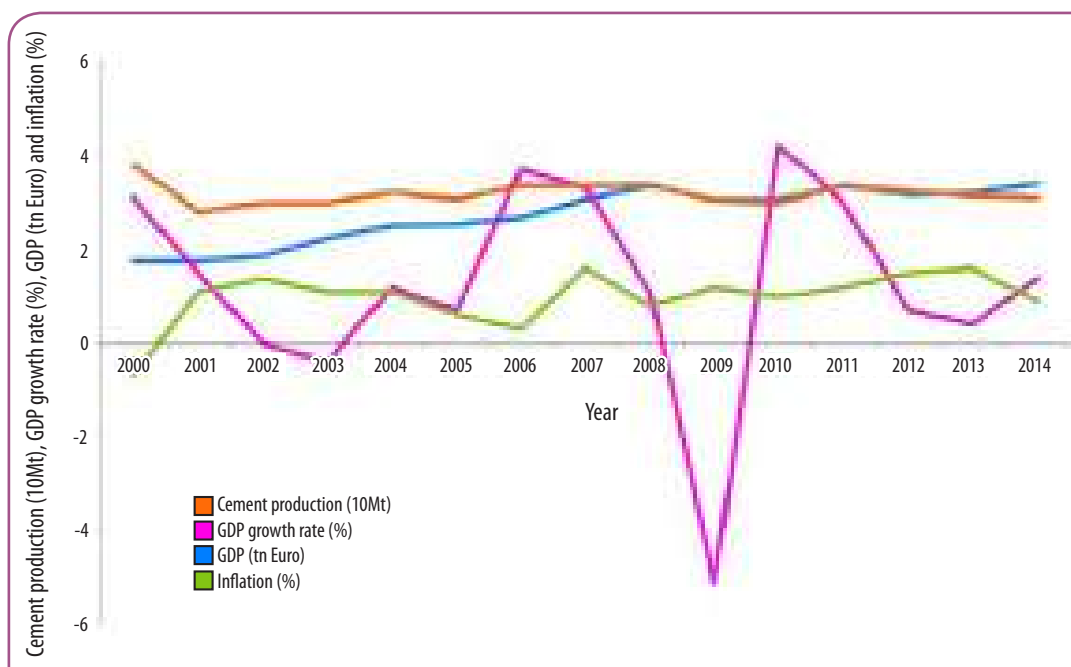
German cement production has been relatively stable since peaking at 38Mt in 2000, although a slight fall was noted in 2009 with the onset of the global financial crisis (Figure 2). Similarly, clinker production capacity has not changed from 31Mt/yr

since 2000, when it fell from 40Mt/yr. The drop in cement demand following 2000 was attributed to a slow-down of the construction sector due to unfavourable demographic and tax frameworks, reduced investments and a drop in public and state-funded construction projects. The United States Geological Survey (USGS) reported that, in 2014, German cement production fell by 0.96% year-on-year to 31Mt.⁵

Cement companies

The German cement industry has 34 integrated cement plants and 32.13Mt/yr of integrated cement production capacity (Table 1, Figure 3). There are also 21 grinding plants. The market includes a mix of large multinational producers, large domestic manufacturers and single plant-owning companies. The most densely populated states of North Rhine-Westphalia, Bavaria and Baden Württemberg are home to the largest number of cement plants with the greatest cement production capacities (Table 2, Figure 4).

Germany's **HeidelbergCement AG** is the largest cement producer with eight plants in the country and a production capacity of 7.60Mt/yr. This represents 23.7% of Germany's total cement production capacity. HeidelbergCement also has five grinding plants; Königs in Brandenburg, Mahlerwerk Mainz in Rhineland-Palatinate, Ennigerloh in North Rhine-Westphalia, Geseke in North Rhine-Westphalia and Hanover in Lower Saxony. HeidelbergCement, which was founded in 1873, produces Ordinary Portland cement (OPC), special cements and white cement, in addition to concrete products and aggregates. It operates in more than 40 countries and was ranked at number five in the top 100 global cement producing companies of 2014.⁶



Left - Figure 2: Cement production (10Mt), GDP growth rate (%), GDP (tn Euro), inflation (%) in Germany in 2000-2014. **Sources:** IMF World Economic Outlook Database April 2015, USGS Mineral Yearbooks.



BADEN-WÜRTTEMBERG (6.88Mt/yr)

1. Schwenk Zementwerk KG, Allmendingen, 1Mt/yr
2. Schwenk Zementwerk KG, Mergelstetten, 1Mt/yr
3. HeidelbergCement AG, Leimen, 0.8Mt/yr
4. HeidelbergCement AG, Schelklingen, 1.5Mt/yr
5. Holcim (LafargeHolcim), Dotternhausen, 0.78Mt/yr
6. Märker Zementwerke GmbH, Harburg, 1Mt/yr
7. CRH (formerly Lafarge Zement), Wössingen, 0.8Mt/yr

BAVARIA (4.62Mt/yr)

8. Schwenk Zementwerk KG, Karlstadt, 1.2Mt/yr
9. HeidelbergCement AG, Burglengenfeld, 1.1Mt/yr
10. HeidelbergCement AG, Lengfurt, 1Mt/yr
11. Südbayrisches Portland Zementwerk (SPZ) (HeidelbergCement AG), Rohrdorf, 0.9Mt/yr
12. Solnhöfer Portland Zementwerke GmbH, Solnhöfen, 0.42Mt/yr

BRANDENBURG (1.9Mt/yr)

13. Cemex OstZement GmbH, Rüdersdorf, 1.9Mt/yr

HESSE (0.4Mt/yr)

14. Dyckerhoff AG (Buzzi Unicem), Amöneburg, 0.2Mt/yr (White)
15. Zement und Kalkwerke Otterbein GmbH & Co KG, Großlüder, 0.2Mt/yr

LOWER SAXONY (1.9Mt/yr)

16. Holcim (LafargeHolcim), Höver, 1Mt/yr
17. HeidelbergCement AG, Teutonia, 0.9Mt/yr

NORTH RHINE-WESTPHALIA (9.52Mt/yr)

18. Dyckerhoff AG (Buzzi Unicem), Geseke, 0.4Mt/yr
19. Dyckerhoff AG (Buzzi Unicem), Lengerich, 1.77Mt/yr
20. HeidelbergCement AG, Paderborn, 0.4Mt/yr
21. HeidelbergCement AG, Zementwerke Ennigerloh, 1Mt/yr
22. Seibel und Söhne Portland-Zementwerke, Erwitte, 0.6Mt/yr
23. Portland Zementwerke Gebr. Seibel GmbH & Co KG, Erwitte, 0.55Mt/yr
24. Portlandzementwerke Wittekind Hugo Miebach Söhne, Erwitte, 1Mt/yr
25. Holcim (LafargeHolcim), Kollenbach, 0.95Mt/yr (formerly Cemex West)
26. Spenner Zement GmbH & Co KG, Diamant, 1Mt/yr
27. Phoenix Cement, Zementwerke Krogbeumker GmbH & Co KG, 0.5Mt/yr
28. HeidelbergCement AG, Geseke, 0.9Mt/yr

RHINELAND-PALATINATE (0.95Mt/yr)

29. Dyckerhoff AG (Buzzi Unicem), Göllheim, 0.8Mt/yr
30. Portland Zementwerk Wotan H Schneider KG, Üxheim, 0.15Mt/yr

SAXONY-ANHALT (3.16Mt/yr)

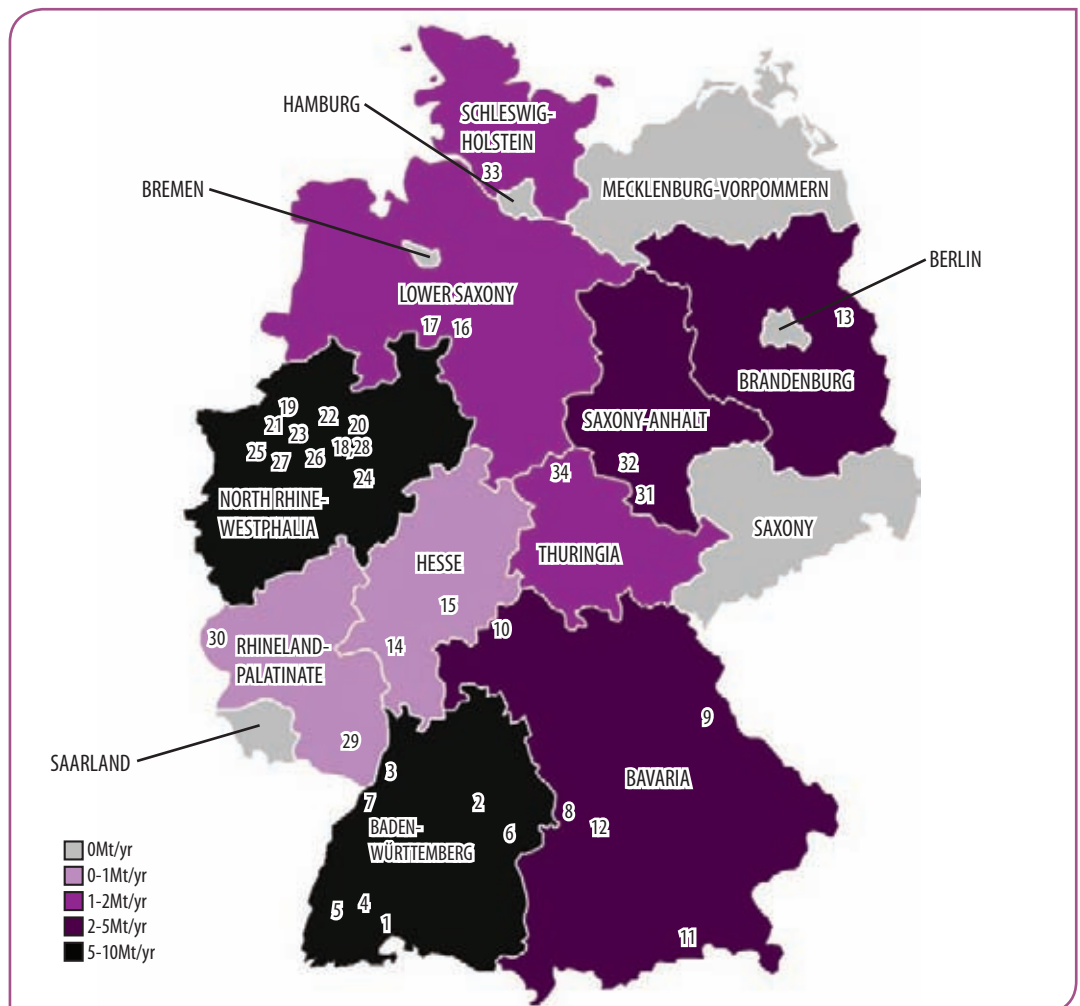
31. Schwenk Zementwerk Bernburg, Bernburg, 0.86Mt/yr
32. CRH (formerly Lafarge Zement), Karsdorf, 2.3Mt/yr

SCHLESWIG-HOLSTEIN (1.5Mt/yr)

33. Holcim (LafargeHolcim), Lägerdorf, 1.5Mt/yr

THURINGIA (1.3Mt/yr)

34. Dyckerhoff AG (Buzzi Unicem), Deuna, 1.3Mt/yr



Right - Figure 3: The integrated cement plants present in Germany in 2015. The states are colour-coded by cement production capacity, inclusive of white cement plants. **Source:** The *Global Cement Directory 2015* and research performed for the *Global Cement Directory 2016*.

A Hot Issue – with a System

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- Heat resistant nozzles within brick work
- Heat resistant nozzles within changing tubes

Other new developments include:

- Extendable heat resistant nozzles, which have been in use since early 2015

Application at the kiln inlet



Heat resistant nozzle within brick work



Application at the inlet chute

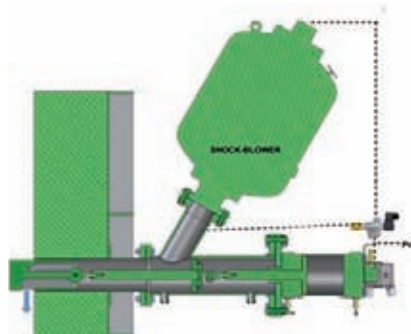


Heat resistant nozzle within a changing tube

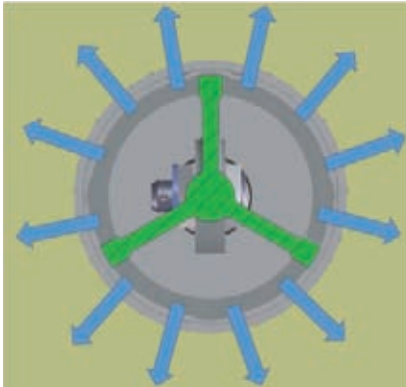


Advantages of the extendable heat resistant nozzle system:

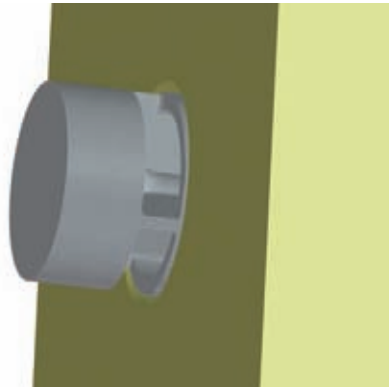
- When required, the heat resistant nozzle is extended into the furnace. Immediately after the air blast the heat resistant nozzle is retracted and sits safely within the brick work.
- Assembly and exchange can be performed on the outside
- Discharge direction can be regulated from the outside



Nozzle with a 360° discharge opening



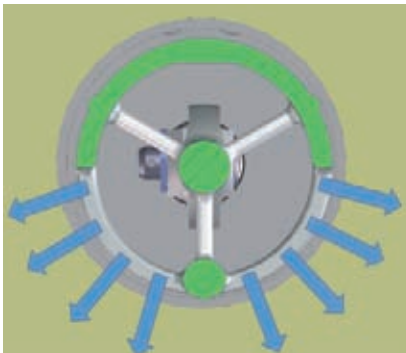
Nozzle head 360° extended into the kiln



Example of a 360° nozzle in use



Nozzle with a 180° discharge opening



Example of a 180° nozzle in use



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Company	Plants	Capacity (Mt/yr)
HeidelbergCement AG	8	7.60
Dyckerhoff (Buzzi Unicem)	5	4.47
LafargeHolcim	4	4.23
Schwenk Zementwerke KG	4	4.06
CRH (formerly Lafarge Zement)	2	3.10
Cemex Deutschland	1	1.90

State	Plants	Capacity (Mt/yr)	Population	Size (km ²)
North Rhine-Westphalia	11	9.52	17,554,300	34,086
Baden-Württemberg	7	6.88	10,569,100	35,751
Bavaria	5	4.62	12,519,600	70,551
Saxony-Anhalt	2	3.16	2,259,400	20,447
Brandenburg	1	1.9	2,449,500	29,480
Lower Saxony	2	1.9	7,779,000	47,625

Above - Table 1: The top cement manufacturers in Germany in 2015. **Source:** The *Global Cement Directory 2015* and research performed for the *Global Cement Directory 2016*.

