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JULY-AUGUST 2020

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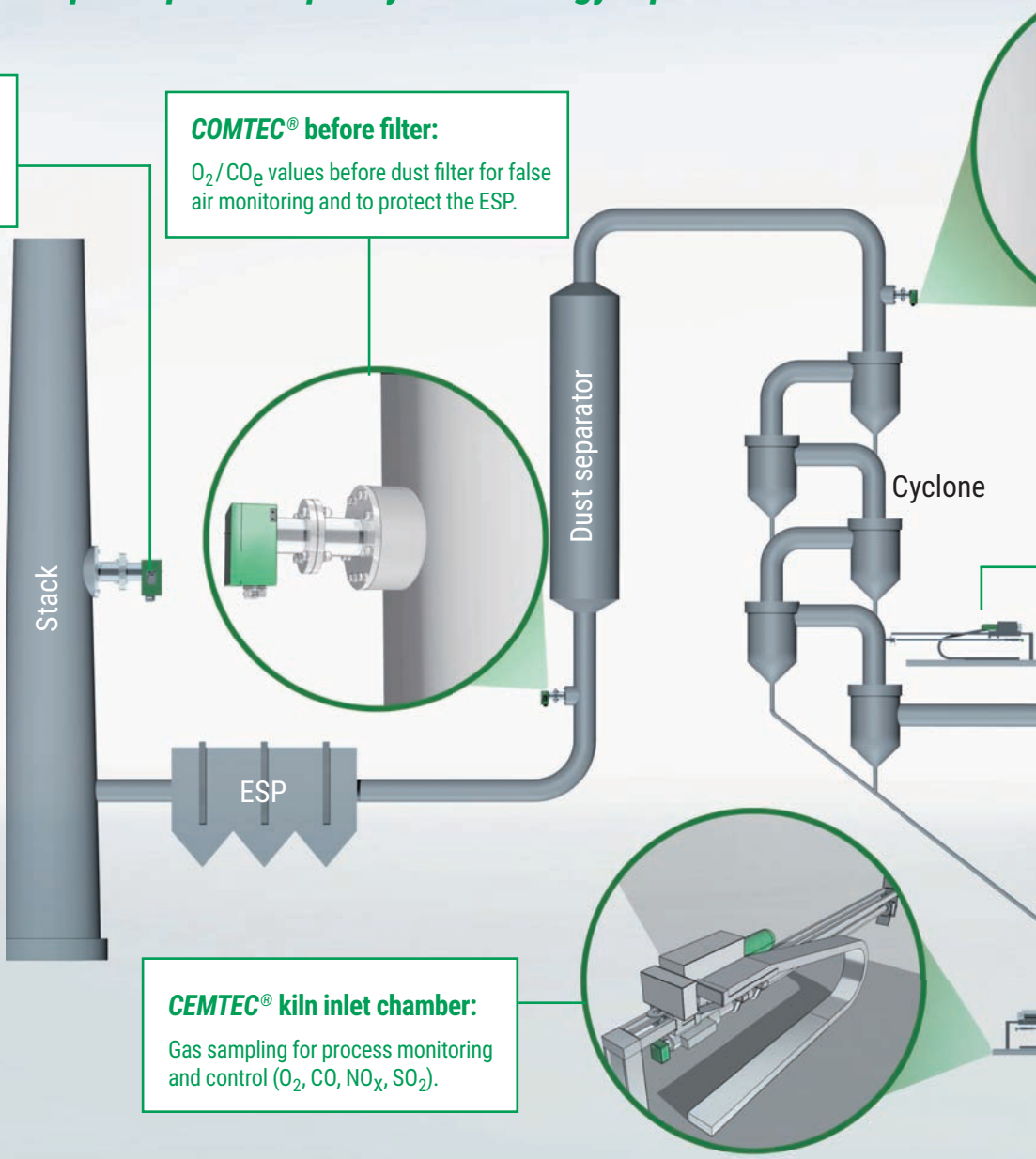

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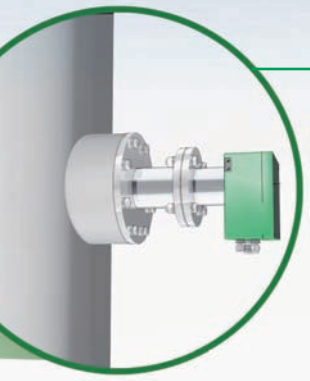

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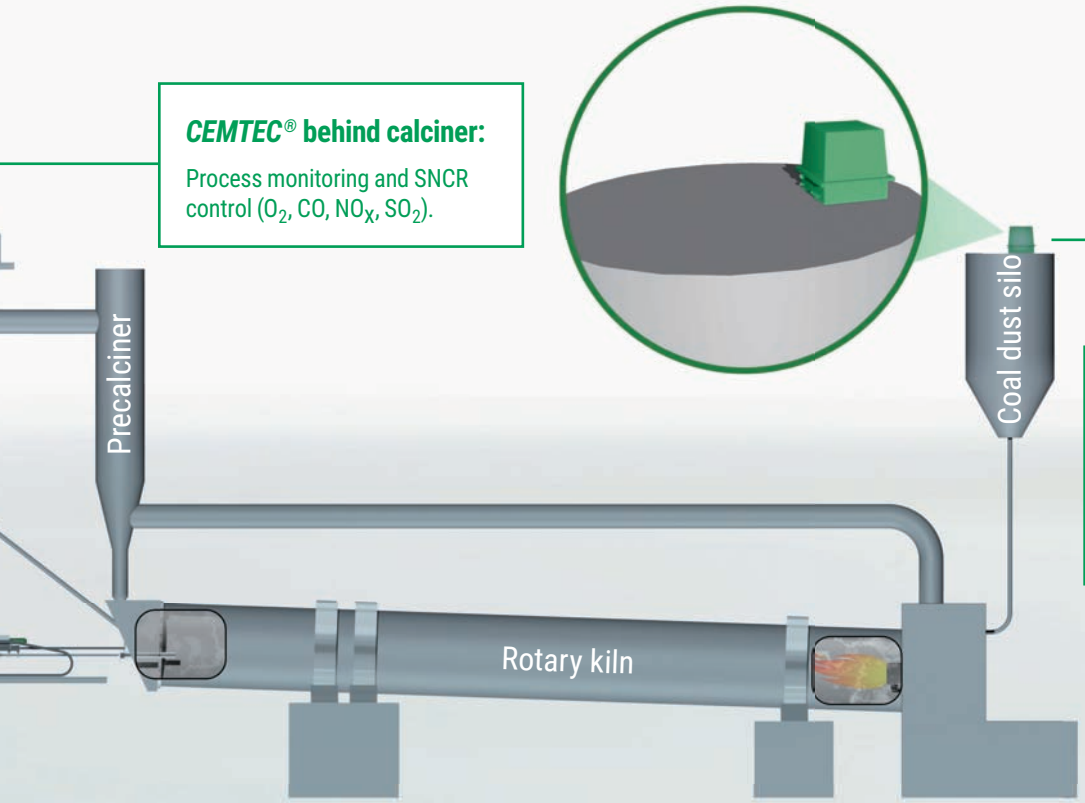

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Cover: Innovation at KettenWulf continues. KettenWulf has launched several highly innovative products especially for the cement Industry, such as permanently oiled chain joints, maintenance-free and oil-filled rollers with click-on mounting system and FEM-designed link plates for maximum weight reduction.

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Dear readers,

Welcome to the July-August 2020 issue of *Global Cement Magazine* - the world's most widely-read cement magazine. This issue has a Health & Safety focus, with commentary on belt conveyors (Page 34), refractory installation (Page 30) and silos (Page 32). All of these topics can be placed firmly within the 'Safety' part of 'Health & Safety.' Indeed, until recently it was possible to almost completely ignore the 'Health &' part entirely in the cement sector. The dangers in a cement plant, be they hot surfaces, rotating machinery or falling materials, were physical and immediate, as well as potentially painful or deadly.

The coronavirus outbreak has fundamentally forced us to revise this assumption. To quote the UK Prime Minster Boris Johnson, Covid-19 is an 'invisible mugger,' an assailant that can attack quietly at any time without warning. Mitigating the risks of such a virus in the cement sector requires a range of hygiene practices and logistics approaches not previously seen outside of intensive care units and microchip clean rooms. John Kline previously discussed some of these approaches in the June 2020 issue of *Global Cement Magazine*. On Page 28 of this issue, Titan America expands on how the outbreak has impacted its 'normal' health and safety training considerations. Meanwhile, on Page 26, Atology presents some innovative solutions for the promotion of social distancing and how to avoid the 'dangers of paperwork.' Away from Health & Safety, this issue's technical articles also take in the challenges of commissioning equipment remotely during the outbreak (Page 24) and mitigating dust emissions from conveying systems (Page 36).

The issue's regional focus is firmly on Asia, with a look at the past 12 months in the Chinese cement sector (Page 52), an industry that will contract more rapidly than planned in the next couple of years due to the coronavirus outbreak. We also have an in-house introduction to the rapidly-changing cement industry of Pakistan (Page 56) and a rare look inside Mongolia's largest cement producer Cement-Lime JSC (Page 58).

Last but not least, this issue also carries our annual look at the Top 10 global cement producers (Page 12), plus Robert McCaffrey looks at how the coronavirus outbreak has altered the cement sector's trajectory (Page 19).

Enjoy the summer and stay safe!

Peter Edwards
Editor

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Technical

GLOBAL CEMENT IN A TIME OF CORONAVIRUS

We have all had to make changes to the way we do things in the world, and *Global Cement* is no different. Many popular events have been cancelled or postponed and these are events that the industry looks forward to and bases its year around - *Global Cement* Magazine included.

While we wait for real-world events to return (our first such scheduled event is *Global Slag* in Vienna in November), *Global Cement* has been active in organising virtual events online, to great acclaim. You can see the full listing opposite. To reflect the changed event schedule, we have also changed our editorial schedule for the rest of 2020, as given below.

You are assured that *Global Cement* Magazine will continue to be printed and distributed around the world throughout the coronavirus pandemic. For all advertising enquiries, please contact Paul Brown at paul.brown@propubs.com. For further information, please scan the QR code.

We look forward to helping you with your business through the rest of the year!

Paul Brown, Robert McCaffrey, *Global Cement* Magazine publishers

SEPTEMBER 2020

Distribution: FICEM; Powtech 2020; *Virtual Global CemFuels Seminar*

Technology: Fuels, Refractories, Additives, Valves, Conveying, Packaging, Bagging, Palletising, Cement Chemistry, Analysis

Country reports: Germany, Caribbean, Central America

Editorial deadline: 4 August 2020
Advertisement order deadline: 9 August 2020 **Advertisement material deadline:** 12 August 2020

Global Cement Calendar **Ad. deadline 1 October**

OCTOBER 2020

Distribution: *Virtual Global CementQC Conference*

Technology: Environmental Protection, Lime, Coolers, Weighing, Bulk Handling, Marine Transport, Loading

Country reports: Myanmar, Laos, Cambodia

Editorial deadline: 7 September 2020
Advertisement order deadline: 6 September 2020 **Advertisement material deadline:** 9 September 2020

NOVEMBER 2020

Distribution: AUCBM Cement Conference; *Global Slag Conference; Virtual Global CemEnergy Conference*

Technology: Alternative Fuels, Maintenance, Process Optimisation, Spare Parts, Conveying, Dust Control, White cement, Advances in Arab Cement Production

Country reports: Middle East

Event reviews: FICEM, Powtech Event preview: *Virtual Global Ash Conference*

Editorial deadline: 5 October 2020
Advertisement order deadline: 7 October 2020 **Advertisement material deadline:** 9 October 2020

DECEMBER 2020

Distribution: AUCBM Cement Conference, *Virtual Global Ash Conference*

Special issue: Global Cement Top 100 & Selected Producer Profiles, 2020 in Cement - news review

Technology: Ash, Pneumatic conveying, Loading & Unloading, Fuels, Wear Solutions, Electrical issues

Country reports: Global ash supply and demand

Editorial deadline: 6 November 2020
Advertisement order deadline: 8 November 2020 **Advertisement material deadline:** 11 November 2020

Virtual global cemproducer2

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Cement plant maintenance during and after the coronavirus pandemic

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Virtual global cemfuels

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Alternative fuels seminar for cement and lime

22 September
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cemfuels.com

Virtual global cementQC

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Maintaining quality control from the quarry to the factory gate

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Online
cementQC.com

15th global slag

Register Online

Slag production and optimisation for beneficial use and profit

11-12 November
Vienna, Austria
globalslag.com

Virtual global cemenergy

Free Registration

Conventional fuels for cement production & Electrical energy production and efficiency

24 November
Online
cementenergy.com

Virtual global ash

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Ash beneficiation and use in the cement and concrete industries

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Online
globalash.com

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FICEM Technical Congress
September 2020 (TBC)
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Virtual Global CemFuels Seminar
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30 September - 1 October 2020
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www.powtech.de

Virtual Global CementQC Conference
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15th Global Slag Conference
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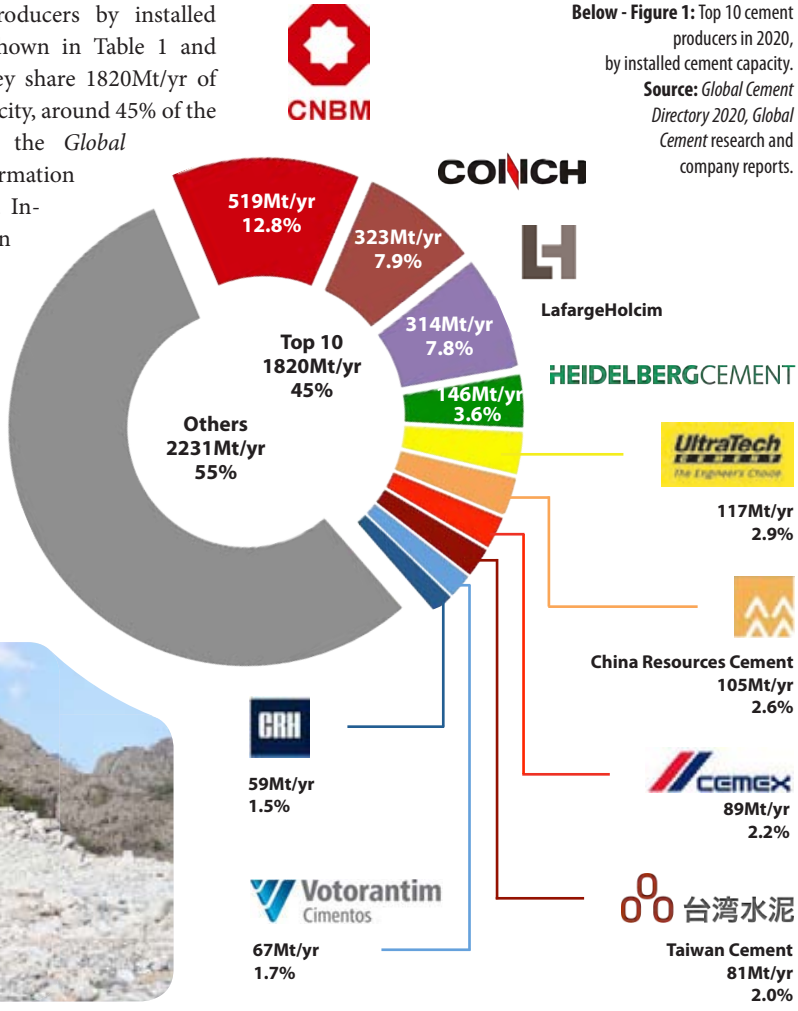
Peter Edwards, Global Cement Magazine

Top 10 cement producer profiles 2020

The Top 10 cement producers started 2020 in the expectation that business would continue broadly as before. However, producers have been hit by a wave of disruption due to the coronavirus outbreak. Some deals are now on hold, but it is possible that the 'new normal' will prompt a new wave of mergers, acquisitions and divestments over the next 12 months.

The Top 10 cement producers by installed capacity in 2020 are shown in Table 1 and Figure 1. Between them they share 1820Mt/yr of integrated and grinding capacity, around 45% of the 4051Mt/yr total listed in the *Global Cement Directory 2020*. Information for Chinese, Taiwanese and Indian producers has been taken from respective company reports. The four Chinese and Taiwanese producers operate 1028Mt/yr of capacity between them, 56% of the capacity held by the Top 10 cement producers and around 25% of global cement production capacity.

Note: Capacity, sales and revenue data in producer summary boxes is for 2019 unless otherwise stated.



Below - Figure 1: Top 10 cement producers in 2020, by installed cement capacity. **Source:** *Global Cement Directory 2020, Global Cement* research and company reports.