Above right - Table 2: The top cement producing states in Germany in 2015. **Source:** The *Global Cement Directory 2015* and <http://www.germany-insider-facts.com/>.

Germany-based **Dyckerhoff AG**, which is owned by Italy's Buzzi Unicem, is the country's second-largest cement producer, with five integrated plants and 4.47Mt/yr of production capacity, inclusive of white cement. Dyckerhoff also has three grinding plants; its white cement grinding plant in Neuss, North Rhine-Westphalia, a grinding plant in Neuwied, Rhineland-Palatinate and another in Wiesbaden, Hesse. Buzzi Unicem purchased shares in 1864-founded Dyckerhoff in 2001-2013, over which period Dyckerhoff became wholly-owned by Buzzi Unicem. Dyckerhoff produces OPC, white and oil well cements in addition to a large variety of concrete materials.

LafargeHolcim, formed by the merger of Lafarge and Holcim, is Germany's third-largest cement producer. It has four plants in Germany with a combined production capacity of 4.23Mt/yr and a grinding plant in Bremen. Holcim produces OPC, Portland slag, blast furnace and special cements.

Germany's **Schwenk Zementwerke KG** is the country's fourth-largest cement producer with an installed capacity of 4.06Mt/yr from four cement plants. The company was founded in 1847 and manufactures OPC, Portland composites and blast furnace cements.

Ireland's **CRH** entered the German cement industry in August 2015 with the acquisition of Lafarge Zement's two cement plants with a combined production capacity of 3.10Mt/yr. It also bought the Sötenich grinding plant in North Rhine-Westphalia. In Germany, CRH now produces OPC, Portland composite cement products and special binders, which are produced only at the Karsdorf plant in Saxony-Anhalt.

Cemex Deutschland, part of Mexico's Cemex, has one cement plant in Germany at Rüdersdorf with 1.90Mt/yr of production capacity, making it Germany's sixth-largest cement producer. The company also operates three grinding plants, namely the Dortmund and Duisburg plants in North Rhine-Westphalia and the Eisenhüttenstadt plant in Brandenburg. In addition to OPC, Cemex also manufactures concrete products and aggregates in Germany.

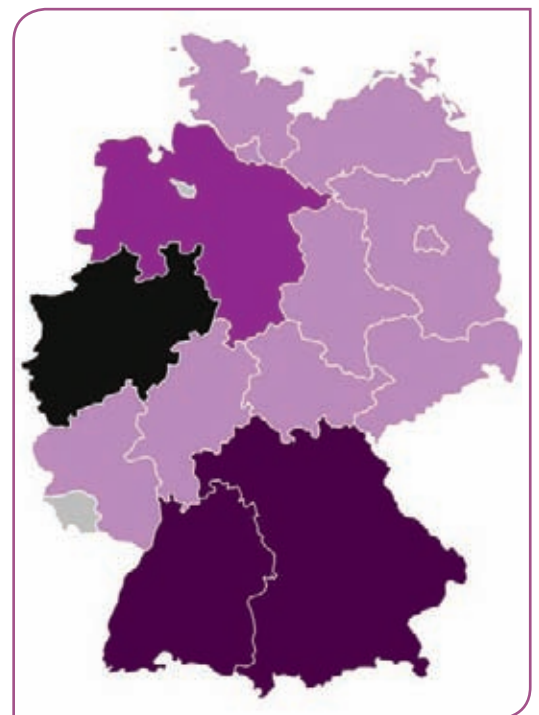
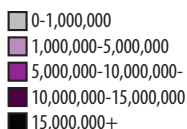
Financial results

The top cement producers in Germany are all multinational companies with operations in many countries. It has not been possible to identify, in most cases, their operating results for Germany alone. However, most of the companies reported similarly poor results for their European assets in 2014.

In 2014, HeidelbergCement's sales grew by 4% year-on-year to Euro12.6bn, or by 8% on a like-for-like basis. Its operating income before depreciation (OIBD) grew by 3% to Euro2.29bn and its cement sales volumes grew by 5% year-on-year to 81.9Mt. Its profit fell by 26% year-on-year to Euro687m due to a non-recurring evaluation loss of Euro236m from the sale of its building products business, while 2013's results included Euro420m of non-recurring gains. HeidelbergCement said that, in 2014, the German construction industry benefitted from 'healthy economic development,' although its German sales volumes fell slightly. In the first quarter of 2015, HeidelbergCement's sales rose by 12% to Euro2.8bn or by 4% on a like-for-like basis, as it benefitted from low energy prices and the weak Euro. It reported a Euro80m loss for the period, compared to a Euro108m loss in the same period of 2014. HeidelbergCement's OIBD grew by 46% to Euro299m, however, its cement sales volumes fell by 0.8% to 16.8Mt/yr. HeidelbergCement said that its sales volumes fell by 4.1% to 4.4Mt in western and northern Europe, including a decline in Germany.

Buzzi Unicem's sales fell by 0.2% year-on-year to Euro2.51bn in 2014. Some 23% or Euro577m of its sales were in Germany. Its earnings before income,

Right - Figure 4: The 16 German States colour-coded by population.



Jahrestagung Zement 2015



22. + 23.
September
Düsseldorf

Programm 22. September 2015 (Beginn 14.00 Uhr)

- Begrüßung Jahrestagung Zement
Dipl.-Wirt.-Ing. Gerhard Hirth,
Präsident Verein Deutscher Zementwerke e.V.
- So wollen wir leben!
Die Vision einer Zukunftsgesellschaft
Prof. Horst W. Opaschowski
- ÖPP einmal anders – funktioniert die ASFINAG
auch in Deutschland?
Dr. Klaus Schierhackl, ASFINAG Bau Management GmbH
- Quo vadis Deutschland?
Investitionen als Schlüssel für Wohlstand
Prof. Marcel Fratzscher,
Deutsches Institut für Wirtschaftsforschung e.V.
- Industrie 4.0: Herausforderungen, Risiken und
Potentiale der industriellen Produktion
Prof. Dr.-Ing. Eberhard Abele,
Technische Universität Darmstadt
- Abendessen in lockerer Atmosphäre
mit Verleihung des VDZ-Arbeitssicherheitspreises

Programm 23. September 2015 Vormittagsplenum

- Warum ich Ingenieur geworden bin
und was daraus wurde!
Dr.-Ing. Markus Wetzel, WETZEL & VON SEHT
- Moderne Wasserbauwerke und ihre Anforderungen
an die Betontechnik aus der Sicht eines öffentlichen
Bauherren
Dipl.-Ing. Andreas Westendarp,
Bundesanstalt für Wasserbau (BAW)
- Effiziente Zerkleinerungstechnik in der Zementindustrie:
Herausforderungen und Potentiale
Prof. Dr.-Ing. Arno Kwade, TU Braunschweig;
Dr.-Ing. Philipp Fleiger, VDZ
- Zementwerke als genehmigungsbedürftige Anlagen –
zukünftige Emissionsanforderungen
Dr. Norbert Salomon, Bundesministerium für Umwelt,
Naturschutz, Bau und Reaktorsicherheit
- NO_x-Minderung durch effiziente SNCR
Dipl.-Ing. Peter Scur, CEMEX Zement GmbH

Programm 23. September 2015

Nachmittagsplenum Verfahrenstechnik

- Energieeffizienz und Abwärmenutzung:
Moderne Kühlertechnik ebnet den Weg
Dr. Robert Mathai und Dr. Thomas Weiss, IKN GmbH Neustadt
- Verbrennungsführung in Drehofenanlagen der Zementindustrie
Dr. Georg Locher, ThyssenKrupp Industrial Solutions AG
- Der Einsatz von Ersatzrohstoffen in Österreich
Dipl.-Ing. Sebastian Spaun,
Vereinigung der Österreichischen Zementindustrie
- Oxyfuel-Technologie zur CO₂-Abscheidung
Dr.-Ing. Kristina Fleiger, VDZ
- Die Vertikalmühle zur Hüttensandmahlung im Zementwerk
Duisburg der Spenner Zement GmbH & Co. KG
Dr. rer. nat. Heinrich Sievers, Dipl.-Ing. Franz-Josef Schäfers
und Frank Baumann, Spenner Zement GmbH & Co. KG

Programm 23. September 2015

Nachmittagsplenum Betontechnik

- Alternative Bindemittelkonzepte: Ein Überblick
Dr.-Ing. Jörg Rickert, VDZ; Dr. Wolfgang Dienemann,
HeidelbergCement Technology Center;
Dr. Günther Walenta, Lafarge Centre de Recherche;
Dr. Gerold Schnedl,
Lafarge Cement Technical Center Vienna GmbH;
Thomas Neumann, SCHWENK Zement KG
- Betonbauwerke in der Schweiz: Anforderungen
an die Normung und die Bauweisen
Dr. Peter Lunk, Holcim (Schweiz) AG
- Zementgehaltsbestimmung im Beton
M.Sc. Johannes Horsch, VDZ;
Dr. Peter Boos, HeidelbergCement AG;
Thomas Neumann, SCHWENK Zement KG
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taxes, depreciation and amortisation (EBITDA) grew by 4.96% to Euro423m and its pre-tax profit rose by 998% to Euro176m. Its global cement sales volumes grew by 1.80% to 25.1Mt, while its German cement production grew by 3.3% to 6.02Mt. Buzzi Unicem confirmed HeidelbergCement's assertion that Germany's construction industry gained momentum in 2014 and added that its white cement sales and exports from Germany both grew. In the first quarter of 2015, Buzzi Unicem's revenue grew by 3.4% to Euro513m, its EBITDA was up by 164% to Euro27.2m and its pre-tax loss fell by 24.4% to Euro46.2m. In Germany, its revenue fell by 12.7% to Euro115m, its EBITDA fell by 0.9% to a Euro700,000 loss and its cement volumes fell by 5.2%, contributed to by a weaker oil well cement market.

Holcim said that when negative currency effects and merger costs were accounted for, most of its 2014 key financials were worse than the previous year. Its cement sales were up by 1% year-on-year to 140Mt, but its sales fell by 3.1% to Euro17.8bn, its EBITDA declined by 3.8% to Euro3.49bn and its profit fell by 1.7% to Euro2.16bn. In the first quarter of 2015, Holcim's cement sales fell by 5.5% to 31.2Mt, its sales grew by 10.7% to Euro3.69bn, its EBITDA grew by 9.5% to Euro552m and its profit fell by 0.9% to Euro243m. Holcim said that its sales were boosted in part due to increased aggregate and cement sales in

Germany, however, these volumes were themselves boosted by the acquisition of Cemex West's assets.

Lafarge's sales fell by 2% year-on-year in 2014 to Euro12.8bn, its EBITDA fell by 3% to Euro2.72bn and its operating income fell by 3% to Euro1.88bn. However, its cement sales volumes grew by 4% and its net debt fell to Euro9.3bn. In the first quarter of 2015, Lafarge's net loss fell by 28.8% to Euro96m, which it attributed to seasonal factors. Its sales grew by 6% to Euro2.78bn and its cement sales fell by 4% to 25Mt, with an 8% volume loss in western Europe, mainly due to lower volumes in France.

In 2014 Cemex's net sales grew by 3% year-on-year to Euro13.8bn, its operating earnings grew by 9% to Euro1.46bn and its EBITDA grew by 4% to Euro2.4bn. In the first quarter of 2015, Cemex's cement sales grew by 4% to 16.2Mt, its net sales fell by 5% to Euro2.98bn, its operating earnings grew by 25% to Euro294m and its EBITDA grew by 6% to Euro499m. In northern Europe, Cemex's net sales fell by 23% to Euro614m and its EBITDA grew by 174% to Euro31.2m. In Germany, its domestic grey cement volumes fell by 54% and its pro-forma cement volumes grew by 5%. Cemex said that the main driver for cement consumption continued to be the residential sector, despite constraints like land availability and regulatory caps on rental increases. The sector benefited from low unemployment, low mortgage rates, rising purchase power and growing immigration. Cemex added that the German infrastructure sector showed signs of recovery.

Right - Table 3: Fuel energy consumption (%) in German cement plants in 2005, 2010-2012. **Source:** The VDZ.

Fuel	2005	2010	2011	2012
Coal	9.8	10.2	10.6	10.4
Lignite	32.8	23.5	25.1	23.7
Petcoke	4.7	3.8	2.2	3.4
Heavy fuel oil	2.5	0.6	0.5	0.4
Fuel oil	0.2	0.3	0.2	0.7
Gases	0.6	0.1	0.2	0.2
Other fossil fuels	0.6	0.5	0.1	0.2
Alternative fuels	48.8	61.0	61.1	61.0

Sustainability

Fuels

German cement plants have traditionally used coal and lignite with small amounts of heavy fuel oil for thermal energy (Table 3). Coal has been partially replaced by petcoke since the 1990s and the use of alternative fuels has risen significantly.

The average alternative fuel substitution rates by German cement plants was 61% in 2012, representing 57.3mGJ/yr.³ By comparison, the average 2012 alternative fuel substitution rate of the EU28 was 37%, of which 5% was biomass.⁷ Industrial and commercial waste was the most significant type of alternative fuel used in German cement plants in 2012, although municipal waste, sewage sludge, waste plastics and waste tyres were also heavily used (Table 4).

In 2014, HeidelbergCement had a global alternative fuels substitution rate of 21%, while Buzzi Unicem's rate was 19.3% (Table 5). Dyckerhoff, Buzzi Unicem's German subsidiary, had a substitution rate of 54.9%. In January 2015, N+P and Dyckerhoff, which have worked together since 2013 to improve the Subcoal alternative fuel for use in Dyckerhoff's kilns, developed a new, high-quality Subcoal for use at Dyckerhoff's plant in Lengerich. The Geseke plant still uses the standard-quality Subcoal.

Meanwhile, Holcim reached a global alterna-

Right - Table 4: Alternative fuel consumption in German cement plants in 2012. **Source:** The VDZ. **Note:** MBM = meat and bone meal.

Fuel	Consumption ('000t/yr)	Energy (MJ/kg)
Waste tyres	234	28
Waste oil	56	26
Waste paper	96	4
Waste plastics	474	23
Waste textiles	3	17
Other industrial & commercial waste	1246	21
MBM	176	18
Municipal waste	352	15
Waste wood	8	14
Waste solvents	96	22
Sewage sludge	310	4
Others	54	9

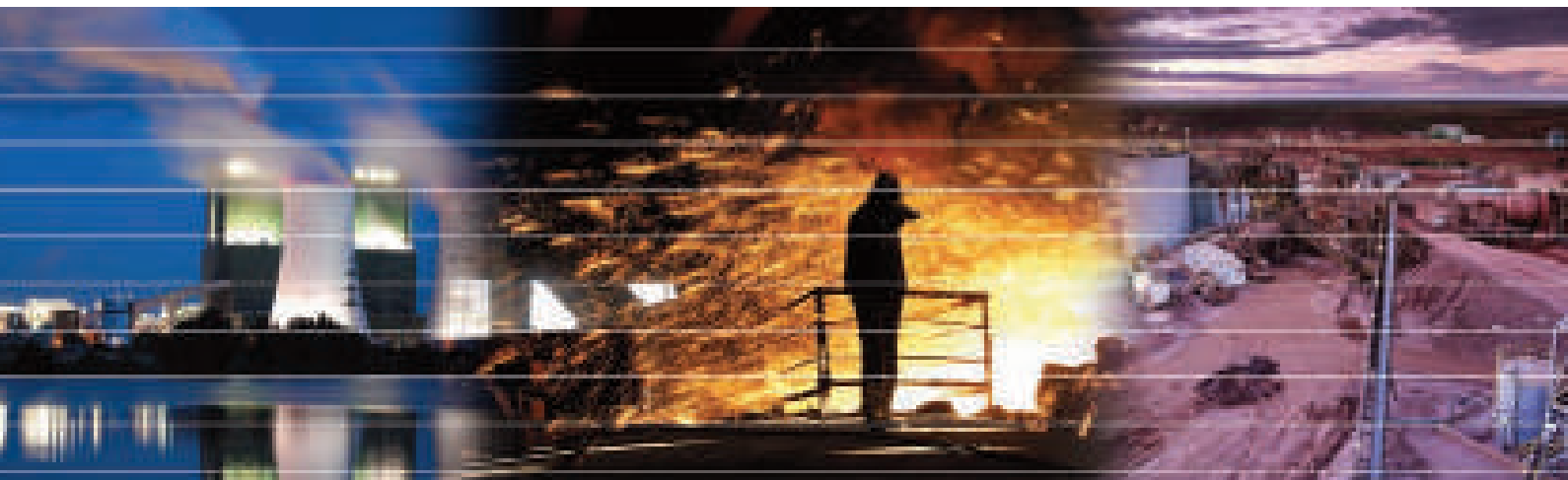
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tive fuels rate of 14% in 2014. In February 2014 it commissioned a new combustion chamber at its Lägerdorf plant that was specifically designed for alternative fuels.⁸ The same plant uses broken wind turbine blades as alternative fuels;⁹ each 1t of processed blade resin replaces 600kg of conventional fuels and, due to its high silica content, the resin can also replace some of the sand as an alternative raw material (ARM).

In other news, Schwenk Zementwerke said that its average alternative fuels substitution rate 'exceeds 90%.' In December 2014 it installed a new 15t/hr Beumer pipe conveyor at its Bernburg cement plant, which has increased the alternative fuels dosing rate and reduced noise and dust emissions.¹⁰

Cemex posted the only reduction in alternative fuel use among Germany's cement producers. Its 2014 alternative fuels rate fell to 27.7% from 28.4% in 2013. The 27.7% included 11.4% of biomass, which fell from 12.3% in 2013. In contrast, Lafarge's alternative fuels rate was 20.7% in 2014, up from 17.2% in 2013 and including 6.8% of biomass.

The disparity between the alternative fuels substitution rate of Germany's top cement producers and the significantly-lower German averages reported by the VDZ are explained by the cement producers' non-EU assets. The technology in non-EU cement plants is typically much older, less energy-efficient, more highly-polluting and with less alternative fuel

use. One example of this will likely be seen now that the LafargeHolcim merger has closed; according to Holcim's 2014 sustainability report, the merger, 'Will present increased sustainability challenges.' Lafarge-Holcim's alternative fuels substitution rate is likely to be considerably lower than the Lafarge and Holcim 2014 average of 17.4%, as many of the asset divestments are in Europe, where higher alternative fuel substitution rates are typical.

Alternative raw materials

'ARMS' play a significant role in Germany's cement industry.³ In 2012, some 5.93Mt of blast furnace slag, 222,000t of fly ash and 142,000t of shale oil was used. Other materials, like lime sludge from water treatment, comprised 59,000t of raw materials, while 159,000t of used foundry sand was also consumed. Regarding additives, some 722,000t of natural gypsum, 476,000t of anhydrite and 339,000t of flue gas desulphurised (FGD) gypsum was used in 2012.

The German cement industry is increasing its ARM use and reducing its clinker factor as stipulated by the German Waste Management and Recycling Act.¹¹ HeidelbergCement, Holcim, Lafarge and Cemex's clinker factors all fell year-on-year in 2014 (Table 5); while Buzzi Unicem's global rate rose marginally to 79.9%, its rate in Germany fell to 70.9%. Buzzi Unicem and Cemex's ARM substitution rates both fell in 2014, however, Buzzi Unicem's German ARM rate rose to 13.1%.

In April 2014, Spenner Zement opened a new slag sand mill that produces slag cements from blast furnace slag in Duisburg, North Rhine-Westphalia.¹² The plant replaced its less energy- and fuel-efficient slag sand mill in Erwitte, North Rhine-Westphalia. Spenner Zement said that the new plant would reduce specific power consumption, CO₂ emissions and clinker factor group-wide.

Energy

In Europe, around 30% of cement plant operating costs relate to energy. German cement plants became more energy-efficient until the 2000s, when specific energy consumption was 2674MJ/t and specific electricity consumption

Below - Table 5: Alternative fuels and alternative raw materials substitution rates and clinker factors (% change from 2013) of Germany's major cement producers in 2014. **Source:** Company websites and sustainability reports.

	Alternative fuels rate	Clinker factor	Alternative raw materials rate	Notes
HeidelbergCement	21%	75% (-1.32%)	-	• Expects alternative fuels rate of 30% by 2020
Dyckerhoff (Buzzi Unicem)	19.3%	79.9% (+0.63%) 70.9% in Germany	8% (-2.4%) 13.1% in Germany	• Alternative fuels rate includes 3.86% biomass • German alternative fuels rate was 54.9% in 2014 • Geseke plant = 70% • Göllheim plant = 60.6% • Deuna plant = 57% • Uses waste plastics, municipal wastes (CDR), exhaust lubricants, biomass and waste solvents
Holcim	14%	72% (-0.14%)	-	• Alternative fuels rate includes 4% biomass • Uses broken wind turbine blades at Lägerdorf plant as alternative fuel and ARM
Schwenk Zementwerke	>90%	69.8%	>20%	• Uses waste tyres, industrial and municipal waste, waste wood • Installed new Beumer alternative fuels conveyor in December 2014
Lafarge	20.7%	72% (-0.14%)	-	• Alternative fuels rate of 17.2% in 2013 • Alternative fuels rate includes 6.8% biomass • Expects alternative fuels rate of 50% by 2020
Cemex	27.7%	76.5% (-0.52%)	11.2% (-3.45%)	• Alternative fuels rate of 28.4% in 2013 • Alternative fuels rate includes 11.4% biomass (12.3% in 2013) • Uses industrial and household waste (49.7%), other biomass (31.6%), tyres (9%), agricultural organic waste (7.2%), MBM (2.5%) • Expects alternative fuels rate of 35% by 2020

was 99kWh/t. Specific energy consumption grew to 2866MJ/t and specific electricity consumption grew to 110.8kWh/t in 2012 due to the increase in demand for finely-ground high-performance cement. Thermal energy is primarily used for clinker burning, while electrical energy is used for grinding (38%), raw material pre-treatment (35%) and clinker cooling (22%).

Germany's energy sector is changing. Safety and environmental factors are now key priorities. Following the melt-down of three of the Fukushima Daini Nuclear power plant reactors in Japan, triggered by the Tōhoku earthquake and subsequent tsunami in March 2011, chancellor Merkel announced that eight of Germany's 17 nuclear reactors would be shut down immediately, while the remaining plants would close by 2022. Germany ultimately hopes to replace nuclear power with renewable energy.

In 2014 Germany's major cement producers reported a mixture of rises and falls for their global specific energy consumption (Table 6). Buzzi Unicem, which experienced a 0.75% increase in specific energy consumption, said that due to the 'industry crisis,' it was unable to manage its kiln lines optimally. However, its German specific energy consumption fell to 3941MJ/t. Holcim attributed its 24.2% fall to increased alternative fuels use and equipment optimisations. HeidelbergCement has not made its specific energy or electricity consumption data, or indeed its emissions data, publicly-available.

In contrast, all of the companies that reported specific electricity consumption data had experienced either small reductions or no change. Cemex, a world-leader in terms of renewable energy, reported a 1.69% fall. In 2014 some 14.6% of its electrical energy was from renewable sources. Although most of its recent developments were in the Americas, Cemex operates a 30MW waste-to-energy plant in Rüdersdorf, which powers its nearby cement plant.

As for German alternative fuel use, the VDZ-reported averages for specific energy consumption are much lower than the global data reported by Germany's producers. This was again due to Germany's technologically-advanced and energy-efficient cement plants compared to the same producers' cement plants elsewhere in the world.

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Emissions

German cement plants are subject to the Federal Ambient Pollution Protection Act, which stipulates different emissions limits depending on the fuels in use. Dust, NO_x and SO₂ emissions are usually monitored continuously, while most other emissions are monitored discontinuously. However, NH₃, Hg and total organic carbon (TOC) emissions are measured continuously more and more often.

In 2013, the VDZ reported that average German CO₂ emissions fell to 559kg/t of cement, down from 576kg/t in 2012.³ CO₂ emissions were contributed to by thermal energy (99kg/t), electrical energy (74kg/t) and raw materials (387kg/t). In comparison, in CEM-BUREAU member countries CO₂ emissions averaged 841kg/t in 2012.

Germany's major cement producers reported a selection of emissions data for 2014, although much of the data refers only to global averages.

Below - Table 6: Specific emissions levels, energy and electricity consumptions and year-on-year changes in brackets for Germany's major cement producers in 2014. **Source:** Company sustainability reports.

Input	Buzzi Unicem global	Buzzi Unicem German	Holcim global	Lafarge global	Cemex global
Energy consumption (MJ/t)	4009 (+0.75%)	3941	4578 (-24.2%)	3613 (-0.05%)	3854 (+1.10%)
Electricity consumption (MJ/t)	118 (-0.84%)	115	94 (0%)	-	116 (-1.69%)
Emissions	Buzzi Unicem global specific concentration (g/t)	Buzzi Unicem German specific concentration (g/t)	Holcim global specific concentration (g/t)	Lafarge global specific concentration (g/t)	Cemex global specific concentration (g/t)
CO₂	706,000 (+2.47%)	603,000	594,000 (+0.68%)	594,000 (-0.34%)	653,000 (+0.77%)
NO_x	1831 (+2.06%)	745	1120 (-0.40%)	1407 (-12.6%)	1205 (-4.44%)
SO_x	248 (+6.89%)	28	210 (+5.00%)	400 (+15.3%)	257 (+19.5%)
Dust	118 (-2.93%)	8	30 (-34.8%)	113 (-17.5%)	134 (+5.52%)
Mercury	0.036 (+33.3%)	0.030	0.007 (-2.00%)	0.0243 (+22.7%)	-
TOC	-	-	36 (-5.26%)	-	-
Dioxins/Furans	-	-	0.00000018 (-18.2%)	0.00000030 (-13.4%)	-



HeidelbergCement only posted its global CO₂ emissions, which fell by 0.66% year-on-year to 609kg/t in 2014. Buzzi Unicem said that its emissions were 'negatively affected by the industry crisis in 2014.' Its global CO₂ emissions grew by 2.47% to 706kg/t of cement, however, as for all of its emissions, its German CO₂ emissions were significantly lower (Table 6). Overall, emissions levels were mixed, with improvements in some areas overshadowed by poor results elsewhere. Most notably, all of Germany's major producers reported higher SO_x emissions in 2014.

Supplier news

Germany is home to many world-leading suppliers to the global cement industry. Significant German cement industry supplier events in 2014-2015 included new products, personnel and contracts.

Aumund Fördertechnik appointed Robert Gruss as its new managing director with effect from 1 November 2014. He is responsible for sales, service and technology and research and development. Gruss also joined the managing board. During 2015, Aumund's president, Franz-W Aumund, will gradually retire from operational business. He will continue as managing director of Aumund Holding and as member of the advisory boards of the product and daughter companies. Gruss will take over additional responsibilities from Franz-W Aumund.

In November 2014, FRITZ & MACZIOL expanded its contract with HeidelbergCement. Under HeidelbergCement's 'Logistic Efficiency Optimisation' (LEO) initiative, FRITZ & MACZIOL's IT logistic solution VAS, which is currently installed at four of HeidelbergCement's German cement plants, will be rolled out to the remaining German plants, in addition to several of its other global cement, aggregates and concrete businesses. HeidelbergCement also named FRITZ & MACZIOL as a 'preferred supplier.' The technology is also used by Phoenix Cement.

Haver & Boecker selected November 2014 to launch three new products. The Roto-Packer, based on Adams technology, fills powder-type bulk materials into compact polyethylene bags at speeds of up to 600bags/hr and over a steplessly adjustable weight range of 1-10kg. Haver Innovation Management is working to increase the packing speed to 1200bags/hr.