1. CNBM

CNBM, founded in 1984, now operates 519Mt/yr of cement capacity. It operates solely in China in the cement, concrete, aggregate, gypsum wallboard, glass fibre and wind turbine sectors.

HQ: China
Capacity: 519Mt/yr
Cement / Clinker Sales: 391Mt
Revenue: US$35.7bn

China National Building Materials (CNBM) is the largest producer of cement in the world, with a hand in 519Mt/yr of cement capacity. It operates cement plants via the subsidiaries shown in Table 1. When one takes the various shareholdings into account, CNBM's share of the 519Mt/yr capacity shrinks by 111Mt/yr, albeit to a still huge 408Mt/yr. CNBM's revenue grew by 19% to US$35.7bn in 2019 from US$30.8bn in 2018. Its gross profit rose by 17.4% to US$10.8bn from US$9.2bn. Its profit after tax also rose, by 32.8%, to US$2.59bn from US$1.95bn. Its cement and clinker sales volumes rose by 5.9% to 391Mt in 2019 from 369Mt in 2018, while ready-mix concrete volumes rose by 16.6% to 111.8Mm^3 from 95.9Mm^3.

Revenue attributable to CNBM's cement activities came to US$21.4bn, while its operating profit from cement operations reached US$3.06bn. We have taken the shareholdings shown in Table 2 into account to calculate these figures, which were 15.3% and 13.5% higher than in 2018, respectively. These improvements can be attributed to strong performance at several of CNBM's subsidiary companies, including China United, where revenue rose by 27.1%. However, its cost of sales also rose by 27.8%, leading to only a 6.3% rise in operating profit compared to 2018. South Cement increased its operating profit by 22.8%, while Southwest Cement saw its operating profit rise by 18.4%. Tianshan Cement's profit rose by 66.6% year-on-year. Only one subsidiary, North Cement, made an operating loss, of US$122m.

In the first quarter of 2020, CNBM reported a 20.5% fall in revenue to US$4.81bn in the first quarter of 2020 from US$6.05bn a year earlier. This was due to the need to close its plants due to coronavirus-related lockdowns in many Chinese Provinces. However, the company reported that it had already taken steps to reopen its plants in early March 2020.

Company	Capacity (Mt/yr)	CNBM Share (%)	Capacity Share (Mt/yr)
China United	106	100.00	106.0
South Cement	141	84.83	119.6
North Cement	37	71.68	26.5
Southwest Cement	122	78.99	96.4
Sinoma Cement	25	100	25.0
Tianshan Cement	39	45.87	17.9
Ningxia Building Materials	21	47.56	10.0
Qilianshan Cement	28	25.04	7.0
TOTAL	519		408.3

Above - Table 1: CNBM subsidiaries as at 31 December 2019.
Source: CNBM Annual Report 2019.

2. Anhui Conch

Anhui Conch was founded in 1997 and grew rapidly as China's cement consumption rose in the early 2000s. Like other Chinese producers, it has recently been forced to adjust to falling demand by expanding abroad. It is the most international of all Chinese-owned cement producers.

HQ:	China
Capacity:	359Mt/yr
Cement / Clinker Sales:	323Mt
Revenue:	US$22.0bn

Above right: A five-kiln cement plant.

Anhui Conch is the second-largest cement company in 2020. At the end of 2019 the group reported that it had clinker and cement production capacities of 253Mt/yr and 359Mt/yr respectively. These figures are 1Mt/yr and 6Mt/yr larger than at the close of 2018. The company sold 323Mt of cement and clinker that it made itself during the year, a year-on-year rise of 8.6% from 297Mt in 2018. When one includes its cement and clinker trading arm, which traded 109Mt/yr of cement not produced by Anhui Conch, the company handled a total of 432Mt of cement in 2019. Anhui Conch traded 55% more cement that it did not produce in 2019 compared to 2018, when it traded 70.4Mt.

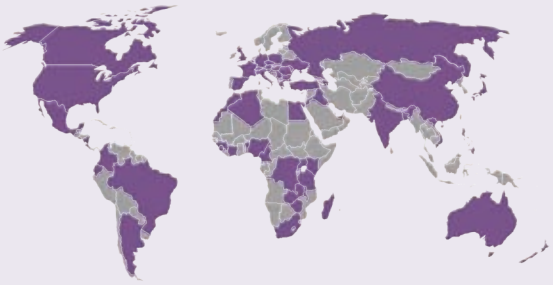
In its 2019 Annual Report Anhui Conch reported that its revenue grew by 15.2% year-on-year to US$22.0bn in 2019 from US$19.1bn in 2018. Its net profit increased by 9.8% to US$4.59bn from US$4.18bn. Like CNBM, Anhui Conch has been a major beneficiary of China's cement capacity reduction drive, which has driven prices higher (See Page 54). This has predominantly rewarded larger companies with wide geographic spreads and the ability to leverage economies of scale.

Anhui Conch's profit in the first quarter of 2020 was US$690m, down by 19% year-on-year from US$860m in the corresponding period of 2019. Sales fell by 24%, to US$3.28bn from US$4.31bn. The coronavirus outbreak in China impacted the results, notably through decreased sales volumes and a 190% increase in financial expenses due to devaluation of the Chinese Yuan.

Below right: View of a circular storage dome at the Lafarge Canada Exshaw plant in Alberta, Canada.

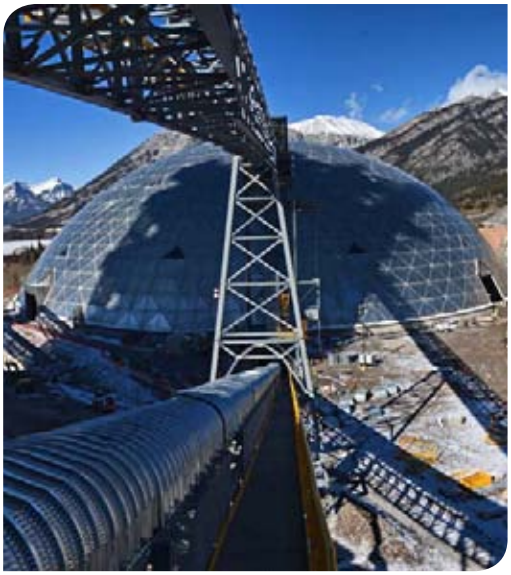
3. LafargeHolcim

The combination of Lafarge and Holcim five years ago resulted in the largest non-Chinese cement producer, albeit one that has now contracted significantly. In 2018 and 2019 LafargeHolcim has sold major assets in South East Asia, with further asset sales rumoured elsewhere.



HQ:	Switzerland
Capacity:	314Mt/yr
Cement / Clinker sales:	208Mt
Revenue:	US$27.8bn

Each with their own illustrious history, Lafarge and Holcim combined forces in July 2015. The process of combining these two large entities required the sale of significant cement production



assets, the vast majority to Ireland's CRH. A second major wave of asset sales in the 'ultra-competitive' South East Asian cement market has seen LafargeHolcim sell up in Malaysia and Indonesia. The sale of its 86% stake in Holcim Philippines to San Miguel Corporation for US$2.15bn fell through in May 2020 after the Philippines Competition Authority (PCC) failed to approve the deal within 12 months of its conclusion.

According to the *Global Cement Directory 2020* LafargeHolcim's headline capacity now stands at 314Mt/yr. The company saw cement sales fall to 208Mt in 2019 from 221Mt in 2018. The company had been rumoured to be looking to exit the South African cement sector in February 2020. It is possible that a reduction in global cement demand stemming from the coronavirus outbreak may speed up LafargeHolcim's divestment plans.

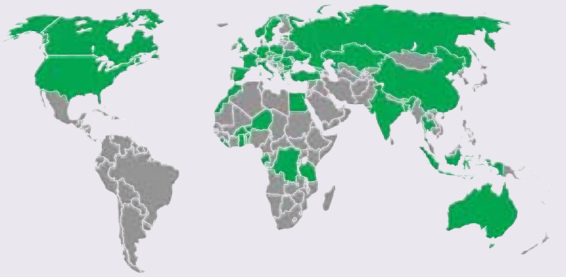
LafargeHolcim made a US$2.18bn profit in 2019, up by 32% from US$1.66bn in 2018. The profit was a company record, made possible by 'lower restructuring costs and financial expenses,' according to CEO Jan Jenisch. Sales were US$28.1bn, up by 3.1% from US$27.3bn, 'driven by good growth in Europe and North America, good price dynamics across all business segments and higher prices in most markets,' according to Jenisch. "We have achieved all our targets for 2019 and have moved our company to a new level of performance," he said.

LafargeHolcim has reported sales of US$5.6bn in the first quarter of 2020, down by 11% year-on-year from US$6.3bn in the corresponding period of 2019. Cement sales over the period fell by 10% year-on-year to 45.0Mt from 50.0Mt. The group's earnings before interest and taxation (EBIT) was US$279m, down by 14% from US$325m.

LafargeHolcim CEO Jan Jenisch said that the results showed the group's 'resilience, despite the Covid-19 outbreak in China' in January 2020. Other markets were disrupted from mid-March 2020. "I am confident that LafargeHolcim will emerge from this pandemic as an important contributor to economic recovery as building activity gets back to normal," added Jenisch.

4. HeidelbergCement

Germany-based HeidelbergCement rose up the global cement capacity rankings in 2016 when it acquired Italian rival Italcementi. It has since been bolstered by its new assets and has only been forced to sell relatively few plants to date.



HQ: Germany
Capacity: 146Mt/yr
Cement / Clinker sales: 126Mt
Revenue: US$21.2bn

HEIDELBERGCEMENT

Right: The HeidelbergCement Rezzato-Mazzano plant in Italy.
Source: HeidelbergCement.

HeidelbergCement was established in Heidelberg, Baden-Württemberg, Germany in 1874. It expanded rapidly from the 1960s onwards into the US, Eastern Europe, China, Turkey, Scandinavia, India, Russia and Africa via a mixture of acquisitions and new-build plants. It completed its largest acquisition to date on 1 July 2016, by purchasing Italcementi. It now boasts 146Mt/yr of cement capacity across 34 countries.

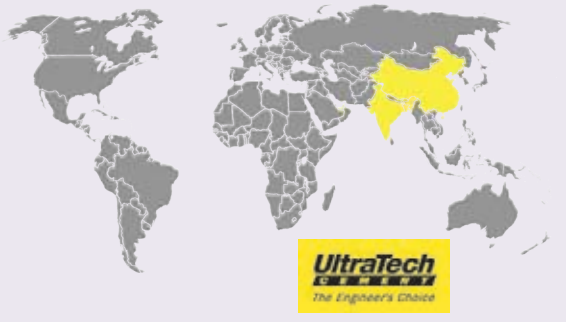
In 2019 HeidelbergCement produced 125.9Mt of cement, a 3.1% fall year-on-year compared to 130.0Mt in 2018. Its profit was Euro1.24bn in 2019, down by 3.4% from Euro1.23bn in 2018. Its revenue grew by 4.3% to Euro18.9bn from Euro18.1bn.

HeidelbergCement has reported a fall in first quarter revenues by 7% year-on-year in 2020, to US$4.4bn from US$4.75bn. Revenues fell by 6% in Western and Southern Europe and by 10% in the Asia-Pacific region, but rose by 11% in North America, by 2% in Northern and Eastern Europe and Central Asia and by 3% in Africa-Eastern Mediterranean Basin.

HeidelbergCement Managing Board Chairman Dominik von Achten said that, after year-on-year sales increases across all business lines, "from mid-March 2020 our sales volumes were significantly impaired by the effects of the coronavirus pandemic, such as state-imposed production downtimes and construction stoppages on major infrastructure projects." Total cement and clinker sales over the period were 27.7Mt, down by 3.0% year-on-year from 28.6Mt in the first three months of 2019.

5. Ultratech Cement

India's largest cement producer is now the fifth-largest in the world by installed capacity following a concerted spending spree over the past couple of years.



HQ: India
Capacity: 117Mt/yr
Revenue (Year to 31 March 2020): US$5.5bn

GLOBAL CEMENT: *TOP 10 PROFILES*

UltraTech Cement has a grey cement capacity of 117Mt/yr, with 23 integrated plants, one standalone clinker plant, 27 grinding units and seven bulk terminals across India, UAE, Bahrain, Bangladesh and Sri Lanka. From humble beginnings as a small Grasim Group subsidiary in the 1980s, it began the 21st Century with a capacity of just 8.5Mt/yr. Via a series of new greenfield plants and acquisitions, most notably L&T's cement businesses in 2004, assets from Jaypee Cement in 2004 and 2017 and the absorbtion of Century Textiles & Industries in 2019, UltraTech now claims to be the only company outside of China to have more than 100Mt/yr of capacity in a single country.

UltraTech Cement's sales have been negatively affected by coronavirus-related lockdowns in the fourth quarter of its 2020 Financial Year, which ran from 1 April 2019 to 31 March 2020. Its net sales fell by 13% year-on-year to US$1.40bn in the quarter to 31 March 2020 from US$1.61bn in the same period in 2019. The cement producer was forced to shut down certain plants in March 2020, usually one of the busiest months of the year. Plants started to reopen in late April 2020.

UltraTech has announced plans for a 3.5Mt/yr clinker production capacity expansion to its integrated Andhra Pradesh plant in Bhogasamudram, Anantapur district, to 10Mt/yr from 6.5Mt/yr. The new kiln line will cost US$169m and will be completed in March 2022.

6. China Resources Cement (CRC)

CRC operates 45 clinker lines and 96 grinding plants across seven Chinese Provinces. One grinding plant was added in 2019, increasing CRC's capacity by 1.0Mt/yr.

HQ: China **Revenue:** US$5.3bn
Capacity: 105Mt/yr

7. Cemex

Cemex has been on the back foot for much of the past 15 years following an unfortunately-timed decision to purchase Australia's Rinker in 2007. The debt taken on as part of that deal has forced it to sell cement assets in several markets and scale back production in others.

HQ: Mexico **Cement / Clinker sales:** 62.8Mt
Capacity: 89.3Mt/yr **Revenue:** US$13.1bn

8. Taiwan Cement

In late 2018 Taiwan Cement agreed a joint-venture with Turkey's OYAK Group, adding ~12Mt/yr of capacity in that country to 69Mt/yr already held in Taiwan and China.

台湾水泥

Revenue: US$4.1bn

HQ: Taiwan **Capacity:** 81.0Mt/yr **Production:** 62.4Mt

9. Votorantim

Votorantim Cimentos

Votorantim Cimentos is the most international of Brazilian cement producers, with capacity in South and North America, Turkey, Spain, Morocco and Tunisia.

HQ: Brazil **Capacity:** 67.1Mt/yr **Revenue:** US$6.9bn

10. CRH

CRH added US-based Ash Grove Cement to its portfolio in 2018, alongside the major assets it gained from Lafarge and Holcim groups in 2016. It has recently been rumoured to be considering selling assets in India, Brazil and the Philippines.

HQ: Ireland **Capacity:** 58.9Mt/yr **Revenue:** US$31.8bn

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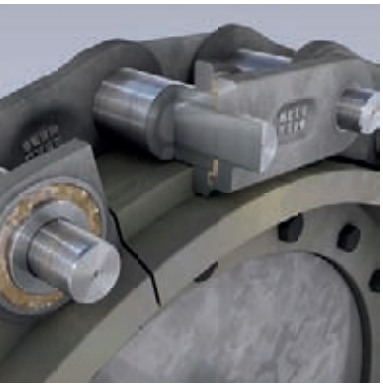

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Robert McCaffrey, Global Cement Magazine

Global cement trends

The coronavirus pandemic, which still rages around the world and which may rear its ugly head again and again in the months and years to come, has changed the world - changed it utterly. This article looks at how the virus has halted or retarded some pre-existing trends in the global cement industry, and has accelerated others.

Last December, back in 2019, seemingly an aeon ago, my colleague Peter Edwards wrote an article for *Global Cement Magazine*[1] on trends in the cement industry. It is instructive to look back to that pre-Covid-19 time, because we had no idea of the calamity that was heading towards us, even then. I would like to revisit his conclusions in the first part of this article, and will then go on to look at some additional areas that may also be important.