HeidelbergCement buys Italcementi

In July 2015 HeidelbergCement announced its plan to acquire Italy's Italcementi for Euro3.7bn. It began with the purchase of 45% of Italcementi's shares for Euro1.67bn, subject to approval by the relevant authorities. As the fifth- and seventh-largest cement producers in the world in 2014, the deal stands to cause significant changes in the global cement industry.

The new G600 palletiser series from Newtec Bag Palletizing, a Haver & Boecker subsidiary, was also launched. Finally, Haver & Boecker subsidiary Feige launched the Feige PalletFill Type 16, a swivel-type pallet filling station with 'Plug & Fill' and 'ATEX compliance' functions. The pallet-filling station is used for the automatic and calibrated filling of drums and pails on pallets.

Hendrik Rahms joined Loesche ThermoProzess GmbH (LTP) in the technical sales and product development of thermal applications areas in November 2014. Rahms previously worked as a process engineer and project manager at burner solutions and process technology company Brinkmann Industrielle Feuerungs-Systeme GmbH.

On 1 April 2015, Uwe Vãth assumed control of operations and was named joint managing director at Schenck Process Group. He is responsible for global manufacturing, supply chain and purchasing. Horst Klein was appointed as vice president of purchasing.

Also in April 2015, Haver & Boecker announced plans to launch its newest generation INTEGRA® Form-Fill-Seal design system for filling tubular film bags with cement, building products and chemical products, among others, by the end of 2015. The largest system is designed for speeds of up to 3200bags/hr. The weight spectrum is 1-50kg. 2000kg is possible with big bags. "We can find a solution for almost every possible 'product-packaging-weight' combination, completely customised to suit customer wishes," said Robert Brüggemann, business unit manager of Haver Chemicals.

Holcim's Cemex West acquisition

In August 2013 Cemex and Holcim proposed a series of asset transactions in Europe. Cemex planned to sell, among other European interests, its assets in west Germany, namely one cement plant and two grinding plants with a total capacity of 2.5Mt/yr, one slag granulator, 22 aggregates quarries and 79 ready-mix plants. Cemex would retain its interests in other parts of the country and receive Euro70m in cash from Holcim.

In October 2013 the European Commission (EC) launched an investigation into the plan, citing concerns that the acquisition of Cemex's west German assets may reduce competition in parts of Germany and Belgium. However, in June 2014 the EC granted Holcim clearance to complete the acquisition.

In November 2014 Cemex signed binding agreements with Holcim for the transactions. The final scope included Cemex's acquisition of all of Holcim's assets in the Czech Republic and the divestment of its assets in west Germany to Holcim. In Spain, Cemex acquired Holcim's 0.85Mt/yr capacity Gador cement plant and its 0.9Mt/yr capacity Yeles cement grinding plant. Cemex also paid Euro45m in cash to Holcim. The deal was closed in January 2015.

The LafargeHolcim merger

The ‘merger of equals’ of France’s Lafarge and Switzerland’s Holcim was first announced on 7 April 2014. Although the combined company will benefit from reduced costs and improved profitability, due to the large amount of overlap in operating regions, significant asset divestments were necessary to maintain competition in several world regions.

In Germany at the start of 2015, Holcim had 4.23Mt/yr of production capacity, representing 13.2% of the industry, while Lafarge had 3.1Mt/yr or a 9.65% market share. Germany was one of the most heavily-affected EU countries by the LafargeHolcim merger;¹³ the merged company would have had 7.33Mt/yr of cement production capacity, a market share of 22.8%, if not for the asset divestments required by the EC. Instead of overtaking Dyckerhoff to become Germany’s second-largest cement producer, Lafarge was required to sell all of its German assets.

In February 2015 CRH agreed to pay Euro6.5bn for many of Lafarge and Holcim’s assets, mainly in Europe and the Philippines. CRH planned to fund the purchase through a mix of existing cash, debt and equity placing. The assets included 36Mt/yr of cement production capacity from 24 cement plants and included all of Lafarge’s assets in Germany. The deal also included aggregates, ready mixed concrete and asphalt assets. In April 2015, CRH was approved by the EC as a purchaser of Lafarge and Holcim’s European assets.

The merger was ultimately completed on 15 July 2015 and LafargeHolcim was created. Lafarge’s German assets were sold to CRH in August 2015.

Outlook

The IMF has predicted that Germany’s GDP will grow by 1.6% in 2015, a rate unchanged from 2014 (Table 7). This is in contrast with the EU and advanced economy averages, where the GDP growth rate is expected to increase. The IMF said that Germany, ‘Could do more to encourage growth, especially by undertaking much-needed public investment.’


The outlook for the German construction sector is uncertain. HeidelbergCement has raised concerns about the effects of Quantitative Easing,¹⁴ which started in January 2015. In addition to a volatile investment environment and reduced competitiveness with Asia and the US, ‘I’m concerned that this leads to another bubble,’ said Bernd Scheifele, HeidelbergCement chief executive and chairman of the managing board. However, construction sector optimism hit a four-year high in February 2015,¹⁵ industrial production and exports rose unexpectedly in April 2015,¹⁶ while in June 2015 Reuters reported that the positive market developments were expected to continue throughout 2015.¹⁷

All of Germany’s major cement producers expect

	2014	2015	2016
Germany	1.6	1.6	1.7
Europe	0.9	1.5	1.6
Advanced economies	1.8	2.4	2.4

Left - Table 7: GDP growth rates of Germany, Europe and advanced economies (%).
Source: IMF World Economic Outlook Database April 2015.

improvements in 2015 and beyond, however, several have voiced concerns about Europe. ‘We are confident about 2015. The outlook for the global economy is positive, but there are still macroeconomic and geopolitical risks,’ said Scheifele. HeidelbergCement was the only producer to state that it expects any EU-growth to stem from ‘positive development in the UK, Germany and northern Europe.’ Indeed, Holcim said that the global economy would continue to recover gradually in the near future, but it expects that cement sales volumes will remain flat in Europe.

The VDZ’s forecast of 1% cement consumption growth in 2015, combined with a slowly-growing construction sector suggests that in the absence of any dramatic changes to Germany’s economy, its cement sector will continue to slowly recover. 

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Amy Saunders, Global Cement Magazine

Global CemFuels focus: Southern Europe

Southern European countries like Italy, Portugal and Cyprus have relatively low alternative fuel substitution rates compared to much of the rest of Europe and a high dependence upon imported fuels. Italy and Portugal have under-developed waste management supply chains. While in Portugal efforts are being made to address this, Italy's stunted economy and cement industry means that few improvements have been made in recent years.

Portugal



Cement production

Portugal's cement industry comprises six cement plants. Three are owned by Industria de Cimentos (Cimpor) and three are owned by SECIL. The plants have a combined production capacity of 11.6Mt/yr, including 210,000t/yr of white cement from SECIL's Cibra-Pataias plant in Leiria, Maceira.

Portuguese cement production levels peaked in 2010 at 7.2Mt, according to the USGS.¹ In the following years, the country's adverse economic environment had a depressive effect on its construction and cement sectors and demand plummeted. SECIL reported that cement demand fell by 20% to 2.8Mt/yr in 2013, on top of a 28.6% year-on-year drop in 2012.² Cimpor said that Portugal's cement demand was around 3Mt in 2014.³

Both of Portugal's producers turned to the export markets to rally their businesses, although SECIL pointed to overcapacity in Spain as presenting a challenge to this tactic. SECIL's Portuguese cement sales fell by 14.4% year-on-year to Euro260,000 in 2013. Its cement sales volumes fell by 21% year-on-year to 1.08Mt. However, its exports grew by 16% to 1.06Mt.

Cimpor posted similar results for 2014. Its domestic cement sales volumes fell by 12% year-on-year to 1.3Mt in 2014, while its exports from Portugal rose by 20% year-on-year to 3Mt. Cimpor said that, although exports have lower prices than domestic sales, the export market growth was good for the long-term.

Alternative fuels background

In Portugal waste co-processing is regulated, among other statutes, by Decree-Law 85/2005.⁴ The regulation, which is composed of 49 articles and five annexes, aims to prevent or reduce the negative effects of waste incineration on the environment. It defines the limit values for air emissions and for waste discharges and regulates waste transport, storage and recycling, as well as control and monitoring procedures.

Portugal's two cement producers frequently collaborate for improved waste management systems so that both benefit from the use of alternative fuels. In December 2014, N+P International signed a five year contract for the supply of solid recovered fuels (SRF) to SECIL and Cimpor cement plants. The contract was signed by Gestão Ambiental e Valorização Energética (AVE), a subsidiary company of SECIL, Cimpor and Serviços de Gestão e Valorização de Resíduos (SGVR). Created in 2003, AVE processes waste from Portugal and Spain and transports it to the cement plants in Portugal for use as alternative fuels and raw materials. It currently processes around 300,000t/yr of waste.

"In the past years we have invested millions to develop the UK market. Now N+P has several port sites at strategic locations and the possibility to use a large number of sea containers," said Karel Jennissen, N+P chairman. N+P has committed to supply >700,000t of SRF to Portugal in the next five years. The majority of the SRF is already sourced and contracted by companies in the UK recycling market. A

PORTUGAL

1. Cimpor, Alhandra, 3.1Mt/yr.
2. Cimpor, Loule, 0.85Mt/yr.
3. Cimpor, Souselas, 3.2Mt/yr.
4. SECIL, Pataias, Leiria, Maceira, 0.77Mt/yr grey & 0.21Mt/yr white.
5. SECIL, Liz, Leiria, Maceira, 1.45Mt/yr.
6. SECIL, Outão, Setubal, 2Mt/yr.



Right - Figure 1: Integrated cement plants, locations and production capacity in Portugal in 2015. Source: The Global Cement Directory 2015.



Alternative fuel	%
Tyres and rubber	59.54
Agricultural	13.23
Animal meal	7.77
Industrial wastes	6.87
Fossil wastes	6.13
Plastics	3.27
Dry sludge	2.71
Solvents	0.17
Biomass	0.16
Waste oil	0.14

minor part of the volume will be sourced in Italy and France.

This will not be N+P's first venture in Portugal. On 8 May 2014 it sent its first 2500t batch of SRF from the UK to Lisbon.⁵ The material came from the N+P plant in Grimsby, North East Lincolnshire.

Alternative fuels used by cement producers

Industria de Cimentos (Cimpor)

Industria de Cimentos (Cimpor) has three cement plants and 7.15Mt/yr of cement production capacity in Portugal.

In its 2011 sustainability report, Cimpor said that its global alternative fuel substitution rate was 5.1%, up from 4.7% in 2010, although its biomass substitution rate fell to 1.2% from 1.4%.⁶ Its gross CO₂ emissions from cement production grew to 686.86kg/t from 677.72kg/t in 2010. Although its Portuguese plants only accounted for 3% of its global alternative fuel consumption, Cimpor estimated that its thermal substitution rate in Portugal was around 10%. Tyres and rubber comprised the largest type of alternative fuel used by Cimpor around the world, at 59.5% (Table 1).

Cimpor's Loulé plant in Faro has had an alternative fuels facility since 2009.⁷ It processes biomass and refuse-derived fuel (RDF) like waste tyres for use in the precalciner. There are two storage bays equipped to receive the waste and a crane with an automated claw to transfer the waste from the bays to the hopper that feeds the batching belt. The belt batches the material depending on the fuel requirements of the precalciner, with a batching range of 0.5-5t/hr. A sloping and fully-covered belt conveyor with a final metal belt feeds the precalciner through a triple flap gate to prevent the entry of false air into the precalciner. The Loulé plant also uses bottom ash as an alternative raw material. Cimpor also completed an alternative fuels facility at its Alhandra plant in 2014.

SECIL - Companhia Geral de Cal e Cimento

SECIL has three cement plants and 4.43Mt/yr of cement production capacity, including 21,000t/yr of white cement capacity, in Portugal.

	2012	2013
Natural raw materials (Mt)	7.29	7.65
Secondary raw materials (t - %)	298,000 - 3.5	249,000 - 3.2
Solid fossil fuels (t)	349,000	333,000
Gaseous fossil fuels (Nm ³)	24,000	18,000
Alternative fuels rate (t - %)	169,000 - 21.1	169,000 - 21.1
Biomass substitution rate (%)	9.4	10.0
Gross CO ₂ cement production emissions (kg/t)	661	640

In 2013 SECIL's global alternative fuel substitution rate was 21.1% (Table 2), when it burned the same amount (169,000t) of alternative fuels as in 2012.⁴ Globally, SECIL reduced its solid and gaseous fossil fuel use in 2013 compared to the prior year. It also increased its biomass substitution rate to 10% and reduced its gross CO₂ emissions.

In Portugal, SECIL's alternative fuels substitution rate rose from 41% in 2012 to 44% in 2013. Although it aimed to use 55% of alternative fuel in 2013, this was not achieved 'due to the availability and characteristics of the alternative fuels available on the market.' In 2005-2013, the co-processing of 1Mt of waste avoided 1Mt of CO₂ emissions and allowed a 340,000t reduction of coke imports, saving Euro26m.

The Maceira plant in Leiria was SECIL's first plant to use shredded tyres as an alternative fuel. It generates 10-13% of its thermal energy from these. The Outão plant in Setúbal burns coal, fuel oil, gas, pet coke and alternative fuels. In 2013, SECIL completed its gas bypass systems on the clinker lines in Outão and Maceira, which it said increased its use of alternative fuels. SECIL also increased the use of industrial waste as an alternative fuel and expanded its RDF storage capacity.

Outlook

The IMF has predicted that Portugal's GDP will grow by 1.6% in 2015 and 1.5% in 2016,⁸ following 0.9% growth in 2014. While the country's long-term

Far left - Table 1: Cimpor's global alternative fuel statistics in 2011.

Source: Cimpor's 2011 Sustainability Report.

Left - Table 2: SECIL's global raw material and fuel statistics in 2012 and 2013.

Source: SECIL's 2013 Sustainability Report.

Below - Figure 2: SECIL's Outão cement plant in Setúbal. **Source:** ApplEcol.





prospects are positive, the construction and cement sectors are expected to take a significant amount of time to fully recover. As such, Portugal's installed capacity and production rates will continue to surpass domestic demand for some time. Despite the low domestic demand, Cimpor and SECIL both reported fast-growing export markets during 2013, primarily to Africa and South America. This will help to boost demand and prompt higher capacity utilisation rates. Further, Cimpor stated that it expects the domestic cement industry to begin to recover in 2015.

With regards to alternative fuels, Cimpor aims to increase its substitution rate to 30% by 2016 and its biomass substitution rate to 5% in the same period. SECIL's aims are less specific; it plans to increase its alternative fuels substitution rate, particularly its use of waste biomass. As previously noted by SECIL, Portugal's waste management supply chain cannot provide an adequate supply of SRF for cement producers to continue to increase their alternative

fuel substitution rates. N+P has recently started to address the shortfall from its UK operations, but scope is likely to remain for new market entrants.

Italy



Cement production

The cement industry in Italy comprises 44 active cement plants and 45.2Mt/yr of active cement production capacity. There are an additional 10 cement plants that are mothballed or that only operate when required by market demand. Italy's cement sector includes both large multinationals like Italcementi and Buzzi Unicem, as well as smaller local players like SACCI and Calme Cementi.

According to the Italian Technical and Economic Association of Cement (AITEC),⁹ in 2014 cement production fell by 6.9% year-on-year to 20.2Mt. Domestic deliveries fell by 7.3% year-on-year to 18.1Mt



Right - Figure 3: Integrated cement plants, locations and production capacity in Italy in 2015. **Source:** The *Global Cement Directory 2015*.

and exports fell by 2.6% to 2.13Mt. According to Buzzi, Italy's cement sector has been in decline for eight consecutive years. Since its peak in 2006, consumption has fallen by >57%.¹⁰

In 2014, cement and clinker volumes in Italy, exports included, decreased by 7.6%. Export sales suffered due to oversupply in the Mediterranean area. Sales prices fell by 6.6%, partly due to the change in sales mix, with a higher portion of clinker sold. Buzzi's production costs remained stable (-0.4%) thanks to the favourable trend in energy factors, especially for electricity. Cementir reported similar results, including cement sales volumes that fell by 7.8% year-on-year to 1.62Mt in 2014.¹¹ In contrast, Italcementi's cement and clinker sales volumes in Italy only fell by 0.6% year-on-year during the year.¹²

Alternative fuels background

Italy's use of alternative fuels for cement production is less well-developed than many other European countries. Indeed, petcoke and natural gas appear to be the most common fuels used in the country. According to the AITEC, in 2012 Italian cement plants used around 300,000t of alternative fuels (Table 3), achieving an alternative fuels substitution rate of around 10%.¹³ A significant change to the alternative fuel mix was seen in 2013, when more RDF, plastic and rubber was used (Table 4). Industry-wide during 2013, 301,516t of alternative fuels were used, representing an 11% alternative fuels substitution rate.

Alternative fuels used by cement producers

Italcementi

Italcementi has 16 cement plants and 16.0Mt/yr of cement production capacity in Italy, although six of its plants are closed (4.35Mt/yr of production capacity), two are mothballed (1.00Mt/yr of production capacity) and two operate on a campaign basis only (530,000t/yr of production capacity). It is Italy's largest cement producer and also has significant presence in other world regions.

Italcementi's global alternative fuel substitution rate was 10.8% in 2014,¹⁴ up from 9.4% in 2013. Its substitution rate in mature markets (including Italy) was 15.4%, of which 6.0% was biomass. The overall rate did not change from 2013, although the biomass rate improved from 5.4%. Italcementi uses coal, petcoke, high-viscosity fuel oil, natural gas and fuel oil at its plants. Its alternative fuels breakdown in 2014 was:

- Agricultural waste: 24.3%;
- Tyres and rubber: 20.5%;
- Solid waste: 16.1%;
- Liquid waste: 12.1%;
- Meat and bone meal (MBM): 9.4%;
- RDF: 7.3%;
- Waste oils: 5.8%;
- Plastic: 2.6%;
- Sludge: 2.1%.

Italcementi aims to have a global alternative fuels substitution rate of 10% in 2015.

Colacem

Colacem has ten cement plants and 10.2Mt/yr of cement production capacity in Italy, although its 230,000t/yr cement plant in Firenze is mothballed. According to its 2013 sustainability report, Colacem's global alternative fuel substitution rate in 2013 was 7.9%, down from 8.8% in 2012 but up from 6.2% in 2011. Colacem's main fuel is petcoke, although it also uses fuel oil, coal, methane and recoverable waste (waste-derived fuel (CDR) and oils). Colacem plans to increase its use of alternative fuels further, especially biomass.

Buzzi Unicem

Buzzi has 10 cement plants and 9.28Mt/yr of cement production capacity in Italy. Its alternative fuel substitution rate in Italy was 13.9% in 2013, unchanged from 2012. It stated that its substitution rate was limited 'with respect to the quantities authorised.' Worldwide, Buzzi's substitution rate was 19.1% in 2013. Aside from alternative fuels, Buzzi uses petcoke, coal, natural gas, fuel oil and lignite at its plants.

In Italy in 2013, Buzzi used 91,382t of CDR, oil emulsions and MBM. It highlighted its alternative fuel use at the following plants:

Below - Table 3: Italy's alternative fuel use in 2012.
Source: The AITEC.

Alternative fuel	2012 (t)
RDF	170,000
Plastics and rubber	40,000
Waste tyres	30,000
MBM	20,000
Sewage sludge	15,000
Waste oils	10,000
Other liquids	10,000
Waste solvents	5000
Total	300,000

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Right- Table 4: Italy's alternative fuel use in 2013. **Source:** The AITEC.

Alternative fuel	2013 (t)
RDF	180,267
Plastics and rubber	63,197
Waste tyres	19,985
Hazardous liquid wastes	11,733
Sewage sludge	8044
Materials unsuitable for consumption or processing	6378
Emulsions	5861
Non-chlorinated emulsions	3272
Other	1636
Waste oils	1084
Fluff	59
Total	301,516

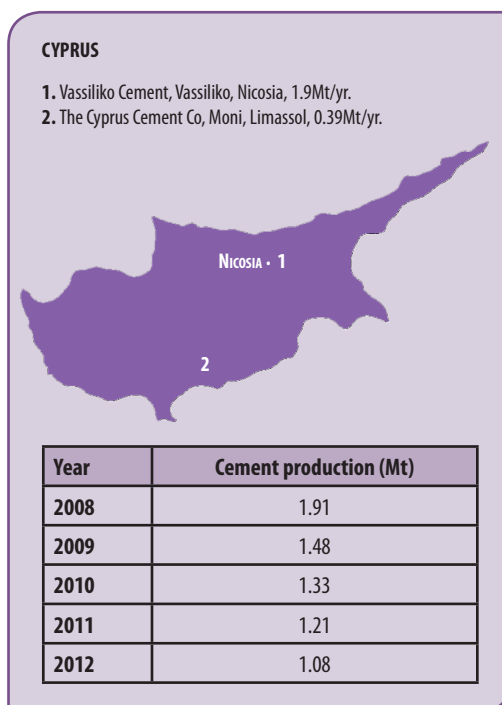
- Robilante plant: 56,582t, 27.9%;
- Barletta plant: 25,895t, 37.5%;
- Travesio plant: 5861t, 31%;
- Vernasca plant: 3043t of MBM.

According to Buzzi, the use of alternative fuels has led to a reduction in petcoke consumption of 51,800t. Similarly, the co-processing of waste with biogenic content (equal to 50.7% for CDR and 100% for MBM) reduced its CO₂ emissions by about 90,000t.

Cementir Holding

Cementir has four cement plants and 4.30Mt/yr of cement production capacity in Italy. Its global alternative fuels substitution rate was 11.94% in 2013, however, it does not distinguish between countries. Cementir operates waste management companies in the UK and in Turkey via its subsidiary, Recydia.

Right - Figure 4: Integrated cement plants, locations and production capacity in Cyprus in 2015. **Source:** The Global Cement Directory 2015.



Right - Table 5: Cement production in Cyprus in 2008-2012. **Source:** The USGS Minerals Yearbook, Cyprus, 2012.

Outlook

The IMF has predicted that Italy's GDP will grow by 0.5% in 2015 and by 1.1% in 2016, following a 0.4% GDP contraction in 2014.⁸ However, construction sector growth is expected to remain negative for some time after the economic recovery has begun. In 2014-2018, the entire sector has been forecast to grow by 0.76%/yr.¹⁵ Indeed, Buzzi and other Italian producers expect that construction prospects and investment trends will remain negative, especially in the residential and commercial building sectors. However, as Italy's cement producers are reliant on expensive fuel imports, the development of a waste management supply chain to guarantee higher volumes and qualities of alternative fuels would help producers to reduce their costs and their environmental impact.

Cyprus



Cement production

Cyprus' cement industry consists of two integrated cement plants that have 2.29Mt/yr of cement production capacity. Both plants are owned by domestic producers.

According to Vassiliko Cement, the Cypriot construction and cement industries have been in decline for five consecutive years.¹⁶ Cement consumption fell by 31.5% year-on-year to 535,000t in 2014, meeting 1979 volumes. Cement demand fell by 72% in 2008-2013. In September 2014, Vassiliko said that the domestic market 'did not show any signs of halting its downward trend' and announced plans to continue to pursue the export market.¹⁷ Doing so in the first nine months of the year enabled Vassiliko to increase its revenues from Euro58.6m in 2013 to Euro62.9m in 2014, while its Euro9485 loss in 2013 was improved to a Euro4.25m profit in 2014. Similarly, The Cyprus Cement Co reported a net loss of Euro1.19m in 2014, improved upon from a Euro10.9m net loss in 2013. However, its operating loss grew from Euro1.15m in 2013 to Euro1.58m in 2014.

Alternative fuels background

Waste management in Cyprus is legislated by Waste Law N.185 (I)/2011, the Packaging and Packaging Waste Law 2002-2006, the Management of Waste from Extractive Industries Law N.82(I)/2009, the Directive for Waste N.98/2008/EC and the Waste Law N.185(I)/2011.¹⁸ According to the legislation, Cyprus must meet targets for the recycling and recovery percentages for waste produced within its borders. Landfill avoidance is a high priority in the country.

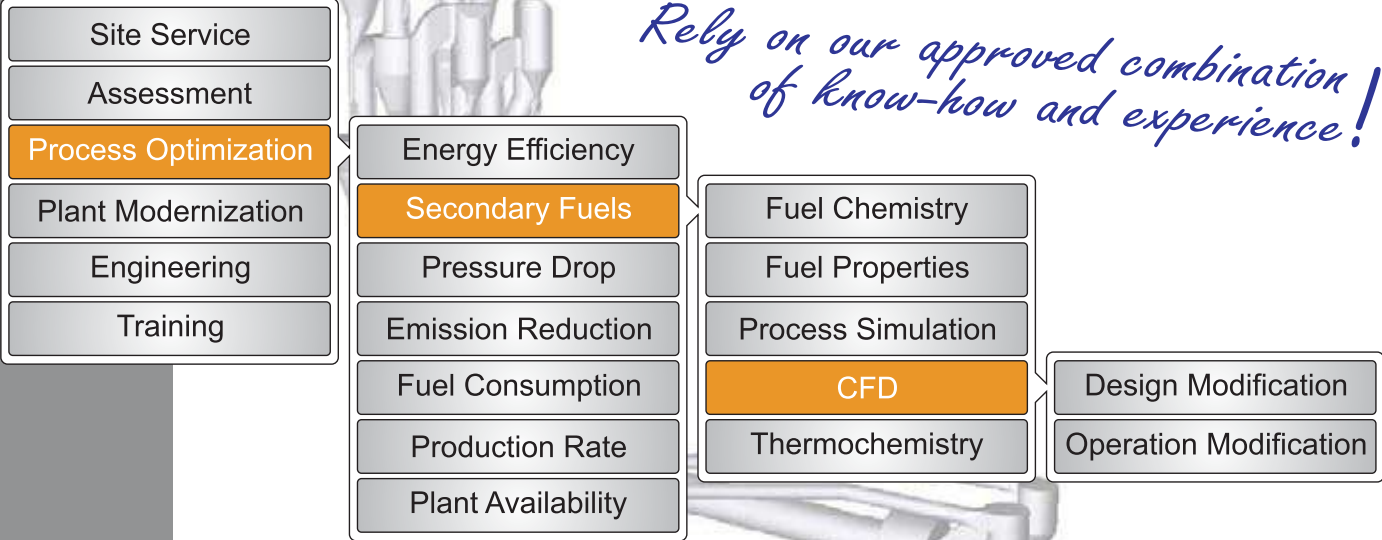
Cyprus is reliant on imports for around 91% of its oil supply,¹⁹ which makes cement plant fuel and energy expensive. Hopes that domestic oil and gas supplies may be found through exploration have recently been dashed.²⁰ Despite this, according to



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GLOBAL CEMENT: ALTERNATIVE FUELS

the ALF-CEMIND Consortium (a co-financed project by the European Commission through the Sixth Framework Programme (2002-2006) for research, technological development and demonstration), the use of alternative fuels by Cyprus' cement plants faces the following challenges:¹⁹

- Scarcity of materials;
- No waste-to-energy commitment or policy by Government bodies: Municipal waste belongs to the municipality and the decision on its utilisation is administered by the central government;
- No subsidies for collection and treatment.

Alternative fuels used by cement producers

The Cyprus Cement Co

The Cyprus Cement Co, which is owned by Galatariotis Group, runs the 0.39Mt/yr Moni plant in Limassol. No data is available regarding The Cyprus Cement Co's use of alternative fuels.

Vassiliko Cement

Vassiliko Cement, in which Italcementi has a minority shareholding, operates the 1.9Mt/yr capac-

ity Vassiliko cement plant in Nicosia. In addition to Ordinary Portland cement, it also produces white low-alkali Portland cement.


Vassiliko had an alternative fuels substitution rate of 6% using waste from Mari Garbage Site, MBM, granulated tyres and sewage sludge in 2008.²¹ At the time, the importance of using waste biomass to replace oil, coal and petcoke was highlighted due to the CO₂ savings. Vassiliko aimed to increase its alternative fuel substitution rate to 35% by 2010 by replacing five old lines with one new line from Sinoma, reducing petcoke consumption by 7.3%.