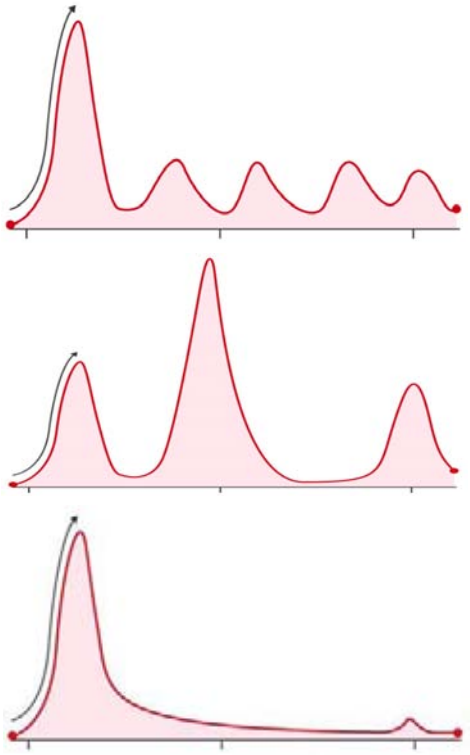
As in previous issues, it's important to point out that this article is being written at the start of June 2020. The situation is changing all the time (we still don't know the shape of the pandemic - or the various national epidemics - Figure 1), and the trends described in this article may have been further amplified, dampened or even reversed as the coronavirus crisis ebbs and flows.

European multinationals retreat from Asia - or do they?

Prior to the coronavirus pandemic, there was a strong impetus towards the European/Mexican multinationals retreating from Asia. As was said at the time by CRH's chief executive officer Albert Manifold "…you're faced with a capital allocation decision of investing in Europe or North America where you've got stability, certainty, overlap, capability, versus going for something a bit more exotic. The returns you need to generate to justify that higher level of risk are extraordinary and we just don't see it."

However, the situation has changed somewhat. The European markets have been decimated by the virus, with widespread lockdowns of populations, closures of construction job sites, disruption to supply chains and shuttering of DIY stores and wholesalers. Given the collapse in demand, which will shortly be revealed by the companies' second quarter results to be in the order of 20-50% down, it's no wonder that kilns and plants have been mothballed, that maintenance periods have been extended and that cement companies have been working through clinker stockpiles in what should be the run-up to their busiest summer period. The disruption, though, is likely to be relatively short-lived, with many economies in Europe eager to get back to normality. Economists have forecast a sharp recovery in 2021, but 2020 does not look like delivering 'stability' and/or 'certainty' in either Europe or North America. Perhaps risking an 'exotic' investment might not have been such a bad idea after all.

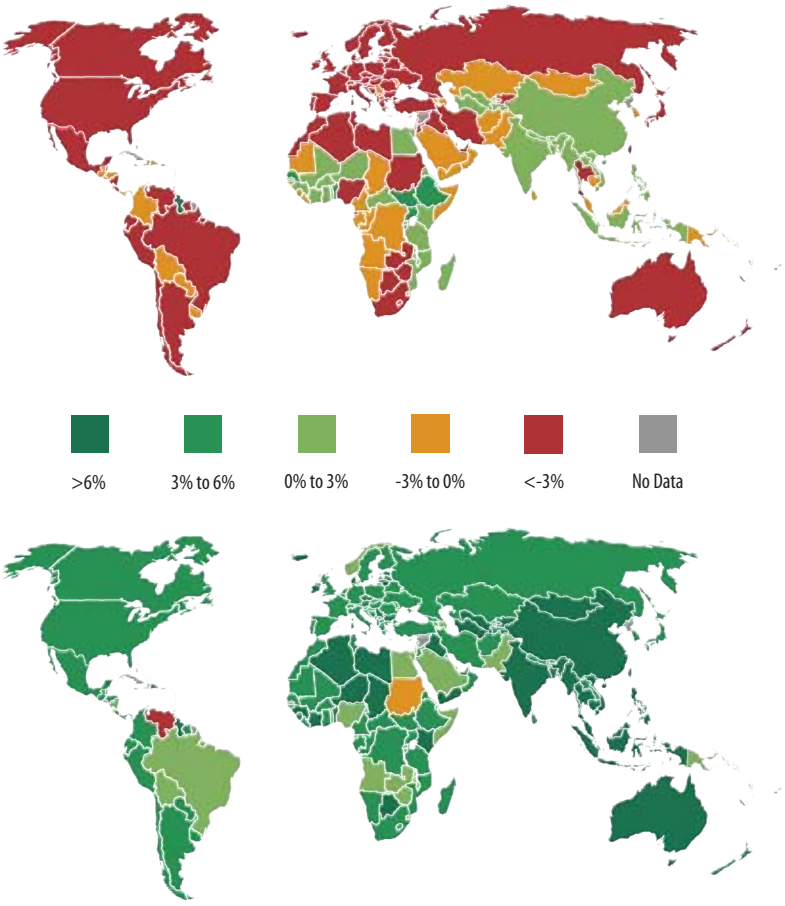
As it turned out, LafargeHolcim was obliged to stick with its Asian investment, in the Philippines at least, when the country's competition authority declined to give its imprimatur to a deal to sell four cement plants and a grinding plant to San Miguel Corporation, over worries that the sale would create a *de-facto* monopoly. At the time, LafargeHolcim said that, "With today's unprecedented global health crisis, the world has changed dramatically. Given today's new reality, we have decided to no longer sell our business in the Philippines. The Philippines is one of the most high-growth countries in the Asia-Pacific region and we intend to maintain our leadership position there." Although this is clearly a case of making a virtue out of a necessity, it's also a smart move, with younger populations being less susceptible to the virus and potentially sustainable profits to be made. Might we see a new wave of investments heading towards Asia?



Above - Figure 1: Coronavirus epidemic (national) outcomes. **Top:** Initial large outbreak followed by periodic flare-ups, requiring local lock-downs; **Middle:** Virus circulates for years with flare-ups possibly concentrated in the winter months; **Bottom:** Contact-tracing and isolation succeeds in nearly eliminating the virus, but localised flare-ups require continuing vigilance. **Source:** The Guardian.[3]

The European Green Recovery Deal

Back in December 2019, *Global Cement* described the battle to shape the direction of Europe's so-called 'Green Deal,' a package of measures that aims to make Europe climate neutral by 2050, which would undoubtedly impact the cement industry through



Above - Figure 2: What a difference a year makes.

Above Top: The IMF's global GDP 2020 forecast map shows near ubiquitous contraction (red and orange) or anaemic positive growth (for example for India and China).

Above: The IMF's global GDP 2021 forecast map shows near ubiquitous growth or strong growth worldwide - apart from in Venezuela and Sudan.

Source: The IMF.[4]

higher energy and carbon emissions prices. Existing legislation would be reviewed to ensure that it complies with the targets and new laws would be introduced on the circular economy, building renovation, biodiversity, farming and innovation[2]. In fact, the European Council backed the plan (with an opt-out for Poland) in December 2019, and the European Parliament voted it through in January 2020… just before the coronavirus hit the continent like a sledge-hammer in the first quarter of 2020.

The European Green Deal has not been forgotten, but it has been modified and potentially even turbo-charged by the coronavirus crisis, through its incorporation into the nascent Euro750bn European recovery plan, a plan with a distinctly green tinge. "Never waste a crisis," is an old adage taken to heart by Europe's technocrats - and voters. Politicians around the continent are being pressured by their constituents and NGOs to ensure that recovery funds are being spent on 'green' projects. Fossil fuel and nuclear power projects are excluded from the deal (despite nuclear being arguably the 'greenest' source of power available to us right now).

A 'European Green Recovery Deal' might yet be turned to the cement industry's advantage. 'Shovel-ready' major infrastructure projects will require substantial amounts of concrete - even if that concrete uses less cement due to optimised concrete mixes, and even if the cement that goes into the concrete has a progressively lower clinker content. Ed Sullivan of the US Portland Cement Association has suggested that in the drive towards an infrastructure-led stimulus package, cement and concrete-based roads may lose out to those made with asphalt, since in the short term they can be cheaper. Long-term, and when fuel economy is included in the equation, concrete roads are the best way forward.

Alternative fuels may also yet receive a boost from the coronavirus situation, as populations demand 'greener' policies and a 'new normal.' If voters are insistent upon moving away from fossil fuels, then they should be open to increased use of waste-derived and biomass-based fuels. Cement companies are not slackening their efforts to move away from fossil fuels despite softness in demand (and hence prices) for coal and oil due to coronavirus lockdowns. However, one possible factor in a slowing of the uptake of alternative fuels may be an industry-wide slashing of capital project budgets. Only those projects with the shortest payback times will now be funded - but alternative fuels projects should be amongst them.

The managed march of China

In 2019, China's cement demand and production was forecast to continue to grow, albeit at slower rates, but the coronacrisis put sharp brakes on a prolonged industrial growth trend. GDP dropped by 6.8% in the first quarter of 2020, halting a 40-year streak, while growth in the second quarter was barely positive at only 1.3%: growth for the year is estimated at around 1.8%, compared to sustained rates of above 6% for the last decade. Lockdowns are only part of the story: with the virus ravaging economies around the world, international orders for what China makes have dropped precipitously, leading to a 'second wave' in a deep 'demand crisis.' This has fed through to steeply rising unemployment in China, and will increasingly lead to a knock on effect on state coffers - and the ability to fund further infrastructure projects without resorting to increased debt. A short-term weakening of the economic situation in China might be shrugged off (a strong rebound is forecast for 2021), but the combined effects of weakened demand, ongoing trade wars and continuing lockdown measures will cap the possible upper bounds of Chinese cement industry performance. We can expect Chinese ambitions in Africa, and throughout Asia as part of the 'Belt and Road' project, to continue unabated - these are multi-decade projects, after all.

India's position magnified

Forecasts from the end of last year suggested that consolidation would be the watchword in India, alongside a focus on the environment. The virus will probably accelerate both trends. A dented demand due to a national lockdown (and rapidly rising case numbers, despite a paucity of testing), caused demand to drop and will dampen demand in the medium term, with a long-term and massive

oversupply of clinker providing a discouraging backdrop. Industry consolidation is inevitable, with some producers likely to go to the wall if they wait too long to find partners for financial stability and capacity 'rationalisations.' In addition, having now experienced blue skies and pollution-free air for the first time in years, many city-dwellers are likely to agitate for even stricter environmental regulations (and enforcement) on both transport and industrial emitters. Emissions trading schemes (ETS) for particulate matter (PM), first launched in Surat, Gujarat, may become more widespread.

Steady growth in the US

Back in December we reported that Ed Sullivan at the Portland Cement Association had forecast slowing growth in the early 2020s but that he didn't think that a recession was coming anytime soon. As Monty Python famously said, "Nobody expects the Spanish Inquisition," and nobody expected the emergence of a deadly new virus from China (except all the epidemiologists, who said that it was absolutely inevitable, and scriptwriter Scott Burns and director Steven Soderbergh who made the film 'Contagion' in 2011, which has pretty accurately forecast nearly every turn of events in 2020). From 'slowing growth' to 'worst recession since the Second World War' is quite a step, but upwards of 30 million were made unemployed within two months of the start of the epidemic in the US, unemployment spiked to 14.7% and annualised GDP is likely to drop by around 6% by the end of the year[4] (and more on a quarterly basis). The coronavirus will badly dent cement demand in the US in 2020, with imports likely to be slashed from a pre-Covid-19 forecast of 14Mt to less than 3Mt - with knock-on effects for countries exporting to the US, such as Spain, Turkey and Greece.

However, after the coronavirus crisis, which may take longer to subside in the US than in countries with more severe lock-downs, we can expect a return to growth, albeit unspectacular growth, hobbled by virus/lockdown weakness in state budgets and the lingering after-effects of the unemployment shock. Some time-limited infrastructure funds may be lost, but America's crumbling infrastructure will still need to be repaired, somehow.

Mixed picture in Latin America

Latin America was previously said to have a 'mixed' picture, but now every country south of the US has a short-term negative outlook, with some (much) worse than others. Mexico was already struggling with lower government infrastructure spending which hit cement sales volumes in the first half of 2019, and its response to the Covid-19 situation has been mixed, with lockdown restrictions being lifted even as the number of cases continues to rise steeply. Argentina's cement demand had already fallen through 2019, and the trend is expected to

have accelerated through the first half of 2020: the country has not yet reached the bottom of its current economic and health-care crisis. Venezuela's estimated capacity utilisation was just 12.5% in 2019 and with coronavirus spreading throughout a society in meltdown and the government actively discouraging accurate reporting of statistics, there is currently no way to accurately gauge the situation in the country. However, it is certain that it is worse than the authorities are admitting and, despite Venezuela having the world's largest reserves of oil, the outlook for the country in the short term is grim.

Both Brazil and Peru had been looking at robust cement demand through 2020 (Brazil from historic lows), but both countries have been badly affected by the current crisis. Brazil's politicians took the pre-emptive step of hiding the number of cases before the country was named as having the second highest number of deaths worldwide (after the US, and ahead of the UK), although the country's highest court has now told them to reveal the numbers. In any case, under-testing means that the total in Brazil is likely to be much higher than official numbers (in common with countries around the world). Peru's economy will have been similarly badly affected by the pandemic, since it is currently one of the top-10 worst affected countries in the world by number of cases (at the time of writing, over 200,000).

Coronavirus hits oil demand hits state budgets hits cement demand

Prior to the coronavirus, MENA countries had tried to combat endemic clinker overcapacity by exporting their excess production, but now that the pandemic has slashed cement demand worldwide, the possibility of exports has been nearly eliminated. Added to a demand collapse is the now lengthening of the collapse in the oil price, caused by not only weakened energy demand but also by a price war between Saudi Arabia and Russia, which coincided with the start of the pandemic. OPEC and Russia have agreed a deal to cut production by 10% on an ongoing basis,[5] but this may still not be enough to lift the oil price much above US$40/barrel, which is below production cost for many countries, and is below the level that would allow any Gulf country to balance its budget. Cement and concrete-intensive government infrastructure spending can be expected to be hit hard while coronavirus-related oil price weakness continues.

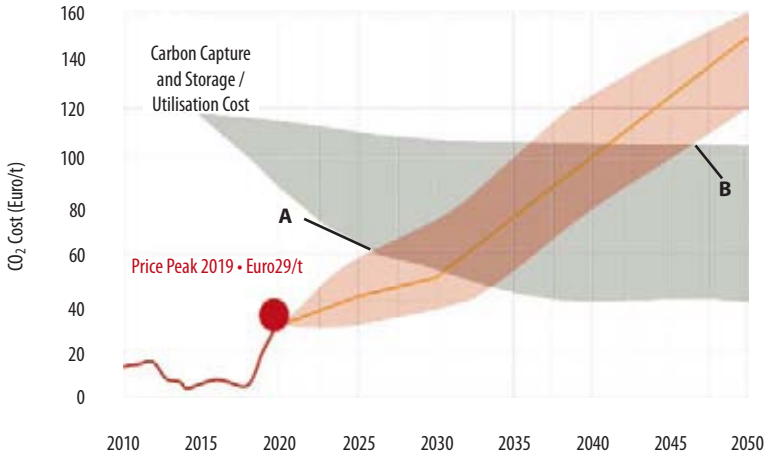
Fewer workers, more 'robots'

The trend towards increasing automation in the cement industry has been supercharged by the coronavirus crisis, with cement plants having to deal with social distancing, absent workers and decreased maintenance budgets (indeed, decreased budgets of any kind). Now only the fastest-payback projects have the possibility of being financed, and, apart from alternative fuels projects, many of the most attractive possibilities will be in automation, digitalisation and process and logistics optimisation.

At the same time, cement companies have been optimising their product mix to decrease the effects of the crisis - or to make the most of it. Cemex has identified its key products that can help customers to continue to operate under lockdown measures: The company's self-compacting fibre-reinforced concrete range, Evolution, allows placement with a minimum number of workers, while its factory-produced mortars increase productivity. Its Cemex Go digital platform allows online ordering and delivery tracking, further cutting workers from the work-flow. If not quite staffed with robots, the cement industry of the future will certainly feature fewer humans.

Upcoming trends

Carbon capture and sequestration or use (CCS/U) is coming over the horizon and will soon be economic[6] – even before it becomes obligatory. The coronavirus has shown many people around the world that working from home and video conferencing can eliminate some (but not all) real-world travel. Expect this to translate into slower growth in real-world infrastructure (such as airport expansions or new railways) and reduced growth in demand for cement alongside a reallocation of resources into cyber-infrastruture. A deceleration in urbanisation and a return to the countryside looks possible with increased remote working. There may even be an awakening of environmental awareness, a 'reenvironmentalisation,' which might lead economies away from consumerism and towards sustainable modes of living. One can only hope.



Below - Figure 3: A comparison of forecasts for CO_2 emission prices and the cost of carbon capture and storage/use costs. According to the graph, CCS/U *may* be cheaper than CO_2 emissions prices in some situations by 2027 (point A), but in all forecast scenarios it *will* be cheaper by around 2048 (point B).

Source: HeidelbergCement.[6]

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2. https://en.wikipedia.org/wiki/European_Green_Deal
3. https://www.theguardian.com/science/2020/jun/05/the-first-wave-of-covid-19-is-not-over-but-how-may-a-second-look
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Lindner-Recyclingtech GmbH

Commissioning in the time of coronavirus

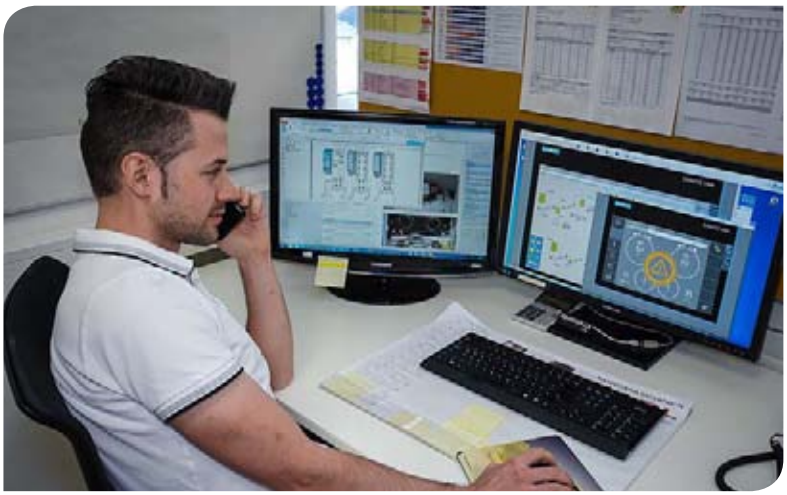
A new shredder to transform waste into alternative fuels had been ordered and delivered to the German waste management company Hündgen Entsorgungs GmbH & Co KG in Swisstal-Ollheim. The installation was in full swing, but then came the coronavirus lockdown. However, thanks to state-of-the-art communication software and remote service tools, the new Lindner Micromat 2500 is now running smoothly... and on time.

Every single minute that delays the commissioning of a new facility comes with a price tag. This well-known truism poses a challenge to many a company, even under normal circumstances. What it means in light of the global coronavirus crisis is something that Christian Hündgen, CEO and Plant Manager of Hündgen Entsorgungs GmbH & Co. KG, knows all too well. "Our new Lindner Micromat 2500 shredder was delivered in March 2020, when the construction of our facility was well under way. When we were told that due to Covid-19 and the associated travel restrictions, no Lindner service technicians could start up the machine on-site, we were already expecting delays. We were faced with an enormous problem, since there was material on site that we were bound by contract to process."

To overcome this seemingly impossible situation, Lindner opted for an unorthodox but smart solution. The Lindner Service Centre helped with video analysis and online support to install the machine on-site. Account Manager Manfred Eßmann, said, "One of the fundamental values at Lindner is to be a reliable and trustworthy partner. Right now we are doing everything we can to support our customers with all available means and keep to agreements that have been made. Thanks to modern technology, our service team can do a great many things remotely and give instructions via video call for commissioning equipment on-site. It works amazingly well. I am sure that this installation method will be used in the future, even after the crisis is over."

The Micromat shredder has now run for 200hr without any issues. The wider facility is in full operation. Christian Hündgen is relieved. "Despite all the adversities, the scheduled construction time was maintained and production is on time. We would like to thank Manfred Eßmann and the Lindner Recyclingtech team for their exemplary commitment to our project."

Below and below left: The Micromat 2500 shredder was installed on-site at Hündgen Entsorgungs GmbH & Co. KG with the assistance of the Lindner Service Centre via video analysis and online support.

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Anthony G Tarantino, PhD, Adjunct Professor, Santa Clara University & Senior Advisor to Atollogy

Keep your social distance

For the cement sector, the term 'Health & Safety' has usually concerned efforts to protect workers' well-being from physical risks such as trips and falls, hot surfaces, rotating machinery and falling material. Now, as we enter the post-lockdown era, there is an increased focus on worker health, not just safety...

Social distancing

Atollogy's proprietary camera-based computer algorithms have helped cement, concrete, aggregate and other yard operators for over two years. Initially, clients asked for improvements to cycle times and other efficiency issues with 24x7 monitoring, analytics and alerts to bottlenecks.

However, in this era of social distancing (and possibly other infectious diseases in the future), Atollogy's proprietary computer vision algorithms have been adapted to monitor social distancing compliance in workplace environments while protecting personal privacy. The system is entirely based on visual-range cameras.

It is clear that social distancing is key to preventing the community transmission of infectious diseases. Figure 1 shows varying degrees of social distancing in the yard, from safe to unsafe. Proximity warnings can be given and Atollogy can also obfuscate or obscure individual identities, depending on privacy policies.

Right - Figure 1: Atollogy's camera-based systems monitor proximity of workers on sites with social distancing measures.

Paper handling

Processes as simple as handing paperwork from one person to another or keying in data on tablets and terminals are now seen as potential vectors to spread highly contagious and deadly viruses. The fewer times drivers and equipment operators are required to key in data or fill out forms, the greater their personal safety. There are indicators that Covid-19 and related viruses can live up to 72 hours on surfaces, so the fear of physical contact is bound to continue even after infection rates subside. Atollogy's solution eliminates the multiple hand-offs of paperwork.

Figure 2 shows another Atollogy innovation that automatically scans each document when it is placed into the box. Unlike a simple scanner, optical character recognition captures quantities, dates and other critical information. A UV light, to irradiate viruses from the paperwork, can be added as an extra layer of safety. One such use would be to scan bills of lading, so drivers do not have to leave their trucks and employees need not handle the paperwork.

Below - Figure 2: An intelligent document holder that scans and irradiates the content placed in it.

Conclusion

It is reasonable to assume that we are not likely to ever fully return to the pre-Covid-19 world in the workplace. With a virus that is 10 times as deadly as the flu and has pushed most all economies into a major recession (and possibly a depression), strong counter measures will be needed for the foreseeable future. While various guidelines around the world are not yet legally-binding, any workplace that ignores them will invite a litigious nightmare. Regardless of regulations and fear of litigation, workers will seek out employers who follow best practices in workplace safety.

Atollogy's AI-based computer vision is a proven and cost-effective technology that provides 24-7 monitoring and alerts to workplace safety as well as social distancing for your workforce, which will help ensure a safe working environment and improve customer and employee satisfaction.

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Titan America, with Mary-Beth Kramer, Kramer Consulting

Health, Safety... and Covid-19

Representatives from Titan America, part of the multinational Titan Cement, discuss the changes that the coronavirus outbreak has brought to the company's existing health and safety operations...

Titan Cement has a presence in 15 countries, including in the US through its subsidiary, Titan America, LLC. Titan America's two plants, Pennsuco (PNS), located in Medley, Florida, and Roanoke Cement Company (RCC) located in Troutville, Virginia, are safety award winning plants.

Earlier in 2020, both were honoured by the Mine Safety & Health Administration (MSHA) and the Portland Cement Association (PCA) Chairman's Safety Awards for 2019 in the Large and Medium Facility Categories, respectively. RCC's Front Royal Terminal was also honoured for 20 years without a lost time accident in 2020.

Titan America operates two cement plants, the Pennsuco plant in Medley, Florida, and the Roanoke Cement plant in Troutville, Virginia. Zaklina Stamboliska, Vice President of Cement Manufacturing, provides oversight to the safety team, led by Titan America's Safety leader, Walter Reed, Senior Vice President of Aggregates. Joe Ayers, Safety Director, guided the newly formed Coronavirus team through Brad Tucker, Safety Manager at Pennsuco and Eric Clendenin, Safety Manager at Roanoke Cement. The Coronavirus team offers the following discussion, which demonstrates their approach to safety and training during the outbreak.

Zaklina Stamboliska (ZS): **First, I want to thank my team for all of the work and effort to lead both plants through this challenging time. Brad, can you outline the Coronavirus measures adopted at Pennsuco?**

Brad Tucker (BT): Certainly. The list includes:

- Nursing station temperature checks. Temperatures are verified on multiple devices and verified high temperature individuals are asked to quarantine;
- Wristband verifications to show that all employees, contractors and visitors have been checked;
- Quarantine of individuals who have tested positive or were in close personal relations with people who have tested positive;
- Mandatory mask and gloves while working throughout the plant;
- Staggered break times so that employees can maintain social distancing;
- Staggered schedules for office personnel;
- Additional temporary break areas to maintain social distancing during breaks;
- Video conferences instead of face-to-face meetings;
- Working from home for personnel in cases where the nature of the job allows it;
- Weekly sterilisation of all facilities;
- Sterilisation of work vehicles before each shift;
- One person per vehicle;
- Truck drivers are discouraged from leaving their vehicles during loading operations;
- Social distancing and protective measures are extended to visitors and contractors;
- Training provided to employees regarding hygiene and protective practices that people can adopt at work and at home;
- E-ticketing for truck drivers at plants and terminals.

Below: Titan America's Heard Aggregates employees social distancing in Virginia.

ZS: **Our plants are situated in different areas. Pennsuco is located in a commercial region, while the Roanoke Cement plant is located in the Roanoke Valley, a recreational area. Eric, the Roanoke Cement plant had other safety measures, including outside tents to congregate while social distancing, teleworking and rotating personnel, as well as multiple portable washing and hand liquid sanitiser stations onsite, and a Covid-19 preparedness audit rotation for the entire property, among other initiatives. How did you communicate this at the plant?**

Eric Clendenin (EC): We communicated to employees, contractors and customers through email, intranet, virtual meetings and small, socially distanced, in-person meetings. We provided detailed and organised training for third-party personnel hired to conduct temperature testing. We shared

mask-wearing comfort and proper utilisation guidelines through posters or other visuals. We discussed the prevention of Covid-19 at Roanoke Cement in all safety committee meetings and morning status calls.

***ZS:* Brad, was there an extra burden placed on health and safety training at the plant due to the outbreak? How will this play out as the virus fades…and possibly returns?**

BT: We never saw it as a burden because we care about each employee and their family. If we want to continue to lead in health and safety and continue to produce cement, we must adapt to the ever-changing environment. Safety and training communication must be reflective of that. We'll be ready with additional training and safety measures if there is a second wave. The safety measures we have taken have become second nature, and that's where we want to be.

***ZS:* Eric, where have the biggest difficulties arisen with respect to health and safety because of extra considerations required by the virus?**

EC: We lost value in the face-to-face meetings and open dialogue. Our safety sessions previously were always interactive and located in the workplace where best practices could avoid lost time accidents. Virtual training is a good substitute, but we miss the human contact and relationship building.

***ZS:* Do you think that the coronavirus outbreak has shone a spotlight on 'normal' health and safety outcomes in the cement sector, as it has with overall hygiene in the general population?**

BT: I believe it has. For example, hygiene is an often-overlooked part of our occupational safety because it is such a prevalent part of our jobs. Covid-19 presents us with a new danger and we've been successful at directing our attention to that beyond our traditional health and safety program. I do not believe there are negative outcomes. I believe that training reinforces safety principles in the plant and hygiene is just one element. The silver lining is, hygiene has become front and centre, which is beneficial to everyone.

***ZS:* Eric, has the outbreak affected the ability of cement plants to monitor health and safety?**

EC: No. We practice social distancing at the plants and audit health and safety aspects regularly. The monitoring seems to be more fluid and manageable.

***ZS:* Agreed. I believe the pandemic has raised the bar on all aspects of health and safety. Brad, how concerned is the wider US cement sector by coronavirus measures? Do operatives see them as life-saving or draconian?**

Zaklina Stamboliska

A Vice President, Cement Manufacturing, Zaklina is responsible for cement operations at Titan America. She also provides administrative oversight for the entire Pennsuco site across multiple facilities. In addition, she manages coordination of all site-essential shared services including safety, security, environmental, warehouse, human resources and community relations.

Brad Tucker

Brad Tucker is Safety Manager at Titan America's Pennsuco Plant and a Certified Safety Professional. He has eight years of professional safety experience including at Titan America, Martin Marietta and Gerdau Long Steel North America.

Eric Clendenin

Eric Clendenin is the Safety Manager at Roanoke Cement. He is a Certified Mine Safety Professional (CMSP), an International Safety Mine Safety Professional (ISMSP), as well as a certified member of the Society of Corporate Compliance and Ethics (SCCE).

BT: Draconian is a strong word. I believe it's imperative for businesses to adapt to new and present hazards in the workforce.

***ZS:* As good neighbours in our communities and as industry leaders, we are obliged to respond to any hazard that presents itself to our workforce. We must be vigilant and overcome these obstacles so that our employees can return home safely and our business can flourish.**

Above: Hand sanitising is now second nature.

Above left: Masks and gloves are the new standard protocol for Titan America.

Below: Best practice at the Pennsuco plant in Florida.

Chris Jones, Bricking Solutions

Safety first: Selecting the right equipment to optimise refractory safety and productivity

With refractory maintenance taking place annually in most cement plants, making the right equipment choice not only increases productivity, it provides peace of mind with regard to worker safety.

Above: Chris Jones is lead engineer for Bricking Solutions.

The entire refractory maintenance process, from initial inspection to installation and final clean-up, comes with inherent dangers. To combat health and safety risks, contractors and facilities rely on specially-designed support equipment that can stand up to the harsh conditions of refractory installation. However, just as site-specific evaluations must be made when selecting refractory bricks, determining the specific support equipment for optimal results requires careful consideration. To help make the selection process a little easier, here are four things facilities and contractors should consider for long-term safety and productivity.

1. Quality of construction materials

When it comes to selecting the safest refractory installation equipment, features like fall guards, railings, kick plates, non-slip surfaces and, where appropriate, stainless-steel netting are good indicators of a product's overall safety contributions. However, contractors and facilities will benefit by looking a little deeper into the construction materials as well.

Right: Products manufactured with 6061-T6 aircraft aluminium offer an industry-leading strength-to-weight ratio. When used in safety cages, for example, this material is strong enough to protect workers from debris up to 140kg falling from a height of up to 2.4m, while still being light enough for two people to manoeuvre.

Products built with high-quality materials will provide long-lasting service even in the harshest refractory installation conditions. 6061-T6 aircraft aluminium, for example, offers an industry-leading strength-to-weight ratio. It provides the durability of steel at a third the weight. Incorporated into modular designs, this results in equipment that is lighter and easier to assemble, reducing risk of physical strain.

Additionally, the material's strength can produce a high safety factor when combined with high-quality engineering. When used in safety cages or personnel tunnels, for example, this material is strong enough to protect workers from debris up to 140kg falling from a height of up to 2.4m, while still being light enough for two people to manoeuvre. A custom-engineered kiln access ramp using aircraft aluminum can support as much as a 6.8t live load, increasing protection for workers and equipment moving across the ramp.

2. Tailor-made options

Customisation should also be a key consideration when evaluating refractory installation equipment for safety and productivity. Every kiln and burn floor offers its own set of challenges. Tailor-made equipment means site-specific concerns can be addressed in design, leading to a safer, more efficient solution. For many facilities, this is the main argument for using in-house engineers. However, a number of leading manufacturers also understand the importance of customisation. Working with these companies can provide the best of both worlds: custom-designed equipment that safely meets the needs of a particular facility backed by the knowledge, experience and know-how of a specialty manufacturer.

3. Support equipment for the entire process

Another important consideration is that refractory installation is a long, multi-phase project. A number of products are available to help improve safety and efficiency throughout the entire process. A thorough investigation of the features and benefits of all available support equipment is the best way to ensure

safety and efficiency through the whole process, from inspection to final clean-up.

The bricking machine is the most recognisable piece of support equipment for refractory installers. Originally designed to reduce physical strain and safety risks compared to more manual installation methods, such as pogo sticks, mechanical jack screws, glueing, and jack and timber, bricking machines have evolved over the years to provide a number of cutting-edge safety benefits. The newest machines offer innovative features, such as adjustable dual-arch systems with pneumatic cylinders to push bricks into place, greatly reducing the risk of injuries from unsupported material overhead. Ergonomic design elements further increase worker comfort and safety. Some models also offer a cut-away section for unobstructed access to the keying area to increase ease and visibility to close out a ring.

Left: Refractory installation is a long, multi-phase project. A number of products are available to help improve safety and efficiency throughout the entire process.

Left: Newer generation bricking machines offer the most innovative features, such as adjustable dual-arch systems with pneumatic cylinders to push bricks into place, greatly reducing the risk of injuries from unsupported material overhead.

However, to truly optimise refractory installation safety, contractors and facilities should consider support equipment beyond just bricking machines. Certain manufacturers that specialise in refractory installation have developed entire product lines that increase safety and efficiency throughout the whole process. From safety cages and access ramps to hydraulic and incline conveyor systems that allow workers to move materials twice as quickly as manual methods with significantly less physical strain, these manufacturers offer a number of equipment solutions that facilities and contractors should keep in mind.