In 2010, Vassiliko signed a contract with waste processing company Enerco for the handling and shredding of waste tyres to be used as alternative fuels.²² In 2011, Sinoma said that Vassiliko's new line used shredded tires, municipal solid waste and sludge to supply 50% of its thermal energy requirements.²³

During the third quarter of 2014, Vassiliko started operations of its new alternative fuels feeding equipment.¹⁷ It said that alternative fuels would replace a substantial portion of fossil fuels, although no further details have been supplied.



Outlook

The IMF has predicted that Cyprus' GDP will grow by 0.2% in 2015 and by 1.4% in 2016, following a 2.3% contraction in 2014.⁸ Although the economic outlook is upbeat compared to recent years, the Cypriot cement industry will likely take several years before recovery is seen and demand begins to grow. The lack of industry transparency makes it hard to discern the scale of demand for more alternative fuels by the Cypriot cement sector. Vassiliko Cement's substitution rate may be as high as 50% already and although The Cyprus Cement Co's use of alternative fuels remains unknown, that relatively small plant's alternative fuel demand is surely low relative to the amount of potential waste fuels in Cyprus. 

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Right - Figure 5: Italcementi's Vibo Valentia cement plant is now closed. **Source:** Italcementi website.



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News in brief

Dominican Republic: Cemex to boost production

Cemex plans to invest US\$5.96m to expand the packaging and palletising capacity at its plant in San Pedro de Macoris, increasing its cement production capacity to 2.4Mt/yr.

Bolivia: Soboce's profit down

Sociedad Boliviana de Cemento's (Soboce) profit fell by 48.8% year-on-year to US\$16.1m in the year that ended on 31 March 2015. The fall was due to higher costs, poor weather and a one-off US\$7.41m fine.

US: ACG Materials buys AWC

ACG Materials, a producer and processor of high-quality minerals and aggregates including limestone and gypsum, has acquired Art Wilson Company (AWC), a miner and processor of industrial minerals.

Brazil: New president

COO of Intercement Ricardo Lima has been appointed as company president. He replaces Jose Edison Franco.

Mexico: Cementos Moctezuma orders Loesche mill

Cementos Moctezuma, a joint venture company of Cementos Molins, Buzzi Unicem and Grupo Carso, has ordered a Loesche vertical roller mill LM 53.3+3 C for its cement plant in Apazapan, Veracruz.

Jamaica: Caribbean Cement is named Champion Exporter

Caribbean Cement Company has been named as Jamaica's Champion Exporter for 2014. It was awarded the Governor General's Trophy by the Jamaica Exporters Association. Caribbean Cement also won the category III award for achieving sales above US\$5m.

US: Emissions deal for Holcim

Chemisch Thermische Prozesstechnik (CTP) Sinto America has entered into a contract with Holcim (US) to supply, install and commission emissions reductions equipment for one of the cement kilns at its Midlothian plant in Texas.

US/Japan: Taiheiyō to buy Martin Marietta assets

Taiheiyō Cement has announced that its California-based subsidiary CalPortland Company will buy Martin Marietta Materials' cement business in California for US\$420m. Completion of the deal is expected in September 2015. The acquisition will allow Taiheiyō to recoup the cement production capacity lost by the discontinuation of output at CalPortland's plant in Colton, California and to meet growing demand in California, Arizona and Nevada.

Brazil: Cement demand expected to fall 10-15%

Estimates from the cement industry association Sindicato Nacional da Indústria do Cimento (SNIC) point to a retraction in Brazil's cement demand in 2015, the first market dip in 10 years. Some of the estimates point to a 10-12% decrease.

There was a 1% increase in cement demand in 2014, as the sector was boosted by construction activities and abundant credit offers at favourable rates. Cement sales in 2014 grew by 1.4% to 70.9Mt and imports fell by 20.4% to 817,000t. Apparent cement consumption in 2014 grew by 1% to 71.7Mt. The SNIC has said that consumption could fall to around 60Mt in 2016. Installed capacity is 90Mt/yr and 10Mt/yr of new production capacity is expected in 2015.

Based on Brazil's 2015 GDP forecast, cement production and civil construction are expected to remain flat in 2015. GDP rose by 7.53% in 2010, but growth dropped in the following four years to 2.73%, 1.03%, 2.49% and 0.1%, according to BNamericas' data. The amount of cement produced followed the same trend. While in 2010 production was up by 14.2%, it rose by 7.55%, 8.19%, 2% and only 1.5% in the following four years, ending 2014 at 71.2Mt. Finally, civil construction revenue jumped by 33.5% in 2010, but the industry posted increases of 12.6%, 12.9%, 7.60% and 8.48% over the next four years. As GDP estimates point towards a 1.7% contraction for 2015, cement production and civil construction are unlikely to grow if they continue to follow Brazil's overall economy.

Brazil: Semapa buys 50% of Supremo Cimentos

NSOSPE Empreendimentos e Participações has acquired a 50% stake in Brazil's Supremo Cimentos for US\$94m. NSOSPE is jointly-owned by Portugal's Semapa Sociedade Invest Gestao SGPS and SECIL. Following the closure of the transaction, Semapa and SECIL indirectly own the entire share capital of Supremo Cimentos.

Canada: McInnis Cement and Forestry Cooperative Association sign biomass agreement

McInnis Cement and the St Elzear Forestry Cooperative Association (ACF) have signed a cooperative agreement to study the feasibility of using forest biomass as an auxiliary fuel for the cement plant under construction in Port-Daniel-Gascons.

The utilisation of forest biomass as an alternative fuel would enable the McInnis cement plant to reduce its emissions of greenhouse gases (GHG). McInnis Cement has provided the equipment necessary for the use of alternative fuels at its new cement plant. Forest biomass is in abundant supply in Gaspé. McInnis Cement requires a local long-term quality source of supply at competitive costs. The St Elzear ACF is able to supply forest residues, wood chips, sawdust, shavings and bark.

Peru: Unacem and Cementos Pacasmayo report growth in 2015

Peru's Unacem boosted its net income by 23% year-on-year in the first half of 2015 with higher prices and lower costs. Its profit rose to US\$47.8m and its sales rose by 6% to US\$896m. The company cut its operating costs by 8% and its sales costs by 2.1%. Cement production fell by 1.6% to 2.71Mt, while clinker production fell by 6.3% to 2.58Mt. Exports jumped by 36.6% to 590,863t. Unacem said that it had increased its market share to 51.2% from 49.9% in 2014. In the future it expects to benefit from a growing contribution from its US\$553m acquisition in 2014 from Lafarge Ecuador.

Peru-based Cementos Pacasmayo's consolidated earnings before income, taxes, depreciation and amortisation (EBITDA) increased by 6.4% to US\$28m in the second quarter of 2015. Its net income rose by 8% to US\$13.9m, but its revenues fell by 8.8%. The company said that its second quarter results were impacted by continued weakness in cement demand from the public sector. This led to a 9.4% reduction in cement sales volumes. In the first six months of 2015, Cementos Pacasmayo's consolidated EBITDA increased by 8.4% to US\$55.9m, its net income grew by 19.4% to US\$30.3m and its revenue fell by 6%. Forecasts point towards a recovery in Peruvian infrastructure spending. Cementos Pacasmayo expects its full-year cement volumes to be similar to those of 2014.

Brazil: Cade ends cement inquest

Brazil's antitrust body Cade has ended its inquest into Votorantim Cimentos, Cia de Cimento Itambe and Cimpor Cimentos do Brasil. The investigation was into the alleged breach of economic order through actions like the refusal to sell certain types of cement to independent companies from 2008 onward. The illicit operations were alleged to have affected companies in Rio Grande do Sul and in the south-east and central-west regions.

Brazil: Correction

In the July-August issue of *Global Cement Magazine* we published an image of the Itaipu Dam incorrectly labelled as the Belo Monte Dam in Brazil. Below is a rendering of the Belo Monte Dam.



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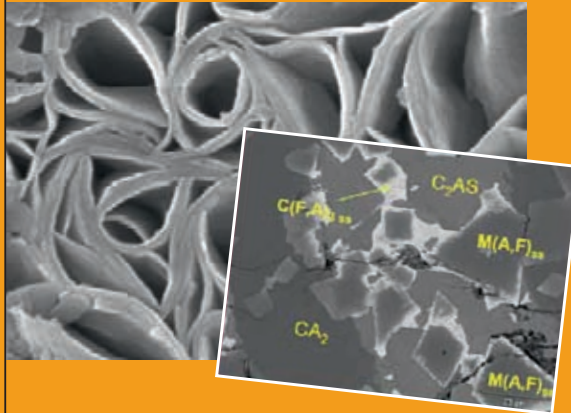
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US: Brazil gives six cement firms 30 days to pay combined US\$934m fines

Brazil's antitrust watchdog Cade ordered six cement makers named in a price-rigging case to pay a combined US\$934m in fines by the end of August 2015. Votorantim Cimentos (US\$450m), Cimpor Cimentos (US\$89.2m), Intercement Brasil (US\$72.4m), Itabira Agro Industrial (US\$123m), Holcim (US\$153m) and Cia de Cimentos Itambé (US\$26.4m) were fined, as were ABCP, Brazil's Portland cement group and SNIC, which represents local cement plants. Cade also gave the companies a one-year deadline to complete several asset divestments. Some of the companies plan to challenge Cade's ruling in the courts.

According to Cade, the cement producers, which control about 75% of the domestic market for cement, colluded on pricing to force rivals out of the market. Cade showed evidence that several takeovers and asset swaps during the 1990s and the 2000s were made to prevent rivals from entering the market. Brazil's largest players tend to have strong market control in specific regions, increasing the potential for collusion. The number of cement producers in Brazil shrank to about 10 in 2011 from almost 25 in the 1990s.

Mexico: Cemex reports 2015 sales growth

Cemex's consolidated net sales in the second quarter of 2015 grew by 5% year-on-year on a like-for-like basis adjusted for ongoing operations and currency fluctuations to US\$3.8bn. Its operating earnings before income, taxes, depreciation and amortisation (EBITDA) increased by 1% to US\$744m, or by 13% on a like-for-like basis. The increase was due to higher product prices in local currency terms in most of its operations, as well as improved volumes in most of its products in Mexico, the US, northern Europe and Asia.

Cemex's net sales in Mexico decreased by 9% to US\$745m while its operating EBITDA increased by 4% to US\$256m. In the US, its net sales grew by 5% to US\$1.01bn and its operating EBITDA increased by 31% to US\$156m. In northern Europe, net sales fell by 21% to US\$904m and operating EBITDA fell by 8% to US\$111m. In the Mediterranean its net sales fell by 9% to US\$409m and its operating EBITDA fell by 25% to US\$75m. Cemex's net sales from operations in South, Central America and the Caribbean fell by 8% to US\$517m and its operating EBITDA fell by 10% to US\$160m. In Asia, net sales grew by 11% to US\$177m and operating EBITDA was up by 34% to US\$45m.

In other news, Cemex has completed the refinancing of a bank loan agreement, paying off the remnants of what was originally a US\$15bn debt refinancing at the height of the 2009 global crisis. Cemex has paid the remaining US\$1.94bn of a 2012 accord ahead of time with funds from 17 financial institutions that joined others in a refinancing deal reached about a year ago. The amount owed under the new credit agreement now stands at US\$3.79bn, including Euro620m (US\$681m) and the rest in US Dollars.

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US: Summit Materials reports strong results for the second quarter of 2015

Summit Materials has reported increased net revenue, operating income and gross profit in the second quarter of 2015, which ended on 30 June 2015.

"During the second quarter of 2015, we produced significant growth in net revenues and margins across all of our lines of business. This reflects the steady demand improvement in all of our regions, despite some weather-related challenges, as well as our disciplined focus on price optimisation. The success of our acquisition strategy was also evident, with more than half of our profit growth contributed by acquisitions," said Tom Hill, president and CEO of Summit. "As we look to the second half of 2015, we plan to capitalise on the improving demand environment to improve our profitability while also remaining opportunistic with our capital to further expand our businesses in select target markets."

In the second quarter of 2015, Summit's net revenue increased by 12.5% to US\$329m due to an increase in volumes across all business lines. Net revenue grew by 3.2% to US\$9.3m and adjusted earnings before interest, taxes,

depreciation and amortisation (EBITDA) increased by 28.4% to US\$78.1m, with growth in all regions. Gross profit increased by 25.1% to US\$116m. Cement volumes and prices increased by 0.7% and 9.1%, respectively, both driven by additional market demand. Gross profit from materials grew by 34.7% to US\$52.7m.

Adjusted EBITDA in the west region grew by 28.4% to US\$8.7m, primarily driven by a higher mix of net revenue from aggregates, organic volume and price growth and the impact of acquisitions. In the central region, adjusted EBITDA increased by 23.2% to US\$6.7m, largely attributable to price growth across all lines of business. Adjusted EBITDA in the east region improved by 20.8% to US\$1.6m.

In July 2015 Summit completed the acquisition of Lafarge's Davenport, Iowa assets, which included a 1.2Mt/yr cement plant, a quarry and seven cement distribution terminals, for US\$450m in cash and a cement terminal in Bettendorf, Iowa. The Davenport assets will be integrated with Continental Cement, a wholly-owned subsidiary of Summit.

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Trinidad & Tobago: Trinidad Cement reports 2015 growth

Trinidad Cement Ltd's (TCL) revenue rose by 11% year-on-year, its cement sales grew by 8% quarter-on-quarter and its profit hit US\$573m in the second quarter of 2015. TCL has also delisted from the Barbados Stock Exchange (BSE), the Guyana Association of Securities Companies and the Eastern Caribbean Securities Exchange. TCL remains listed on the Trinidad and Tobago Stock Exchange and the Jamaica Stock Exchange.

US: Essroc acquires Holcim slag plant

Essroc, part of Italcementi, has acquired the Holcim (US) slag cement grinding plant in Camden, New Jersey. As part of the transaction, Essroc will also obtain Holcim's cement terminal in Everett, Massachusetts. Upon completion of the transaction, Holcim's staff in Camden and Everett will join Essroc. The transaction is expected to be completed later in 2015. The acquisition will allow Essroc to strengthen its position in the sustainable building products market.



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News in brief

China: CRC net profit down

China Resources Cement's net profit fell by 25.6% year-on-year to US\$242m in the first half of 2015.

India: Sanghi Industries installs new grinding mill

Sanghi Industries has installed a 1.2Mt/yr capacity grinding mill at its plant in Sanghipuram, Kutch, which has increased its capacity to 4.1Mt/yr. It will next install a 15MW waste heat recovery system.

Japan: Sumitomo Osaka Cement reports strong growth

In April-June 2015, Japan's Sumitomo Osaka Cement's operating profit rose by 26.8% year-on-year to US\$35.5m and its sales rose by 6% to US\$455m.

China: Anhui Conch reduces holdings in two companies

Anhui Conch Cement has sold its shares in Xinjiang Qingsong Building Materials and Chemicals Group and Tangshan Jidong Cement Company for US\$217m.

Kazakhstan: ICK agrees cement plant joint venture in Almaty

International Cement Kazakhstan (ICK) has entered into a joint-venture agreement with Nurzhan Shakirov to establish and operate a cement plant in Almaty.

Philippines: Utilisation jumps

The capacity utilisation of local cement plants increased from 68% in 2013 to 85% in 2014, mainly due to strong domestic construction activities.

India: Burnpur's new plant

Burnpur Cement's new plant at Patratu Industrial Area, Patratu, Jharkhand was inaugurated on 13 July 2015.

Uzbekistan: Production up

In January-June 2015, Uzbekistan's Portland cement production grew by 113% year-on-year, gypsum by 108%, lime by 135% and fibre cement by 118%.

India: LafargeHolcim to sell US\$768m assets to Birla

LafargeHolcim has entered into a letter agreement with Birla Corporation, subject to approval by the Competition Commission of India (CCI), for the divestment of certain assets in India for US\$768m. The proceeds from the sale will be used to further reduce debt.

The assets include Lafarge's Sonadih cement plant and its Jojobera grinding plant in eastern India, which have 5.15Mt/yr of combined cement production capacity. The transaction with Birla Corporation will be submitted to the CCI for approval and is subject to other regulatory approvals and customary conditions. Following the divestment, LafargeHolcim will have around 68Mt/yr of cement capacity in India.

Vietnam: Cement production up by 10.5% to 32.1Mt

Vietnam is estimated to have produced 32.1Mt of cement in the first half of 2015, up by 10.5% year-on-year, including 6Mt in June, up by 26.8% year-on-year, according to the government-run General Statistics Office. The country's cement and clinker sales are expected to rise by 1.5-4% year-on-year to 72-74Mt in 2015, of which domestic sales will rise by 4.5-6.5% to 53-54Mt and exports will be 19-20Mt.

Indonesia: Indocement to close inefficient plants

HeidelbergCement's Indocement Tunggal Prakarsa plans to cease production at its P1, P2, and P6 cement lines in Citeureup, West Java to improve efficiency and maintain margin stability amid weak demand in the cement industry.

"We seek to stabilise margins in 2015 by closing lines that are not efficient, including lines P1, P2 and P6 in Citeureup," said Christian Kartawijaya, president director of Indocement. He said that lines P1, P2, and P6 were usually only used as backup when another line was on maintenance. The lost production from the closure of the three lines will soon be replaced by production from the new 4.4Mt/yr capacity P14 line, which is due for completion by the end of 2015.

Indocement also plans to reduce its fixed costs and to postpone some of its non-urgent projects and expansions. "We plan to decrease our 2015 capital expenditure to US\$258m, as demand for cement has not risen amid a cement supply hike. Therefore, we will try to postpone our investments," said Kartawijaya. He added that the purchase of stone reserves and the investment in a new cement plant in Pati, Central Java will be postponed.

Indocement's revenue for the first six months of 2015 dropped by 6.6% year-on-year to US\$654m due to an 8.8% decline of domestic sales to 8.2Mt. Its market share also shrank to 29.1% from 30.5% in 2014 due to weak domestic consumption, tight competition and market oversupply. Earnings before interest, taxes, depreciation and amortisation (EBITDA) fell by 4.7% to US\$226m and net profit fell by 8.4% to US\$169m.

China: Asia Cement's revenue down by 23%

Asia Cement said that its profit attributable to owners for the first half of 2015 plunged by 97.4% year-on-year to US\$1.59m. The decrease was attributed primarily to the fall in average cement sales prices. Its revenue fell by 23.1% to US\$484m and its gross profit margin on revenue dropped to 14% from 24% in the same period of 2014. No interim dividend was distributed.

Philippines: Holcim Philippines buys Lafarge Republic assets

Holcim Philippines, part of LafargeHolcim, will expand its market and offer a wider range of materials following its acquisition of Lafarge Republic's Star terminal in Manila and its aggregates business in Rizal.

"These assets further strengthen our ability to provide products and solutions that help our customers and partners in the construction industry," said Holcim Philippines president and CEO Eduardo Sahagun. He said that Lafarge's Star terminal would strengthen Holcim Philippines' ability to support customers in Metro Manila and South Luzon, while the acquisition of Lafarge Republic Aggregates in Angono, Rizal, would provide an established aggregates business. Holcim Philippines closed the deal on 4 August 2015 and paid US\$67.5m.

Iran: UltraTech Cement profit falls by 6%

UltraTech Cement has reported a 6% year-on-year fall in its consolidated net profit to US\$92.9m for the first quarter of its 2016 fiscal year, which ended on 30 June 2015. Its consolidated net sales rose by 6% to US\$1bn from US\$942m while its cement and clinker sales rose to 12.1Mt from 11.7Mt.

"Energy costs improved by 7%. The reduction in fuel prices was partially offset by the increase in railway freight. Input prices remained stable, except for the rise in royalty for limestone and levies under the Mines and Minerals (Development & Regulation) (MMDR) Amendment Act 2015," said UltraTech Cement in a statement.

In other news, Adesh Gupta, UltraTech's non-executive director, resigned from the board with effect from 30 June 2015. Gupta cited time constraints for pursuing professional and personal engagements as reasons.

China: Guangdong Tapai's net profit down

Guangdong Tapai's net profit in the first half of 2015 fell by 47.8% year-on-year to US\$29.9m.

India: Emami to build West Bengal plant

Emami Cement plans to build a US\$65.7m, 1.5Mt/yr capacity cement plant in Panagarh, Bardhaman, West Bengal. The plan includes a 10MW captive coal-fired power plant. Land has been allotted by the West Bengal Industrial Development Corporation (WBIDC).

Kazakhstan: Steppe Cement's cement production up but revenue down

Steppe Cement said that it sold more cement, but at a lower price, in the first half of 2015 due to the unfavourable exchange rate between the Kazakhstan Tenge and the Russian Ruble. The company sold 717,654t of cement for US\$44.4m in the first half of 2015 compared to 709,459t of cement for US\$48.9m in the same period of 2014.

New Zealand: Graymont buys Holcim's Makareao lime plant

The third-largest lime producer in the world, US-based Graymont, has bought the Makareao lime plant in Otago from Holcim. It took over the plant on 1 July 2015. Graymont, which has extensive interests in Canada, the US and Mexico, has also bought the McDonald's lime plant in Te Kuiti, Waikato, New Zealand.

Graymont Makareao's operations manager Craig Porter said that the lime plant's output had grown over the last two to three years and that he was excited about the new ownership. Staffing at the plant will not be affected.

Holcim's Weston cement plant project was put on hold in 2013 after it decided to import cement into New Zealand and build two new terminals, including one at Timaru. Waitaki Mayor Gary Kircher said that Holcim still owns the Weston site, associated quarries for limestone, coal and sand and consent for the cement plant that could be established there.

India: Birla Corporation plans to expand to 15Mt/yr despite poor results

Birla Corporation plans to increase its cement production capacity to 15Mt in the next four years. Its acquisition of LafargeHolcim's east Indian assets, if approved by the Competition Commission of India (CCI), will add 5.15Mt/yr of capacity. "At present, our cement production capacity is 9.3Mt/yr. We want to take it to 15Mt/yr in the next four years," said Birla Corporation chairman Harsh Lodha.

Meanwhile, Birla Corporation is awaiting a limestone mining lease from Assam Mineral Development Corporation (AMDC). It had earlier signed a Memorandum of Understanding with AMDC to set up a 1Mt/yr, US\$94.5m plant there. Once it gets the mining lease from AMDC, it will form a joint venture company with the state-run corporation and get the project off the ground. AMDC will hold 12.5% of the equity and Birla Corporation will hold 87.5%.

In other news, Birla Corporation witnessed a sharp drop in its first quarter 2016 profit to US\$2.55m from US\$15.2m in the same period of its 2015 fiscal year. Its income stood at US\$119m compared to US\$132m in the prior year period.

Lodha said that poor demand in the company's major markets in the north and central regions had put cement prices under severe pressure. He added that, though realisations during the quarter were very low, Birla Corporation could partially mitigate its impact on profitability by improving operational efficiencies. The resilient markets in the east provided some relief. Lodha said that the company was installing equipment to establish an alternative fuel and raw material system to increase alternative fuel use. It plans to utilise agricultural waste and will be operational by the first quarter of its 2017 fiscal year, which ends on 30 June 2016.

Philippines: New RDF plant comes online in Pasig, Manila

The Pasig City government has brought online what it described as, 'The country's largest facility for turning rubbish into fuel, capable of processing 600t/day of trash.'

The plant, which is Pasig City's joint project with the IPM Construction & Development Corp (IPM) and the Metro Manila Development Authority (MMDA), can process almost all of the city's waste into refuse-derived fuel (RDF). Pasig City mayor Maribel Eusebio said that the plant would produce fuel pellets from the waste, which would then be supplied as an alternative fuel to cement plants. The RDF is majority-owned by Basic Environmental Systems & Technologies (BEST), a subsidiary Minerales Industrias Corp, as well as Lafarge Industrial Ecology International.

The plant mechanically segregates the waste and selects garbage with high thermal value that will be shredded, made into pellets and wrapped into bales. It is expected to convert 25-35% of the processed waste into alternative fuels for cement kilns. "The plant addresses concerns on increasing municipal waste and disposal," said Eusebio. "It complies with the waste diversion requirement of Republic Act No 9003 or Ecological Solid Waste Management Act of 2000."

"This is the largest RDF plant in the Philippines to date," said Isabelita P Mercado, president of IPM, which operates and manages the plant. "This is also a pioneering endeavour to save the environment by reducing our dependence on fossil fuel."

Pakistan: Cement sales growth

Pakistan's cement sales in the 2015 fiscal year, which ended on 30 June 2015, grew by 3.5% year-on-year to 35.4Mt.

Domestic sales grew by 8% to 28.3Mt in the 2015 fiscal year, better than the average 5% growth seen in the last five years. This was due to an increase in private sector expenditure on construction and housing, an improved security situation, improving macroeconomic indicators and higher government infrastructure spending. Exports fell by 12% to 7.2Mt, with falling exports to Afghanistan due to competition from low-priced Iranian cement and political instability in the country.

Cement demand in the 2016 fiscal year, which started on 1 July 2015, is expected to improve further due to higher development spending, the initiation of projects due to the China-Pakistan Economic Corridor, favourable macroeconomic indicators and lower interest rates. Additionally, higher disposable income due to lower inflation will also boost private sector expenditure on construction and housing.

Philippines: San Miguel Group to build two new cement plants

San Miguel Group plans to invest US\$800m to build two 2Mt/yr capacity cement plants as part of its diversification efforts. Construction has already begun.

One of the plants is at Northern Cement's existing plant in Pangasinan, while the other is being built in Quezon. In 2013, San Miguel paid US\$77.5m for a 35% stake in Northern Cement, which is owned by the conglomerate's chairman, Eduardo M Cojuangco Jr. The plants are expected to be completed in 2017.

India: UltraTech Cement to build in Rajasthan

Ultratech Cement has signed a Memorandum of Understanding with Rajasthan State Industrial Development & Investment Corporation to set up a US\$312m, 3Mt/yr capacity cement plant in Jhunjhunu, Rajasthan.

New Zealand: Holcim's silo inflated

Holcim's new dome-shaped silo for cement storage has been inflated on Auckland's waterfront in New Zealand. The 28m-high silo holds 30,000t of cement and is located at a Port of Auckland site on the corner of Plumer and Quay Streets. Consent to build the silo was granted on a non-notified basis, so the public had no say, which angered groups concerned about the port's growing footprint.

Holcim is investing in two 30,000t new storage facilities in Auckland and Timaru as part of its business strategy of global sourcing for supply into the New Zealand market. Once complete, the Auckland terminal will provide effective access to the greater Auckland and upper North Island markets, while the terminal in Timaru will supply the South Island and lower North Island markets.



Holcim New Zealand's 30,000t cement silo on Auckland's waterfront in New Zealand.

India: Century Textiles reports net loss

Century Textiles and Industries has posted a net loss of US\$4.53m for the first quarter of its 2016 financial year, which ended on 30 June 2015. During the period, its net profit was US\$10.4m and its sales rose by 5.59% to US\$304m. Its cement division registered sales of US\$175m, up from US\$158m in the prior year quarter.



Kenya: New cement plants

Quarry operator Karsan Ramji & Sons plans to build a 700t/day (224,000t/yr) cement plant in Engashura. The company recently completed the construction of a similar-sized cement plant in Athi River and began selling cement under the brand name Ndovu in June 2015. Once the regulatory approvals have been received, Karsan Ramji & Sons plans to start construction in December 2015 and start operations in November 2016. The plant will use imported clinker while pozzolana and gypsum will be sourced locally from its quarries.

Also in Kenya, Nigeria's Dangote Cement plans to build a US\$395m cement plant in Kitui, while India's Sanghi Group plans to construct a US\$119m cement plant in West Pokot. Kenya's 2014 cement production grew by 16.4% year-on-year to 5.88Mt, up from 5.05Mt in 2013 as a result of new players entering the industry. Cement production in the country has consistently outpaced consumption, which stood at 4.26Mt and 5.19Mt in 2013 and 2014 respectively.

"Everybody knows that there is currently an over-supply of cement in the Kenyan market," said Kishor Varsani, Karsan Ramji & Sons' managing director. "However, our decision to diversify into this sector is based on the belief that demand for cement will soon outpace supply. This is in line with the expected growth of the economy and construction industry."

Angola: Growth at Kwanza Sul Cement

The Kwanza Sul Cement plant plans to increase its production to 4500t/day from the current 4200t/day. The director of the plant's accounting department, Alberto Kiala, said that the increased production would result from increased financial resources to buy raw materials and fuel. Kwanza Sul Cement, which produces the Yetu brand of cement, started operating in February 2014.