4. Long-term manufacturer support

Regardless of who manufactures a facility's refractory equipment, ensuring long-term safety requires continual training and maintenance. While the majority of this upkeep falls on the facility or contractor, things like on-site equipment inspections and parts and service from a reputable manufacturer are worth considering to make lasting safety more attainable.

If possible, look to partner with a manufacturer or dealer that offers on-site inspections. These visits can often be turned into learning opportunities for plant personnel and contractors. Over time, crews change, and those on hand for the initial commissioning, where assembly, maintenance and storage requirements were originally outlined, may not be the same faces three years later. Additionally, a lasting relationship with the manufacturer for parts and service support helps to ensure that equipment is ready for operation during unscheduled kiln downtime.

Safety conscious

When it comes to refractory installation safety, making the right equipment choices can lead to long-term success. Partnering with industry-leading manufacturers that specialise in refractory support equipment provides an unparalleled wealth of knowledge and experience, as well as innovations that continue to meet the industry's evolving safety needs.

Left: To make lasting safety more attainable, look to partner with a manufacturer or dealer that offers on-site inspections. These visits can often be turned into learning opportunities for plant personnel and contractors.

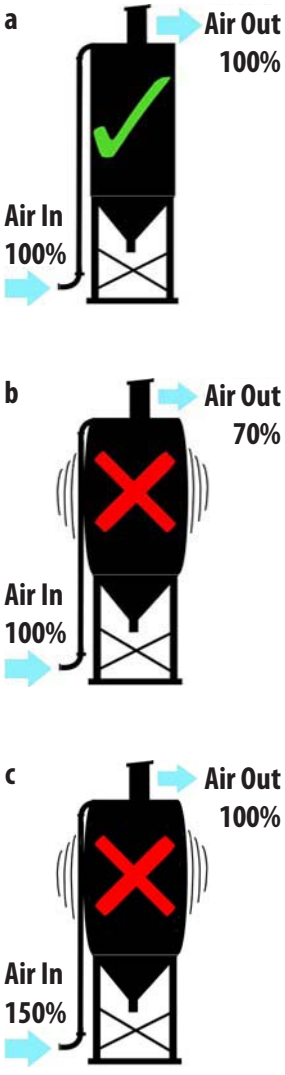
Mark Stevenson, Hycontrol Ltd

Avoiding over-pressurisation risks in silos

Silo protection systems are essential to avoiding the dangers of silo over-pressurisation.

Below - Figure 1: There are three possible states a silo may be in when being pneumatically filled.

a) Balanced.
b) Elevated pressure due to blockage.
c) Elevated pressure due to excess air entering.



During the pneumatic filling of silos, powders are fluidised at the base of the tanker and blown through the connecting hose into the silo. While modern tanker vessels, hoses and couplings are pressure rated, in most cases the receiving silo is not. There are three possible states a silo may be in when it is being pneumatically filled:

1. Balanced: The airflow into the silo is the same as that leaving (Figure 1a);

2. Elevated pressure due to limited air flow through the filter: This may be due to inadequate maintenance of safety equipment, or by filter blinding due to over-filling. An increase in air pressure above 1psi inside a silo can cause severe damage. Risks include rupturing the silo or blowing the filter off the silo roof (Figure 1b);

3. Elevated pressure due to excessive air entering the silo: This is the most dangerous scenario and even a new filter will not cope. This most commonly happens at the end of a delivery when the silo is nearly full and there is limited ullage within the vessel. Recent evidence suggests that this problem is far more common than previously thought (Figure 1c).

Tell-tale signs

Common silo over-pressure indicators include: Powder in and around the pressure relief valve; Blocked air filters; Dust emission upon filling; damage to safety equipment and; in extreme cases, buckling of the silo. Investigations must be carried out for any of these symptoms, as they are a warning that there is a fault in the silo system. Over-pressurisation poses three main risks:

Silo failure: It may take only a small pressure increase to buckle and weaken the silo and cause it to rupture, or even blow the filter unit off the roof. A100kg filter unit falling from the silo-top onto personnel could cause serious injury or death;

Dust pollution: Over-pressurisation often leads to the ejection of cement to the air. Such blow-outs are a common sight, indicative of pressure problems;

Working at height: All silos fed from a road tanker should have safety equipment at the top, making working at height a significant concern. If this equipment can only be tested *in situ*, this means that silos must be climbed before every delivery to perform a functionality test. Even with correct safety equipment, working at height is very dangerous.

What about overfilling?

There is a common misconception that silos are at the highest risk from overfilling. While this can be problematic, the risks of over-pressurisation are much higher. However, overfilling requires consideration because it contributes to filter blinding, increasing the likelihood of pressure becoming trapped in the vessel.

Preventing over-pressurisation

The complex nature of this application, coupled with the speed at which pressure levels can change, dictate that it is unsafe for a human to control the silo's pressurisation. A silo protection system (SPS) is necessary. These comprise:

Pressure sensor: The most critical component, the pressure sensor should be mounted at the top of the silo. It is designed to actuate, and give a signal to close the inlet valve immediately upon reaching the maximum safe internal pressure. The signal should also trigger an alarm to alert site staff. The sensor should be calibrated so that the pressure alarm is triggered before the pressure release valve opens. With the fill valve closed, the driver should also stop the tanker discharge. When the pressure has reduced, the fill can resume in a controlled manner.

High-level sensor: This detects the maximum safe level and instructs the operator to cease filling. It protects the silo against overfilling and filter blinding, which will lead to over-pressurisation. Positioning must take into account the filling of the silo and the location of the fill pipe, to avoid damage from powder as it is propelled into the container.

Pressure relief valve (PRV): The PRV is the last line of defence for the silo if the SPS should fail. Under regular operation, it should never open. The PRV should be appropriately-sized to handle large volumes of air. It should have the facility to be tested by opening and closing before the fill and to signal to the control panel when it opens. Most crucially, however, is that the valve is calibrated to open at a slightly higher trip point than the pressure switch. If both the PRV and pressure sensor are set to the same pressure, the PRV will constantly open and powder will accumulate on and around the valve. Eventually this will block the PRV and compromise the entire system.

Control panel: The control panel provides the essential logic functions for the system. It should be easy for users to interpret the status of the SPS.

Shut-off valve: A comprehensive SPS should include a normally-closed shut-off butterfly valve to control inflow from the tanker and to seal off the silo in the event of a pressure event. Pinch valves and double-acting butterfly valves have previously been used. However. testing shows that air supply failures leave these valves open, meaning that the system cannot control the fill. Therefore, the inlet valve must be a normally-closed unit. In the event of a loss of air pressure or another such issue with the system, it will prevent filling from taking place until the fault is rectified.

Air vent filter unit: This must be correctly sized to be able to vent sufficient quantities of air during the filling process. For this reason, it is essential that the self-cleaning mechanism is in good working order and replacement of the filters carried out according to the manufacturer's guidance. It is essential to bolt the filter unit to the silo. Some sites use banded connections to attach silo-top equipment, which are not secure enough for this application and make a pressure-induced blow-off even more likely.

The most common mistake when putting together an SPS is to assemble systems using a checklist of off-the-shelf general-purpose sensors, which are then often inadequately maintained and cannot correctly be tested. Crucially, they are unlikely to be failsafe and may stop working without warning.

Maintaining the system

Even the best-equipped system is only as good as its last test and regular SPS inspections are crucial. Most systems have a test button. However, in many instances this only performs a lamp test to show that the beacon and alarm on the panel are working. It is essential to know the difference between this and a function check. Systems should have the capability of being functionally tested from ground level, to eliminate the need for working at height to check equipment on a daily or weekly basis.

Above: A silo bulge is a serious indication of over-pressurisation within the silo and should not be ignored.

Comprehensive silo servicing routines are available from a variety of sources. Unfortunately, these guidelines are often overlooked or misunderstood. Usually, silo servicing comprises a visual inspection with a quick once-over and dusting that fails to assess the actual condition. Additionally, engineers often disregard leaked product on the silo top and make no effort to establish the cause. A clear danger sign is being ignored.

Therefore, silo servicing checks must be carried out by trained, competent engineers, thoroughly inspecting and testing all the essential elements and maintaining them appropriately. Records must be kept and any action required addressed as soon as it is highlighted. These actions will help to keep an SPS in optimal working order.

Conclusion

Treating silo safety as a 'box-ticking exercise' has put sites at risk. Without monitoring the conditions inside the silo, we can neither control the delivery process nor prevent the risk of over-pressurisation. Given the potential for injuries or even fatalities arising from over-pressurisation, protection using an SPS is vital in all cases.

When installed and maintained correctly, an SPS should be comprehensive, failsafe and testable to ensure that each of the safety components is fully functional. Only if this is the case can operators be confident that the risk of a pressure-related issue arising is under control.

Below: A Hycontrol SHIELD Lite SPS installed on a site overlooking the River Thames in London, UK.

Rick Felde, Martin Engineering

Belt conveyor danger zones

Recognising the hazards is a key step toward preventing conveyor-related injuries.

In bulk material handling applications, conveyors are typically massive, complex and extremely powerful systems. They are usually constructed of rubber belting, set on rolling idlers, wrapped around large steel drums and driven by a high-torque motor. As such, conveyors present enough danger zones that entire systems should be considered as hazards.

In most applications, a conveyor belt moves at a relatively constant speed, commonly running somewhere between 0.5-10m/s. An Olympic sprinter has a reaction time of about 0.18s when poised at the starting line and totally focused on the race. If this athlete becomes entangled in a conveyor belt travelling at 1.5m/s, they would be carried 27cm before even realising what has happened.

A non-athlete, such as a cement plant worker, would likely require a longer time to react. For simplicity's sake, we can assume it would be twice the athlete's reaction time, so the worker would be pulled twice as far, introducing the potential to strike many more components or to be pulled farther and harder into the first one. In addition, most conveyors are engineered with the ability to start remotely. The system may go from dormant to active at any time at the push of a button. This ability can easily catch a worker unaware, leading to serious injury or death.

"There's a simple rule of thumb regarding conveyors: If it's moving, don't touch it," states Dan Marshall, Process Engineering at Martin Engineering. "The most common way to prevent inadvertent contact is with suitable guarding that renders the moving components inaccessible."

Below: A belt conveyor is a large, complex and powerful system. **Source:** Martin Engineering 2020©.

For maintenance or repairs, procedures for lockout/tagout/blockout/test-out should always be followed when working on a stationary conveyor and systems should be equipped with anti-rollback devices (also known as backstops) on the head pulley.

However, even when belts are not in motion, they can still be dangerous. "When a conveyor belt is moving, there will usually be more tension on the carrying side," continues Marshall. "If the conveyor is merely stopped and de-energised, that tension may remain in the belt in the form of stored energy." A system under tension will always try to approach equilibrium, i.e.: it will try to release the energy. This release will likely come in the form of a pulley slip, which occurs when the belt slides around the head pulley to equalise the tension. The distance the belt moves is proportional to the amount of tension stored and the belt's modulus (elasticity). It is not unusual for this distance to be several metres. If a worker is on the belt or close enough to be pulled in during this sudden release of energy, injuries or death can occur.

Don't get pinched

Many of the moving parts on a conveyor belt system are rotating components. These parts include idlers, drive shafts, couplings, pulleys and speed sensors. Items rotating at a high speed pose the risk of entanglement or entrapment. "All moving machine parts should be guarded with adequately constructed, properly installed, functioning and well-maintained guards," says Marshall.

There are many pinch points on a conveyor, components that the belt actually touches or comes near, including the drive pulleys, snub pulleys, idlers, stringer, chute walls and deflectors. If a worker's limb travels with a conveyor belt, it will meet one of these components. The limb, as well as its attached worker, will become trapped between the belt and the obstruction.

The same thing can happen with a tool, which can pull a worker into a trap faster than they can let go. "Effective fixed guards should ensure total protection. Workers should not be able to reach around, under, through or over the barrier separating them from moving components," adds Marshall.

Above: Belt clamps can be as small as two bars or as large as a giant vice. **Source:** Martin Engineering 2020©.

Above left: Belt conveyors move massive amounts of material, often at very high speeds. **Source:** Martin Engineering 2020©.

Many conveyor-related fatalities occur when workers are cleaning fugitive material from the structure or components of a conveyor system. The process of cleaning may put a worker in proximity to a very dangerous machine. The need to shovel, sweep or hose off accumulations puts the worker within arm's length of the conveyor, often closer.

Don't forget dust

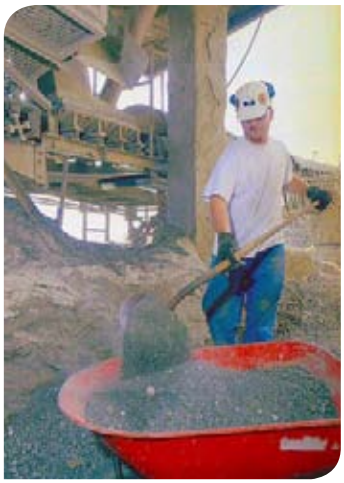
Airborne dust can cause numerous health risks, ranging from material buildup in the lungs to explosions. Categorised as either respirable or inhalable according to particle size, dry, solid dust particles generally range from about 1-100µm in diameter. According to the US Environmental Protection Agency (EPA), inhalable coarse particles are 2.5-10µm in size. They are typically caught by the human nose, throat or upper respiratory tract. In contrast, fine respirable particles under 2.5µm can penetrate beyond the body's natural cleaning mechanisms, travelling deep into the lungs and causing long-term or chronic breathing issues.

While it's virtually impossible to prevent all fugitive material from escaping a conveyor structure, taking practical steps to minimise it as much as possible helps reduce the dangers it can introduce. When cleanup is necessary, performing the job while the conveyor is running should not be an option. Operators concerned with the cost of lost production from stopping a conveyor to clean need only consider the consequences of an accident to confirm the wisdom of this rule.

Knowing the hazards

Until recently, the engineering of belt conveyors to carry bulk materials hadn't changed much in 50 years, despite the fact that virtually every requirement for safety, regulatory compliance and production performance has been raised during that time. Standards continue to tighten and industry best practices now often exceed government requirements.

"Using these new and emerging technologies, even poorly performing conveyors often don't need to be replaced or rebuilt, but merely modified and reconfigured by knowledgeable and experienced technicians installing the right modern equipment," Marshall concluded. "Specialised conveyor training and trusted resources from global suppliers are helping to raise operator awareness to make conveyor systems cleaner, safer and more productive."



Far left: Cleanup brings workers within close proximity of moving conveyors. **Source:** Martin Engineering 2020©.

Left: The pinch point between the belt and a carrying idler is one opportunity for an entrapment injury. **Source:** Martin Engineering 2020©.

Cynthia Meijer, TBK Spillage Control bv

CenTrax belt tracker puts conveyor belts with garland roller pairs back on track

A cement plant in the UK was experiencing a lot of mistracking problems on a 1200mm-wide conveyor belt fitted with 5-part garland roller pairs. The equipment was fitted with tracking systems that were not performing correctly. CenTrax engineers were able to design a custom-made solution.

The solution at the UK cement plant has a CenTrax S-1200 belt tracker as the framework. It is based on the existing CenTrax load carrying and return strand tracking systems. For many years, these systems have proven to be effective under the most arduous conditions. Unlike the standard CenTrax three-roller tracking systems, the S-1200-5V-P has five rollers: two tapered rollers and three flat rollers. These five rollers have the same trough shape as the garland roller pairs.

Swivel bearing

Unlike the mounted tracking systems, CenTrax has only one pivot point, also known as a swivel bearing. The swivel bearing is fully sealed and unaffected by moisture, dust and dirt. The robust bearings are oil-bath lubricated and designed to withstand the axial and radial loads that occur.

Tapered rollers

The tapered rollers ensure that the CenTrax immediately corrects any mistracking as soon as it is about to happen. Other tracking systems only begin to correct when the conveyor touches the side guides. Moreover, those guides also cause additional wear to the belt edges, thereby incurring unnecessary costs.

Unrivalled tracking qualities

The CenTrax belt tracker offers the perfect solution. The tapered rollers are lined with a highly wear-resistant, profiled rubber. This ensures excellent grip on the conveyor belt, even in wet conditions. In combination with the smoothly rotating swivel bearing, the profiled rubber-lined rollers are what give the CenTrax its unparalleled tracking properties.

The customer in the UK was so satisfied with how the CenTrax S-1200-5V-P belt tracker operated that it subsequently ordered a second system. This second system has now been installed and commissioned, to ease the customer's daily production workload.

Left: The CenTrax installation at the UK cement plant.

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Philippines: Big Boss ready2grind

Gebr. Pfeiffer has received an order for a modular four-roller ready2grind 2500 vertical grinding unit for Big Boss Cement's Porac, Pampanga plant. It says that the mill will have a production capacity of 70t/hr of cement, ground to a fineness of 4000cm^2/g according to Blaine. The company will additionally supply a packing plant module for bag and bulk loading.

Image: An MVR 2500 C-4 in in Costa Rica.

Turkey/Vietnam: New FCT burners installed

HeidelbergCement and Sabancı Holding subsidiary Akçansa has used the lockdown period to install a new burner at its Büyükçekmece cement plant in Istanbul, where production has been suspended due to the coronavirus outbreak. FCT Combustion supplied the burner, which it said will improve 'combustion, emissions control and clinker quality.' Akçansa will undertake a burner upgrade on its second kiln during a further scheduled stoppage in mid-2020.

Meanwhile, Vietnam's Lam Tach Cement has upgraded Kiln 1 of its integrated cement plant with a new Turbu-Flex burner supplied by FCT Combustion. The upgrade follows the successful installation of an FCT Combustion Turbu-Flex burner in Kiln 2 of the plant in late 2019.

Germany: Haver & Boecker Niagara launches PROcheck system

Haver & Boecker Niagara has launched a new service programme. Called PROcheck, the programme conducts operational analysis of screens used in raw materials processing. PROcheck reports to Haver & Boecker, which is then able to recommend the best practices for raw materials processing proficiency to the operator.

Haver & Boecker Niagara North America and Australia president Karen Thompson said, "By partnering with our customers through the PROcheck service programme, we are monitoring the efficiency of their screening process to identify potential problems early on."

US: CalPortland Mojave to receive new FLSmidth raw mill

CalPortland has awarded a supply contract to FLSmidth for a new raw mill at its integrated Mojave plant in California. The scope of supply includes engineering, equipment and installation of a new OK 48-4 Raw Mill with a Condition Monitoring System and an ECS/ProcessExpert system. The mill is scheduled to be in operation in late 2021. No value for the current order has been disclosed.

"The new OK Raw Mill from FLSmidth will increase reliability and efficiency at our Mojave plant," said Bruce E Shafer, Senior Vice President for Cement Operations at CalPortland. It follows the purchase of an FLSmidth OK Cement Mill at the same plant in 2004. FLSmidth added that as both OK mills at the plant will share the same gearbox design, the unit will be able to streamline maintenance and manage inventory costs by sharing the one spare FLSmidth MAAG WPU-200 assembly.

Russia: New excavator for Kavkazcement

Eurocement subsidiary Kavkazcement has announced the acquisition of a Hitachi excavator for use at its clay quarry. The reasons behind the choice of excavator were its high productivity and low operating costs.

US: New lime kiln for New Braunfels

The Texas Commission on Environmental Quality (CEQ) has granted permission to Lhoist North America for the installation of a new vertical kiln at its New Braunfels, Texas plant. The company says that the kiln will form the basis for a plant expansion to meet the growing lime demand of the construction and steel sectors.

Netherlands: Van Beek screw conveyors used in 3D-printed reinforced concrete

Researchers from the Technical University of Eindhoven, the Netherlands, have chosen to use screw conveyors from Van beek, also based in the country, for research into 3D-printed reinforced concrete. Most concrete that has been 3D-printed to date is unreinforced and, as such, cannot be used for high-rise construction.

"Reinforcement is necessary to hold concrete together, but this is not possible with a concrete printer. This is why we mix special fibres through the cement that give the concrete the deformability needed for a strong building. At the same time the special fibres hold the concrete together, to prevent it from cracking", explains lead researcher Zeeshan Yunus Ahmed.

However, a new type of concrete printer is needed for fibre-reinforced concrete. Ahmed started looking for a way to dose the concrete, one of the most important factors of a 3D printer. This is certainly the case with reinforced concrete, where the optimum possible dosing of the cement guarantee its strength. "Van Beek has great expertise in the field of screw conveyors. They were immediately enthusiastic and particularly helpful, interested and motivated in contributing to innovation," says Ahmed. He adds that the prototype is now nearly complete and now seeks interest from the commercial sector.

Above: Prototype 3D printer for reinforced concrete at the Technical University of Eindhoven.

Germany: CO_2-neutral concrete for conservation centre

Holcim Deutschland has reported the successful delivery of 280m^3 of climate-neutral concrete to the NABU Conservation Centre Rheinauen in Bingen, Rheinland-Palatinate, due for completion in 2021.

The concrete contains Holcim Duo 3 N CEM-III slag cement from Holcim Deutschland's Dortmund slag plant in North-Rhine Westphalia. The company said, "Only select raw materials are used in the production of Holcim EcoPact Zero, which is mixed in optimal proportions in line with applicable norms." Moorfutures offset 44t of CO_2 by deposition in Moorland in Schleswig Holstein to account for the EcoPact's CO_2 emissions.

Italy: CSC certificate for Chiaravagna plant

Italcementi's Chiaravagna concrete plant in Genoa, Liguria has received international sustainability certification from the Concrete Sustainability Council (CSC), receiving a silver certificate. The plant uses CEM-III ground granulated blast furnace slag (GGBFS) cement from Italcementi's Novi Ligure grinding plant in Alessandria, with specific CO_2 emissions of 500kg/t.

Russia: Topkinsky launches new cements for specific concrete applications

Sibtsem Holding subsidiary Topkinsky Cement has launched three new cement products: a CEM-III slag Portland cement for the construction of monolithic large-scale concrete and reinforced concrete structures; a sulphate-resistant CEM-I ordinary Portland cement for the construction of underground and underwater concrete and reinforced concrete structures, with corrosion resistance against sulphates; and a CEM-II special Portland cement for the manufacture of concrete foundations for roads. The producer has also issued a compliance declaration for the CEM-II special Portland cement in accordance with Eurasian Customs Union (EACU) road safety regulations.

Interview by Peter Edwards, Global Cement Magazine

In discussion: Eco2floor from Ecocem Benelux

Ecocem Benelux, the Netherlands-based subsidiary of Ireland-based Ecocem, launched Eco2floor, an innovative ground granulated blast furnace slag (GGBS) based flooring screed, in 2018. *Global Cement* recently caught up with Jeroen Langenberg and Manfred Mille from the company to find out more...

***Global Cement (GC):* Please could you introduce Ecocem for our readers?**

Jeroen Langenberg - International Sales & Marketing Manager, Ecocem Benelux (JL): Ecocem is an Irish-owned and headquartered company. It was established in 2000 by Donal O'Riain who remains as Managing Director of Ecocem Group. He identified the opportunities to use ground granulated blast furnace slag (GGBS) as a low-CO_2 alternative to traditional cement. Ecocem's GGBS has an embodied CO_2 output as low as 12kg/t. That compares to CEM I, at around 850kg/t or CEM II at 750kg/t.

The group's first GGBS plant was established at Moerdijk in the Netherlands in 2001. It produced its first product in 2003. The plant was extensively upgraded in 2018. This included doubling the raw material storage capacity, production capacity and product storage capacity, with a new KHD roller press for grinding. We also built export terminal facilities at the plant.

***GC:* What prompted the development of the Eco2floor product?**

Manfred Mille - Technical Manager (MM): Ecocem is invested in implementing low-CO_2 solutions across the sector and doing what it can to encourage the transition to a lower-CO_2 construction sector and the economy as a whole. We have developed a number of products, some of which are now on the market. One of the earliest development targets was a flooring screed based on GGBS, which represented a totally new application for this material. The flooring screed market is very large, with millions upon millions of square metres laid in any country in a given year, so it offered ample space in which to launch a new product.

Above: Jeroen Langenberg has been the International Sales & Marketing Manager for Ecocem Benelux since November 2017, primarily for GGBS sales. Prior to this appointment he worked in the plastics sector for 25 years.

Left: Manfred Mille has worked at Ecocem Benelux as its Technical Manager since 2012. He was appointed to develop new products, including Eco2floor, having previously worked on dry mix formulations elsewhere. He has a background in civil engineering, with a deep background in building materials science.

Left: Eco2floor is applied as a flowable screed.

***GC:* How was the product developed?**

MM: The development of the Eco2floor technology from concept to market represented a significant investment for Ecocem in terms of development costs and time. We began the project when I joined in 2012 but did not launch Eco2floor until the third quarter of 2018.

The development was very involved. Flooring screed has to tick a lot of boxes and, from a chemical point of view, GGBS is not the most ideal material to start with. For achieving early strength it needs some activation, but then it sets too rapidly, is fairly thick, gains strength relatively slowly and is prone to cracking when in thin layers. This meant we had to carefully tune the formulation with a number of additives. Of course, as this was a new application, none of the available additives was specifically developed for the use of GGBS as a flooring screed. We had to contact a large number of additive suppliers to test their products and, in some cases, ask them to modify them.

First we had to manage the strength development so that workers could walk on the floor the day after it was laid, without looking at other parameters. At this point there were already 4-5 ingredients in the mix. The next target was achieving optimum flowability. At the same time we had to ensure that the formulation remained stable and did not segregate into layers after pouring. Then, you need to control the shrinkage, which GGBS is unfortunately prone to. Finally, once all of the other requirements are met, we optimised the open time, i.e. the time from the formulation being mixed and it becoming unworkable, as Eco2floor is produced in a ready-mix concrete station and is transported by truck.

At each stage of the process, we had to re-check back down the list of requirements: Is the strength affected by this new additive? Will the plasticiser affect the set time? It's like working with a quadratic equation that has infinite inputs and five unknowns.

Of course, not all the time was spent on refining the formulation. We had to carry out extensive real-world testing with larger and larger floor structures to check everything in the real world too. This allowed us to gain confidence with the material and work our way up to commercialisation in the third quarter of 2018.

***GC:* Where is Eco2floor made and sold?**

JL: Eco2floor compound is made at the Ecocem Benelux Moerdijk plant in the Netherlands, around 45km south of Rotterdam. It is currently only sold in the Netherlands but our ambition is to expand to other markets in the coming years.

***GC:* Did the Moerdijk plant have to be adapted?**

JL: The company invested in some new infrastructure at the plant to allow production of Eco2floor compound, but it was a relatively small project. Further investment will be necessary as and when we increase production.

***GC:* How is the Eco2floor product used?**

JL: Ecocem has a network of eight ready-mix concrete dealers across the Netherlands that have used our GGBS over the past 17 years. They now have an extra silo for the dry Eco2floor compound. They mix the Eco2floor compound with their water and sand, plus GGBS from Ecocem, load it into their trucks and take it to site. Each dealer has a customised Eco2floor compound based on its individual requirements. Changes are made based on the type of sand they use and the mixing process at the plant, as well as other parameters.

***GC:* How is an Eco2floor laid on site?**

MM: There are two main floor screed technologies, certainly in the Netherlands. The modern approach is pumpable anhydrite-based screeds. The older method is cement-based hand-applied screeds, with workers on their hands and knees smoothing out the material under intense conditions.

Eco2floor is pumpable too but offers major advantages over anhydrite screeds. Firstly, it is faster

Right: Eco2floor can be walked on just 24 hours after being laid.

drying and has some strength within one day that allows foot traffic. By contrast and under unfavourable conditions, an anhydrite screed might take several weeks to fully dry out, during which time the contractor cannot apply the final floor, for example tiles. In large projects this represents a major saving in overall project time. Imagine the revenue that a large hotel could bring in by opening two weeks earlier! This time-saving ability and its predictability could be a big factor in a specifier's decision to use Eco2floor.

Due to their propensity for swelling, anhydrite based screeds cannot be used in wet conditions like kitchens or bathrooms, whereas Eco2floor can be used. Also, the application of the final floor covering to anhydrite screeds might involve the placement of cement-based adhesives on a gypsum-based product. This will lead to poor adhesion between the gypsum and cement layers due to ettringite formation. To circumvent this, installers can use special binders, but these are expensive and fiddly. It is far easier to apply the simple cement-based compound to the Eco2floor surface.

We also note that the main source of anhydrite in the Netherlands, and Europe more widely, is recycled material. Most of this is from the desulphurisation of the flue gas of coal-fired power plants. As coal power is shrinking in Europe, there will be less of this raw material in the future.

JL: Another advantage of Eco2floor is that it encapsulates underfloor heating very well. This means that the same temperature can be achieved in the home with less energy. This allows major ongoing cost, energy and emissions savings, as the heating is faster reacting and so more efficient.

MM: Eco2floor also has a major advantage over purely cement-based screeds in terms of CO_2 emissions. For a cement-based screed, CO_2 emissions would typically be in the range of 45kg/m^2. With Eco2floor it is more like 15kg/m^2, just a third of the level. Over a 10-storey apartment block, this rapidly adds up to a big figure. The application is also far less labour intensive.

GC: **How does Eco2floor stack up against other screeds from a physical perspective?**

MM: As with other building materials, there are set standards for flooring screeds. To sell Eco2floor into this market, it must meet these standards and it does so. During and after application it behaves like one would expect it to.

GC: **How much Eco2floor was laid in 2019?**

JL: 2019 was the first full year of operation, with about 150,000m^2 installed via our dealers across a range of building projects. The largest of these was a 17-storey hotel in Amsterdam. We had hoped to double output to 300,000m^2 in 2020 but the coronavirus outbreak has dramatically altered that. While much construction can continue, screed pours need to have installers working in close quarters with each other. Our dealers also rely on private projects, which are more affected than public works.

Above: The Ecocem Benelux Moerdijk plant.

It is simply not possible to predict how 2020 will proceed from here. The start of 2020 was strong, however, so we know that the fundamentals of the business proposition are in place.

GC: **Where will Eco2floor be rolled out next?**

JL: We are conducting research with a view to launching Eco2floor in a number of Western European markets. It is important to remember that the construction practices in different countries, even within countries, can be quite different.

These moves are on hold at present but we are busy with field trials and research in the background. The GGBS, sand and culture are different in each country. The recipes would need adjustment on a country-by-country basis, as well as on a dealer-by-dealer basis. It is not a short project.

GC: **How will the Dutch experience alter Eco2floor launches elsewhere?**

JL: We would probably be more cautious than the first launch, as we've learned some of the local issues that can crop up. We have to be aware of the competition and regulations, working practices and so on... as I just mentioned.

But it is a case of trial and error. GGBS floor screeds is a completely new market that we're opening up. We're still learning a lot from our dealers, specifiers, architects and end-users. It's been a fun ride so far and we look forward to it continuing.

GC: Thank you very much for your time today!

JL/MM: You are very welcome indeed.

Belgium: Cembureau publishes Carbon Neutrality Roadmap

Cembureau, the European Cement Association, has published its new Carbon Neutrality Roadmap, setting out its ambition to reach net zero emissions along the cement and concrete value chain by 2050. The roadmap examines how CO_2 emissions can be reduced at each stage of the value chain – clinker, cement, concrete, construction and (re)carbonation – to achieve zero net emissions by 2050. It quantifies the role of each technology in providing CO_2 emissions savings, making specific political and technical recommendations to support this objective.

"As Europe begins its green recovery, the significance of this moment for our sector is huge. This is our response to the EU Green Deal – we have a plan and are ready to make the leap." said Raoul de Parisot, president of Cembureau. The association has identified areas where it says it requires decisive political action from the European Union (EU). These include: the development of a pan-European CO_2 transportation and storage network; action on circular economy to support the use of non-recyclable waste and biomass waste in cement production; policies to reduce European building's CO_2 footprint, based on a life-cycle approach, that incentivises the market uptake of low-carbon cements; a 'level' playing field on carbon, regulatory certainty and an industrial transformation agenda.

Cembureau says it aspires to be in line with the Paris Agreement's two degrees scenario, reducing CO_2 emissions by 30% for cement and 40% down the value chain. Its chief executive Koen Coppenholle added that, "Carbon neutrality along our full value-chain will be a massive effort, but we are confident we can achieve it. Our sector has made significant progress and, with the right tools and support from the EU, we can go much further."

France: Vicat reports strong Q1

Vicat has reported first-quarter sales of Euro615m in 2020, up by 7% year-on-year from Euro600m in the first quarter of 2019. Cement sales grew by 5.5% to Euro319m (52% of total sales), up by 5.5% year-on-year from Euro302m.

Vicat chair and CEO Guy Sidos said, "The Group's performance over the first quarter of 2020 was solid, despite a sharp slowdown at the end of the period in France, India and Italy." In spite of the coronavirus crisis, "Industrial and commercial activity was maintained on almost all sites, in line with market evolutions." Sidos says that the group expects 'a significant impact on first-half results' in 2020.

Greece: Titan loss more than doubles in first quarter

Titan Cement has reported net losses after tax of Euro16.3m in the first quarter of 2020, up by 122% year-on-year from Euro7.34m in the first quarter of 2019. Revenue also increased, by 6.1% year-on-year to Euro385m from Euro363m. Titan Cement said, "Since mid-March 2020 the outbreak of the coronavirus had a significant, although unevenly distributed, impact on demand for our products. The early impact of the pandemic on our sector was less severe than what was initially feared. Construction has been deemed to be an essential service in most markets and all our cement plants continued their operations, adjusting their production to satisfy the current level of demand."