Zambia/Cameroon: New Dangote plants

Nigeria's Dangote Cement opened its US\$400m cement plant in Masaiti, Zambia on 4 August 2015, signalling its increasingly international ambitions as it plans new investments across Africa. The plant is expected to produce 1.5Mt/yr of cement once it is fully operational, creating at least 1000 direct jobs and 6000 indirectly.

"We hope to commission four other cement plants in Senegal, South Africa, Cameroon and Tanzania in 2015," said Aiko Dangote, president of Dangote Group. "We have decided to invest in 16 countries across the continent because we believe that Africa's future is linked to cement."

In Cameroon, Dangote Cement will invest US\$150m to build a new cement plant in Yaounde. Dangote said that the investment's aim will be to 'totally eliminate' any future cement demand increase in the country. "Cameroon will not lack cement. We can assure the government that we are here to stay and will continue to invest," said Dangote.

Mozambique: Two new cement plants

Two new cement plants are planned for Mozambique in the coming years. Turkey's Limak Holding will invest US\$150m in a 2Mt/yr capacity plant in the Maputo Port area, while Portugal's Cimpor Cimentos, via its subsidiary Cimentos de Moçambique, plans to build a cement plant in Nacala, Nampula for US\$250m. It already owns a cement plant in Matola and operates four grinding plants in the country.

Uganda: Tororo Cement to expand

Tororo Cement will invest US\$25-30m towards the expansion of its cement plant, taking its capacity from the current 1.8Mt/yr to 3Mt/yr to meet regional demand. The company will construct a new grinding mill, cement storage silos, rotary packers, clinker feeding system and clinker sheds.

Ethiopia: Habesha Cement considers growth

With construction of its 1.3Mt/yr plant ongoing, Habesha Cement is considering an additional expansion. It hired Waas International Consulting Firm (WICF) in June 2015 to establish the need for further expansion projects. WICF will look at the current cement demand in the country and will restructure Habesha's strategy accordingly. "We found it necessary to conduct a study because we expect to launch production and join the market in the coming year," said Mesfin Abadi, chief executive director of Habesha Cement.

Tunisia: Intercem awarded contract

Les Ciments de Jebel Oust has ordered an entire line optimisation from Intercem Engineering GmbH for one of its cement grinding plants. The project will include an Intercem high efficiency ICV-type separator, bag filter, material transport equipment, steel construction, ducts/chutes, electrical equipment and other components. The order is on an engineering, procurement and construction basis.

The engineering has been executed by Intercem and the equipment (below) will be delivered shortly as contractually agreed. The target is mainly the reduction of the specific energy consumption and the optimised plant has a designed capacity of 90t/hr. The project is on schedule and should be commissioned in January 2016.





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News in brief

Nigeria: Dangote posts 20% profit rise

Dangote Cement's pre-tax profit in the first half of 2015 rose by 20.2% year-on-year to US\$646m. Its revenue rose to US\$1.22bn from US\$1.05bn in the same period of 2014.

Egypt: Suez Cement's profit falls

Suez Cement's consolidated net profit fell to US\$15.2m in the first half of 2015 compared to US\$39.9m in the same period of 2014. Its standalone net profit fell to US\$44.6m from US\$53.2m in the 2014 period.

Zambia: 110 jobs to be lost at Zambezi

Some 47 employees at Zambezi Portland in Ndola have been laid off and a further 63 are earmarked for re-trenchment in September 2015. The redundancies are due to falling business volume and stiff competition from the newly-commissioned Dangote Cement plant. The affected workers have been paid US\$308 each. The company will retain 340 employees.

Somalia: Raysut Cement to establish Barqaaqo Cement Company

Oman's Raysut Cement is setting up a subsidiary, Barqaaqo Cement Company, mainly to supply cement to Somalia through a newly built terminal there. Raysut Cement will have a 51% stake in the newly-formed company.

Rwanda: New Cimerwa plant launched

Cimerwa has opened its new 0.6Mt/yr dry-process cement plant. The plant previously relied on wet-process technology. The new technology will help it to reduce its production costs and better compete with imports. It has also built a 15MW peat-powered power plant.

Namibia: Ohorongo ups production

Ohorongo Cement has produced 2.4Mt of cement in the past five years. Cement production has grown since it first began at the site in December 2010.

Zambia: Dangote plans Chongwe plant

Dangote Cement plans to build a new cement plant in Chongwe, Lusaka. Its cement plant in Masaiti was officially commissioned on 4 August 2015.

Egypt: New alternative fuel equipment

Arabian Cement Company has commissioned new alternative fuel processing machinery, the FLSmidth HOTDISK™, at its plant in Suez. Arabian Cement now has a designed fuel mix of 70% coal and 30% alternative fuels, which require no pre-treatment.

Yemen: Amran Cement plant destroyed

Five alleged Saudi-led air-strikes attacked Amran Cement plant on 12 July 2015, leaving three workers dead and 10 others injured. The cement plant was almost entirely destroyed. Yahia Abu Hulaiqa, the director of Amran Cement plant, said that the losses are estimated at US\$100m.



The Amran Cement plant in Yemen before the attacks.

Tunisia: Cement sector sales down

According to the Ministry of Industry, Mining and Energy, grey cement production in Tunisia grew by 0.99% year-on-year to 4.75Mt in the first six months of 2015. The amount sold locally fell by 6.29% to 3.73Mt, while exports increased by 33.8% to 966,095t. In the first half of 2015, white cement production fell by 11.1% to 222,408t from 250,096t in the same period in 2014. Local sales of white cement fell by 6.69% to 96,551t from 103,476 in 2014.

Despite this, in the first four months of 2015, Tunisian cement producer Carthage Cement's domestic sales increased by 44% to 349,823t. In the same period, total cement sector sales fell by 6.69%.

Nigeria: Cement Company of Northern Nigeria earmarks US\$241m for expansion

Cement Company of Northern Nigeria (CCNN) plans to invest US\$241m to double its production capacity from 0.75Mt/yr to 1.5Mt/yr.

"The expansion is part of the ongoing modernisation and cost optimisation programme. It aims to reduce costs and enhance production capacity to ensure that CCNN remains competitive in the cement industry. The increase in installed capacity would enable the company to maintain its current market share and expand into new markets," said managing director Alf Karlsen.

CCNN has also acquired new mining areas to expand its quarry activities. Further, it will invest in an expansion for its power plant from 12MW to 16MW. CCNN's principal manager of corporate affairs Alhaji Suleiman said that the expansion would be built in partnership with China's CBMI. "CCNN's plant does not generate sufficient power when the plant is run at full utilisation," said Suleiman.



Here *Global Cement Magazine* presents its monthly review of global cement prices, in US\$ for easy comparison. Much more price information (including the latest information on prices and market trends throughout the global cement industry from our price correspondents) is only available to subscribers of *Global Cement Magazine*.

To get additional prices, you should subscribe - **See page 72**. In this issue subscribers receive information from 13 countries not shown here, including France, China, Kazakhstan, Pakistan, Indonesia and Honduras.

Malaysia: The majority of Malaysia's top cement manufacturers have increased their cement list prices by 7-9% so far in 2015. The first to move, in March 2015, was Holcim (Malaysia), followed by Lafarge Malayan Cement, Tasek Corp and Hume Cement. It is anticipated that YTL Cement and Cement Industries of Malaysia will now also raise their prices.

The average domestic cement price is currently US\$89.59-94.31/t, higher than the average US\$87.23 /t in the middle of 2014.

According to Maybank Investment Bank Research, Malaysian OPC prices saw an all-time peak of US\$4.19/bag (50kg) in May 2015.

Sri Lanka: Investors are concerned by uncertainty in Sri Lanka's cement policy with price controls on local producers and duty free imports creating market distortions, according to Tokyo Cement's Managing Director S R Gnanam.

Commenting on the fact that the price of Sri Lankan made cement is higher than imported cement, which is causing delays to construction and development, Gnanam said, "Policy and regulatory stability is vital for industry investments, development and growth. The present situation is due to price changes by the state, without adequate industry consultation, despite the existence of a pricing formula to adjust cement retail prices."

Gnanam said the current climate of uncertainty with regards to pricing was 'detrimental to the future of the local cement manufacturing industry,' and called for an urgent re-think on policy.

India: JK Lakshmi Cement has reported that cement prices in northern and western India fell by US\$0.46-0.51/bag (50kg) during the second quarter of 2015 relative to the same period of 2014.

Meanwhile, the Association of Consultant Civil Engineers has urged the Karnataka state government to introduce a uniform policy to control the price of cement. In a memorandum

submitted to Deputy Commissioner Rajendra Cholan, association president Vijayendra Patil said construction works were being 'hit' due to the increasing prices of the commodity.

Nigeria: Dangote Cement has revealed that its average ex-factory, ex-VAT price for 42.5 grade cement in Nigeria in the first half of 2015 was US\$8.26/bag (50kg) or US\$163.72/t.

Meanwhile, Kunle Awobodu, the President of Nigeria's Building Collapse Prevention Guild (BCPG), has said there was a need for all stakeholders to come together to tackle the illegal practice of 'rebagging' cement. This involves the opening of legitimate 50kg bags of cement, removing a small amount and resealing the bag to sell at slightly below market prices. This can have dramatic consequences for building stability if the underweight bags of cement are used to make concrete and mortar mixes under the false assumption that they actually weigh 50kg.

"The practice of cement quantity depletion is prevalent in the building material markets in Nigeria, especially in Abuja and Port Harcourt," said Awobodu. "The intention is to attract customers by deliberately lowering the price, usually by US\$0.25-0.5/bag."

Kenya: Cement prices are reported to be US\$5.47-6.82/bag (50kg).

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ASWP = Any safe world port.

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Viking Laws can teach us a great deal about business - and ourselves...

Robert McCaffrey Editorial Director, *Global Cement Magazine* (rob@propubs.com)



I have just returned from a short trip to Bergen in Norway, to visit an old university friend who now works over there. The region around Bergen, including Øygarden, the Jotenheimen Mountains and Balestrand (the architecture of which was 'borrowed' by Disney for the film 'Frozen') was awe-inspiringly beautiful, but the prices were eye-blisteringly high - just to look at a restaurant menu might leave scorch marks on your retina.

On my way back, I picked up a postcard (published by www.naturkultur.no) which purports to give 'Viking Laws' (see right). These laws, which are grouped under 'Be brave and aggressive; Be prepared; Be a good merchant; and Keep the camp in order,' might be a perfect list of edicts to conduct good business, including business in the cement industry, and might also be usefully applied to our own lives.

'Be brave and aggressive' has certainly worked for Lafarge and Holcim, and has now worked for HeidelbergCement in its takeover of Italcementi. We now have to wait to see what Cemex will do. 'Attack one target at a time' is not an edict that CRH has followed, having taken over LafargeHolcim's obligatory divestments, while at the same time pursuing the takeover of CR Laurence, a large glazing company in the US (and possibly an odd fit with cement-focussed CRH). We will see if breaking the Viking Law on this will come back to bite CRH. Perhaps they were following the next rule, of not planning everything in detail (and leaving some things to chance). 'Use top-quality weapons' might be interpreted in the cement industry as having top executives and the best advice in terms of tax, accounting and banking: certainly Lafarge and Holcim's advisors must now be enjoying the benefits of some large fees for their work on the admittedly impressive, complex and chal-

lenging merger between the two giant companies.


'Be prepared' is a good rule for anyone - As an old Spanish saying goes, 'When they bring you the donkey, be ready with the rope.' 'Find good battle comrades' is a fine adage, but difficult in practice. The oft-derided HR ('human resources') departments of the multinationals are actually critically important in steering the ship -

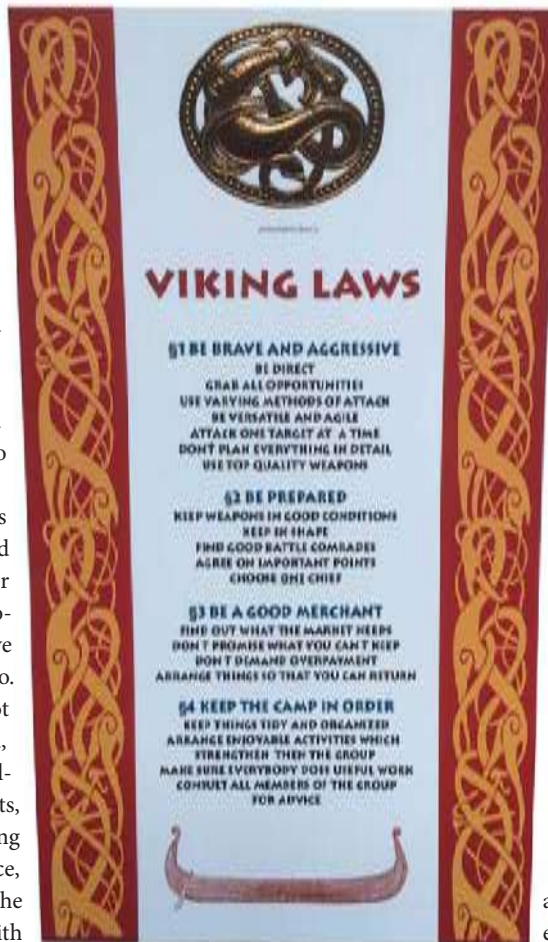
after all, they determine who will be the oarsmen on the vessel. Choosing one chief is obvious - but it is peculiarly often that we see more than one chief in charge - particularly after a merger...

Being 'a good merchant' includes finding out what the market needs and then charging a fair price. I think that for the most part the cement industry does this well... apart from when it involves itself in cartels, which, as shown by the continuing fines levied around the world by cartel-busters, are still common.

Does the cement industry 'keep its camp in good order'? For the most part it does - often with the lash of the local or national regulators at its back - and in some countries it even leads in environmental technology in industry.

However, there are still places where the cement dust lies thick on the ground, and where the camp cannot be said to have been kept in good order. 'Consult all members of the group for advice' sounds like good practice, but is impractical in a group with 100,000 employees.

Now, can any of these Viking Laws be applied to how we might conduct ourselves - and how we interact with our families? 'Arrange enjoyable activities which strengthen the group' sounds like a good start! 





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