Belarus: New RDF plant coming in September 2020

Krasnoselskstroymaterialy has announced that its US$7.8m refuse-derived fuel (RDF) plant at its 1.6Mt/yr Krasnoselskstroymaterialy plant will be completed in September 2020. The plant is installed with equipment worth US$4.5m from Czech suppliers. The Ministry of Construction and Architecture has said that waste from the Grodno Recycling and Mechanical Sorting Plant will replace Belarusian peat and Russian coal as the cement fuel in the plant's kilns, fulfilling Krasnoselskstroymaterialy's goals of renewability and national self-reliance.

Image: Minsk, capital of Belarus.

Belarus: Krichevcementnoshifer exports more cement

Krichevcementnoshifer exported US$2.47m-worth of cement in the first quarter of 2020, up by 41% year-on-year from US$1.75m-worth in the corresponding period of 2019. Belta News has reported that the company, which serves the eastern Belarusian and Russian markets via its 0.6Mt/yr integrated plant at Krichev, Mogilev region, made total sales of US$15.4m, up by 22% year-on-year from US$12.6m. CEO Vladimir Korchevsky said, "We consistently ship 5000t of cement to consumers every day. April 2020 saw shipments reach 6000t/day. We can conclude that, despite the current difficulties associated with the coronavirus pandemic, the demand for our products has not decreased."

UK: CPA expects UK construction to fall 25%

The Construction Products Association (CPA) has predicted a 25% year-on-year decline in total national construction output in 2020. It said that the coronavirus lockdown resulted in the loss of 60% of planned construction output in April 2020, including 85% of homebuilding.

CPA economics director Noble Francis said, "Even under this most optimistic of scenarios, the country's construction activity would suffer its sharpest fall ever recorded. Returns to site in May 2020 will focus on partially completed developments rather than new starts as house builders are expected to be cautious given uncertainty regarding demand. This uncertainty will also keep the recovery muted in commercial offices, industrial factories and the most severely-affected sub-sector, commercial retail." He added, "A more positive outlook is expected for infrastructure activity thanks to a greater ability to implement safe distancing for workers on larger sites but also, vitally, thanks to the HS2 high speed railway being given the go ahead. An increase in activity from the five-year investment programmes within regulated sectors such as water and sewerage, roads and rail also adds to this more positive story." The government encouraged construction work to resume from 11 May 2020 onwards.

Image: The Cemex South Ferriby plant.

UK: Cemex proposes mothballing South Ferriby

Cemex has announced the proposed mothballing of the 0.8Mt/yr South Ferriby integrated plant in Lincolnshire. It says that the move would lead to the redundancy of all staff employed at the plant, except cement delivery drivers, in the third quarter of 2020. A review of the optimal haulage provision will follow. Cemex says that the proposal is the outcome of 'an analysis of the company's European cement supply chain.' Its final decision will follow 'a process of collective consultation with affected employees.' It says that the decision was unaffected by the coronavirus outbreak.

The group said that, "Cemex remains committed to the UK and its European business." It added that the mothballing of the South Ferriby plant will 'optimise the network it has available across the region.' Cemex will continue to supply customers from its existing cement network, maintaining customer service and 'high-quality products in line with customer expectations.' Its strategic growth will focus on 'larger metropolitan markets where demand and profitability will be strongest.'

Germany: Quarry turned over to wine production

Lhoist has taken advantage of the alkaline soils around its Istein, Baden-Württemberg quarry in producing a range of six white wines, two red wines and a rosé under its Kalkweingut label. The grapes are grown on reclaimed sections of the quarry and harvested between August and October. The limestone 'has a high nutritional value and retains the warmth of the sun,' which, in conjunction with the warm climate of South Baden, gives the wines a 'Mediterranean' expression.

Spain: Barite-containing cement for Covid-19 facility

Cemex has supplied concrete made with barite ($BaSO_4$)-containing cement for the construction of a bunker at the Carlos III Hospital in Madrid where radiological coronavirus treatments will be carried out. Alimarket Construction News has reported that the facility will have walls 2m thick.

Germany: ThyssenKrupp sees loss

ThyssenKrupp has reported a first-half net loss before tax for the fiscal year 1 October 2019 to 30 September 2020 of Euro743m compared to a profit of Euro45.0m for the same period of 2018-19. Net sales fell by 3.0% year-on-year to Euro19.8bn from Euro20.4bn. The period brought a medium-sized cement line order from the US and a low-CO_2 calcined clays cement plant order from Cameroon. As a result of the coronavirus crisis, ThyssenKrupp has cut 3000 jobs on a short-to medium-term basis.

Spain: Lockdown lynx leaves

Following a partial easing of Spain's coronavirus lockdown on 25 May 2020, LafargeHolcim España employees returning to the company's Villaluenga de la Sagra cement plant in Toledo, Castile-La Mancha were surprised to discover that an Iberian lynx had moved in during the 2.4Mt/yr integrated plant's 10-week suspension.

Staff contacted the Castile-La Mancha Environmental Agency, which determined that the site was 'not an ideal habitat' for the lynx due to the risk presented by vehicles inside and outside of the cement plant when operations resume. The Castile-La Mancha Environmental Agency has tweeted that it has released the one-year-old female cat at a secret location in the Montes de Toledo region, following a medical check-up and tagging.

US: Cement shipments rise in first quarter

The United States Geological Survey (USGS) has reported that total US cement shipments in the first three months of 2020 were 20.9Mt, up by 7.9% year-on-year from 19.4Mt in the same period of 2019. Imported cement accounted for 2.98Mt (14%) of shipments over the period, up by 22% from 24.4Mt.

The USGS said, "Measures instituted to mitigate the spread of the Covid-19 pandemic may cause disruptions in the cement industry across the US and around the world. However, no US cement plant closures or idlings were reported in March 2020."

Argentina: Sales fall by a third

The Portland Cement Manufacturers Association (AFCP) has reported that cement dispatches in the period from 1 January 2020 to 30 April 2020 were 2.3Mt, down by 36% year-on-year from 3.6Mt in the corresponding period of 2019. Between March and April dispatches fell by 20% to 408,000t, down by 55% year-on-year from 907,000t in April 2019. The El Economista newspaper has reported that the decline 'reflects the worsening of the fall in the private and public demand for housing, road, public works and infrastructure in all the districts of the country.'

Image: Buenos Aires at night.

Puerto Rico: Production plummets

Puerto Rico's two cement plants produced 37,100t of cement in March and April 2020, down by 55% year-on-year from 83,300t in March and April 2019. Local consumption over the period was 41,700t, down by 58% year-on-year from 98,800t. Esmerk Latin American News has reported that the decreases were caused by the suspension of construction work due to the government's coronavirus lockdown.

Argentina: Loma Negra sales fall 26%

Loma Negra's sales of cement, masonry and lime fell by 26% year-on-year to 1.13Mt in first quarter of 2020. The decline was driven by the coronavirus lockdown in Argentina. Concrete and aggregate sales volumes also declined. The company's revenue dropped by 29.6% to US$115m and its adjusted earnings before interest, taxation, depreciation and amortisation (EBITDA) fell by 17.9% to US$38.6m. However, the company's accounting adjustment for use in so-called 'hyperinflationary economies' made a negative impact on these figures. With this adjustment removed both revenue and earnings reportedly rose in the first quarter.

Brazil: Votorantim loss increases by factor of 25

Votorantim Cimentos recorded a loss of US$68.4m in the first quarter of 2020 compared to a loss of US$2.71m in the corresponding period of 2019. However, sales rose by 2.4% year-on-year to US$465m from US$454m.

Votorantim Cimentos said that it is 'closely monitoring the situation' resulting from the coronavirus outbreak and is ready 'to institute new measures should they be needed.' It said that it has 'a solid liquidity position, reinforced by available revolving credit facilities, amounting to US$500m.' Votorantim added that it was in 'a strong position to combat the impacts of the Covid-19 crisis.'

Brazil: Votorantim to raise agricultural lime capacity

Votorantim Cimentos has said that it will end 2020 with an agricultural lime production capacity of 1.0Mt/yr, up by 25% year-on-year from 0.8Mt/yr in 2019 following a US$12.6m investment in two new plants in Itapeva and Nobres and upgrades to plants in Itau de Minas and Nobres. SABI News has reported that the expansion will bring Votorantim Cimentos' diversified products capacity to 4.3Mt/yr. The company says that it is 'targeting value-added products' to insure itself against a fall in demand for cement.

Canada: St Marys Cement stack raised 30m

St Marys Cement has completed a 30m-high stack extension at its 0.8Mt/yr integrated St Marys plant in Stonetown, Ontario. The Canadian Press newspaper has reported that the upgrade is a response to increased odour complaints from Stonetown residents.

St Marys plant manager Jose Soraggi said, "Growing along with the community also means adapting along with it. We consider ourselves fortunate to maintain good relations with local residents and the town and to serve as an integral part of the business community in St Marys and Perth County. We take every opportunity to hear from our constituents and find solutions toward a positive and mutually-beneficial future. The stack extension is an excellent example of that."

Paraguay: INC sees sales boost

Industria Nacional del Cemento (INC) has reported sales of 79,800 bags/day of cement between 4 May 2020 and 8 May 2020. This is around double the average of around 38,000 bags/day. Demand collapsed in April 2020 due to restrictions on construction resulting from the coronavirus outbreak.

Local press reported that newly reopened distributors collected their orders and that a number of customers purchased more than their usual volume in anticipation of a further easing of lockdown. INC has placed an order for 40,000t of imported clinker to help it to meet demand.

Chile: Bío Bío takes loan

Cementos Bío-Bío has taken a loan worth US$37.6m from BCI-Itaú bank and Scotiabank. It took the measure 'to ensure the company's liquidity' in response to the coronavirus outbreak.

Cementos Bío-Bío said, "The Covid-19 pandemic brings risks due to its impact on the global and local economy. The company estimates that it will strongly affect construction, impacting cement dispatches." It added, "The company maintains a comfortable cash position," with liquidity of US$53.3m.

Colombia: Cementos Argos' profit falls by three quarters

Cementos Argos' first quarter profit was US$1.00m, down by 73% year-on-year from US$3.76m in the corresponding period of 2019. Sales fell by 0.2% to US$545m from US$547m. The volume of cement it sold fell by 6.1% to 3.62Mt from 3.86Mt in the corresponding period of 2019. The company launched RESET, a savings initiative in response to the coronavirus outbreak, which aims to save US$75-90m during 2020.

Cementos Argos' CEO Juan Esteban Calle said, "Given the US$154m-strong cash position of the company, the saving initiatives within RESET, the support from our stakeholders, and the passionate commitment of our more than 7000 employees, we firmly believe that Argos is fully prepared to face the current market conditions."

Colombia's coronavirus lockdown ended on 13 April 2020 for infrastructure projects and on 27 April 2020 for cement production and residential and commercial construction. On 5 May 2020 Cementos Argos said that domestic demand was at 50% of pre-lockdown levels.

Image: Rioclaro plant.
Source: Cementos Argos.

Mexico: Musical chairs at Cemex

Cemex made changes to its management team with immediate effect in late May 2020. Jose Antonio Gonzalez, the Executive Vice President of Finance and Administration, has been appointed as Executive Vice President of Strategic Planning and Business Development.

Maher Al-Haffar, the Executive Vice President of Investor Relations, Corporate Communications and Public Affairs, has been appointed Executive Vice President of Finance and Administration. The group added that Investor Relations will now be integrated to its Finance department.

Mauricio Doehner, the Executive Vice President of Corporate Affairs and Enterprise Risk Management, has been appointed Executive Vice President of Corporate Communications, Public Affairs and Enterprise Risk Management.

Juan Romero, the Executive Vice President of Sustainability, Commercial and Operations Development, will oversee Digital Marketing, in addition to his current responsibilities.

Luis Hernandez, current Executive Vice President of Digital and Organizational Development, will oversee Cemex Ventures, in addition to his current responsibilities.

Juan Pablo San Agustin, the Executive Vice President of Strategic Planning and Business Development, will leave Cemex. No date for his departure has so far been released.

Trinidad & Tobago: Trinidad Cement restarts production

Trinidad Cement was granted permission by the government to resume operations at its Claxton Bay integrated plant on 11 May 2020. It had stopped production in early April 2020 due to coronavirus-related government advice.

General manager Guillermo Rojo said that the subsidiary of Cemex has implemented multiple protocols, including temperature testing at all access points and the activation of a local Rapid Response team, so that production could be resumed.

US: PCA announces award winners

The Portland Cement Association has announced the winners of its Chairman's Safety Performance Award for outstanding safety performance in Portland cement production in the US. They were: Cemex USA's Clinchfield, Georgia and Victorville, California plants; Lehigh Hanson's Cupertino, California and Tehachapi, California plants; Titan America's Medley, Florida and Troutville, Virginia plants; LafargeHolcim's Morgan, Utah and Theodore, Alabama plants; Buzzi Unicem's Chattanooga, Tennessee plant; GCC of America's Pueblo, Colorado plant; and Argos USA's Atlanta, Georgia grinding plant.

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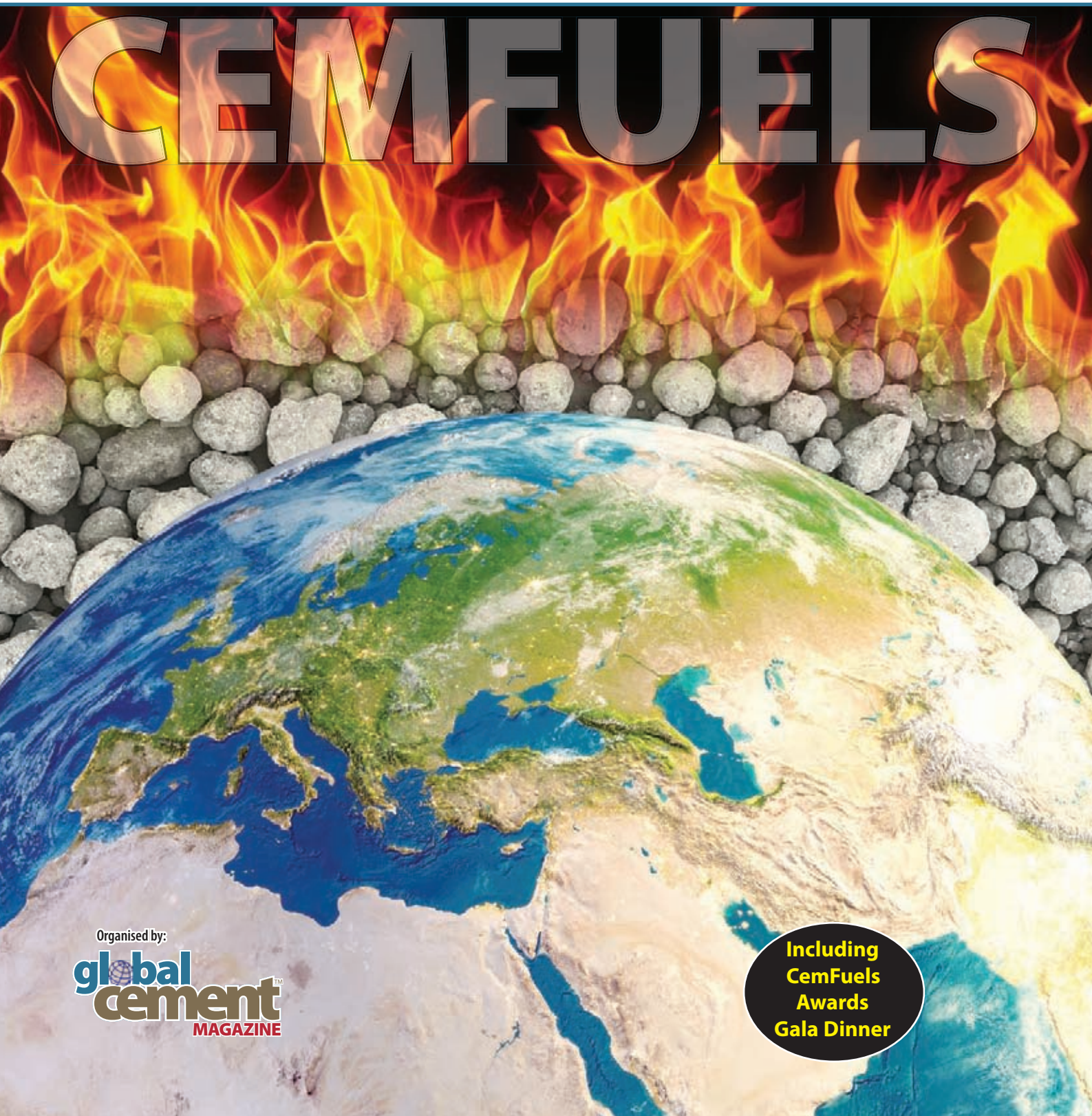


India: UltraTech feels Covid-19 pinch

UltraTech Cement's sales were negatively affected by coronavirus-related lockdowns in the fourth quarter of its financial year. Its net sales fell by 13% year-on-year to US$1.40bn in the quarter to 31 March 2020 from US$1.61bn in the same period in 2019. The cement producer was forced to shut down certain plants in March 2020, usually one of the busiest months of the year. Plants started to reopen in late April 2020.

In the financial year to 31 March 2020, UltraTech's annual net sales rose slightly to US$5.48bn. Its profit before interest, depreciation and tax (PBIDT) grew by 27% year-on-year to US$1.31bn from US$1.03bn. It also reported that it reduced its net debt and earnings before interest, taxation, depreciation and amortisation (EBITDA) ratio to 1.7 from 2.83.

India: Birla profit up despite lockdown

Birla Corporation has recorded a consolidated net profit of US$25.8m over the three months that ended on 31 March 2020, the fourth quarter of the 2020 Indian fiscal year, up by 52% year-on-year from US$16.9m in the fourth quarter of the fiscal year 2019. Sales were US$223m, down by 5.5% from US$247m. This was due to the impacts of the coronavirus outbreak, which ended dispatches from late March 2020.

Birla Corporation said, "Despite muted market conditions, the company was able to raise price realisation through judicious adjustment of geographic and product mix aimed at increasing the share of blended and premium cements."

Birla Corporation's full year net profit for the fiscal year 2020 was a record US$66.7m, nearly doubling from US$33.7m in the fiscal year 2019.

India: Nuvoco Vistas approved to buy Emami Cement

Nuvoco Vistas has received approval from the Competition Commission of India for its 100% acquisition of Emami Cement from Emami Group. Reuters has reported that the acquisition, through which Nuvoco Vistas enters the Bihar and Odisha markets, brings its installed cement production capacity to 23.5Mt/yr.

Uzbekistan: New plant announced

South Korea-based Hwachon Plant Construction Company has shared plans for an integrated cement plant in Karauzyak, Karakalpakstan Autonomous Republic. Uzbekistan Daily News has reported the value of investment in the project as US$380m. Hwachon Plant Construction Company chair Sin Cheol Sik met with Uzbekistan Council of Ministers deputy chair Bakhitzhan Habibullayev via videoconference to discuss funding for the project, which will commence at the earliest possible date.

Image: TV Tower in Tashkent, the Uzbek capital.

Uzbekistan: Second line to quadruple Namangan Cement plant capacity

Namangan Cement has announced the beginning of work at its 0.3Mt/yr integrated cement plant in Namangan region on a second line to boost the plant's capacity to 1.2Mt/yr. The National News Agency of Uzbekistan has reported that the project will be completed in late 2021, creating 250 jobs. It will cost US$49m, of which Namangan Cement will provide US$14m directly, with the remaining US$35m taken on loan from Hamkorbank.

Uzbekistan: Cement import ban lifted

Imported cement has begun to enter Uzbekistan after the government ended a ban on the 'import of cement products' on 23 May 2020. Uzbekistan Daily News has reported that the protectionist measure was lifted due to a spike in cement demand from the construction sector following an easing in the country's coronavirus lockdown measures.

Philippines: Holcim restarts plants as prolonged lockdown lifts

Holcim Philippines has announced its full return to cement production across all integrated plants after it resumed operations at its 3.3Mt/yr Bulacan, Norzagaray plant, 2.1Mt/yr Davao, Ilang plant and 1.2Mt/yr La Union, Bacnotan plant. The company's 1.8Mt/yr Lugait, Misamis Oriental plant remained open throughout the coronavirus lockdown. It says that it started to reopen plants and terminals from mid-March 2020 after national and local governments began to ease the lockdown.

Holcim Philippines president and chief executive officer (CEO) John Stull said, "We are ready to continue supporting our partners nationwide as they build important structures and contribute to reinvigorating the economy. Holcim Philippines is determined to ensure the well-being of our people, communities and business partners in our operations consistent with our core value of health and safety. Our company is also ready to share our expertise in this area to government and private sector partners to further contribute to the recovery efforts."

Credit: junpinzon / Shutterstock.com.

Azerbaijan: Akkord sales jump by a fifth

Akkord Cement has reported sales of 237,000t of cement in the first four months of 2020, up by 20% year-on-year from 197,000t in the same period of 2019. April 2020 sales fell to 31,200t due to the impacts on demand of the coronavirus outbreak. Akkord Cement's 1.0Mt integrated Gazakh cement plant in Ganja region produced 3250t of clinker for export, up by 10% from 2960t in 2019. The company says that it 'plans to organise exports' of clinker from the 3300t/day clinker capacity plant to Iraq and Qatar, after the country leaves the coronavirus quarantine regime, and also mulled exports to Iran.

Vietnam: Cement sales dip in first four months of 2020

Cement producers sold 29.2Mt of cement between 1 January 2020 and 30 April 2020, down by 7% year-on-year from 27.3Mt over the corresponding period of 2019. The Vietnam National Cement Corporation (VICEM) has reported that domestic sales fell by 4% to 19.3Mt (66% of total sales) and exports fell by 11% to 9.90Mt (34%), according to the Việt Nam News newspaper. April 2020 cement sales were just 8.08Mt, including 2.42Mt of exports, due to the effects of the coronavirus lockdown on cement demand from the construction sector.

Japan: Taiheiyo profit drops in year to March

Taiheiyo Cement's net profit in the fiscal year that ended on 31 March 2020 was US$363m, down by 9.9% year-on-year from US$403m in the fiscal year 2019. Sales fell by 3.5% year-on-year to US$8.21bn from US$8.51bn. Taiheiyo Cement said that it experienced a 'decrease in aggregate sales volumes due to the end of demand related to the Tokyo Olympics and Paralympics and reconstruction demand from the Great East Japan Earthquake' in the quarter that ended on 31 March 2020.

Malaysia: Tasek stakes sold

HL Cement Malaysia, the Malaysian subsidiary of Singapore-based Hong Leong Asia, has acquired an 88% stake in Tasek Corporation. Hong Leong Asia subsidiary Ridge Star has acquired the remaining 12% minority stake.

Japan: Profit boost for Sumitomo Osaka

Sumitomo Osaka Cement's net profit in the fiscal year that ended on 31 March 2020 was US$102m, up by 40% year-on-year from US$72.7m in the fiscal year 2019. Sales fell by 2.4% to US$2.28bn from US$2.34bn. This was due to the collapse in cement demand following the coronavirus state of emergency declared in Tokyo and six other prefectures on 7 April 2020.

Peter Edwards & David Perilli, Global Cement Magazine

Coronavirus hastens Chinese consolidation

Contraction of the Chinese cement sector has accelerated due to the Covid-19 outbreak...

China is the most highly-populated country in the world, with an incredible 1.43bn estimated inhabitants in 2019. This total, nearly a fifth of the world's entire population, is unevenly spread across a country that represents only 6.4% of the earth's total land, despite being the fourth-largest country in the world. Within China, the vast bulk of inhabitants are concentrated in the south and west of the country. This has led to the development of numerous mega-cities unlike any seen in the rest of the world. Such developments, as well as many thousands of major infrastructure projects, have been served well by an enormous and centrally-planned domestic cement sector.

China's low labour costs and centrally-planned economy enabled it to become the 'world's factory' during the latter part of the 20th Century. In 2018 China was home to 20% of global manufacturing output. However, China's emerging middle class, associated rising wage demands and hightened environmental concerns have steadily eaten into China's historical manufacturing advantage. In the future this will be further hampered by China's former one-child policy (1979-2015), which has ensured a rapidly-aging population. China's median age in 2020 is around 39. By 2050 it will be around 49.5, older than Japan's present 47.3 years. By this time, China's overall population will have shrunk by 60 million, albeit to a still rather large 1.37bn.

Below - Figure 1: Top cement producers in 2019. China dwarfs production elsewhere and represented 53.6% of global production in 2019. **Source:** NRDC, USGS.

Cement industry background

As Figure 1 demonstrates, China is the world's largest cement sector by a considerable margin. It has produced more cement than the rest of the world combined every year so far during the 21st Century. China's cement production rose from 'just' 500Mt/yr in 1995 to over 1Bnt/yr by 2005. It made more than half of the world's cement for the first time in 2007 and, by 2014, production had skyrocketed to 2.45Bnt. Cement production in 2019 was approximately 2.2Bnt, unchanged from 2018, which was, in turn 6.1% lower compared to production in 2017. This means that the sector's output has contracted by around 300Mt, equal to the cement produced by India in a year, since 2014.

The emphasis on contraction in the cement sector is led directly from the top of the Chinese government, as the country has now clearly passed the largest excesses of its mid-to-late 2000s building boom. The cement sector grew in an excessive fashion to meet the demand for new buildings and entire cities, some of which remain unoccupied to this day.

In 2013, China's State Council issued its 'Guideline to tackle serious production overcapacity,' including in the cement sector. At the same time, the Chinese Cement Association (CCA) drafted plans to promote mergers and acquisitions in the sector. In 2017 the CCA stated that 393Mt/yr of clinker capacity and 540 small to medium-sized cement grinding plants would be closed by 2020. A complete ban on new capacity was announced by the Ministry of Industry and Information Technology (MIIT) in February 2018. There has also been consolidation, most notably the merger of CNBM and Sinoma to produce the world's

Left: The 2.3Mt/yr HeidelbergCement Jingyang plant in Shaanxi Province was commissioned at the height of the Chinese cement capacity boom in 2007. **Source:** HeidelbergCement website.

largest cement producer, with more than 500Mt/yr of capacity, in 2018. The aim of all of these measures is to reach clinker and cement capacity utilisation rates of 80% and 70% respectively.

Speaking on *Global Cement Live* on 23 April 2020 Ian Riley, the President of the World Cement Association (WCA) and long-standing participant in the Chinese cement sector, stated that, while the average cement capacity utilisation rate was 71% in 2019, this headline conceals a disparity. While the cement industry in the north of China operated at a capacity utilisation rate of 48% in 2019, the south was already up at 80%. This is due to the fact that construction projects and cement production in the north have historically been halted for four months over the winter. Due to the government's capacity reduction policies, this approach became nationwide in 2016, with enforced closures of 80-100 days/yr in all provinces since 2017. With further capacity cuts to come, the cement capacity utilisation rate of 70% is already a tough target.

Turning green

Capacity restrictions have gone hand-in-hand with tighter emissions standards for cement production. Firstly, premiums were charged for power consumption above a given rate, in order to drive production efficiency. Since 2016 plants that fail to meet the most recent (2013) standards of 30mg/Nm^3 for dust, 200mg/Nm^3 for NO_x and 400mg/Nm^3 for SO_2 have faced closure or been ordered to clean up their act.

In 2018 Henan Province introduced ultra-low standards (10mg/Nm^3 for dust, 50mg/Nm^3 for NO_x and 100mg/Nm^3 for SO_2). It was followed in 2019 by Hebei Province (10mg/Nm^3 for dust, 30mg/Nm^3 for NO_x and 100mg/Nm^3 for SO_2). This has led to a raft of upgrades by plants that didn't want to go out of production. In the longer term it is likely that emissions reductions will drive demand for alternative fuels and a move away from China's traditional use of coal for cement production.

Profitability rollercoaster

Since the onset of supply-side reductions by the Chinese government, the country's cement producers have been on a profitability rollercoaster. Production peaked at 2.4Bnt in 2014 but profits were hit hard in 2015 as production capacity was not met by demand. Producers were able to recover some of their lost profitability in 2016 as supply reductions led to higher prices. 2017 was a stronger year again, based in part on expansion efforts overseas. Price rises continued into 2018, enabling further stabilisation of balance sheets.

Data from the Ministry of Industry and Information Technology (MIIT) showed that China's cement sector's net profit grew by 20% year-on-year to US$26.6bn in 2019 from US$22.3bn in 2018. The sector's total revenues reached US$144bn, representing an increase of 13% from US$128bn. It appeared that the sector's profitability has been secured, even if it was still making vast quantities of cement.

CNBM-Sinoma recorded a net profit of US$2.48bn in 2019, a 27% year-on-year increase compared to US$1.95bn in 2018. Its revenues rose to US$36.0bn in 2019 from US$30.7bn in 2018, a 17.3% year-on-year rise. Meanwhile, Anhui Conch Cement recorded a net profit of US$4.77bn in 2019, 13% higher than its 2018 net profit of US$4.23bn in 2019. Revenues rose by 22% year-on-year to US$22.2bn from US$18.2bn in 2018.

Enter the 'novel coronavirus'

The strong performance seen by many Chinese cement producers in 2019 will now most likely be looked back upon as the start of a new profitability rollercoaster. This is due to the coronavirus outbreak, which first rose to prominence in Wuhan, Hebei Province in the autumn of 2019. The region was the first of many to see 'lockdown' conditions, which soon spread across China and the rest of the world.

Below: The Shanghai Metro in January 2020. Scenes like this, as coronavirus cases spread across China, were a warning to the world that the virus would not be short-lived. **Credit:** Robert Way / Shutterstock.com.

Construction, and hence cement production, was adversely affected. Across China, cement production fell by 29% year-on-year to 150Mt in January and February 2020 combined, already the quietest months of the year due to Chinese New Year. Output then picked up to 149Mt in March 2020, 17% lower than in March 2019. On the demand side, reporting from the Chinese Cement Association reveals that national infrastructure investment (excluding electricity) decreased by 19.7% year-on-year in the first quarter of 2020. National real estate development investment for the quarter fell by 7.7% to US$310bn.

While construction projects were allowed to resume in Hebei Province as early as the end of March 2020, in areas away from Wuhan, progress was initially limited due to workers being locked down away from worksites after the New Year holiday. Three weeks after measures were relaxed, the average shipping rate for cement producers was only 60% of the regular rate in these areas. In Wuhan itself the situation was more stark, with demand for cement at only 20% of expected levels at the time the lockdown ended on 8 April 2020. Data from the Hubei Cement Association shows that only half of Hubei province's 57 clinker production lines were producing cement on 30 March 2020, with the rest suspended.

Across China, producers felt the full brunt of the coronavirus outbreak in their first quarter results. Anhui Conch's first quarter profit was US$690m, down by 19% year-on-year from US$860m in the corresponding period of 2019. Sales fell by 24%, to US$3.28bn from US$4.31bn. Huaxin Cement announced a predicted profit drop of 46% year-on-year in the first quarter of 2020, to US$100m from US$188m in the corresponding three months of 2019. Its sales were down by more than a third. Meanwhile, Shanshui Cement has said that it expects its first-quarter losses to rise year-on-year in 2020.

However, the Chinese cement sector appears to have bounced back strongly in the second quarter of 2020. Although second-quarter results were unavailable at the time of going to press, the Ministry of Industry and Information Technology published data showing 94% domestic cement production capacity utilisation in the two-week period ending 10 April 2020. This, it reported, followed the end of coronavirus-related plant shutdowns in all provinces. Figure 2 shows that April 2020 sales exceeded those of April 2019. For the first four months, sales were 14% lower than in 2019. The May 2020 values will make interesting reading.

Looking ahead

In *Covid-19 Impact Analysis CIC 2025*, its extensive new report on the effects of the coronavirus outbreak on global cement production, OneStone Consulting forecasts that China's cement capacity utilisation will fall to 70% in 2020 from an estimated 74% in 2019. This will translate into a 8.5% decline in cement production in 2020 compared to 2019 to around 2.1Bnt. For 2021 it expects further contraction of 3.3% to around 2.03Bnt. This will be due to continuation of China's supply side changes. Before the coronavirus, OneStone already expected production to fall by about 2% in 2021 compared to 2020. It appears that the coronavirus outbreak has inadvertently sped up the process of Chinese cement capacity reduction.

In its report, OneStone Consulting also estimates that the plant closure rate will soon overtake the overall decrease in production, leading to higher utilisation rates. It concludes that, by 2025, China will lose a further 570Mt/yr of cement production capacity and have cut production by around 500Mt/yr. This leads to a headline production figure of 1.85Bnt by 2025, around the same as last seen in 2010. Over the same period, OneStone Consulting forecasts that the rest of the world will increase its cement production total to 2.11Bnt, taking more than 50% of production for the first time since the early 2000s. While the expansion around the world will be uneven and chaotic, China's continued contraction will be a planned and centrally ordered process.

Looking abroad

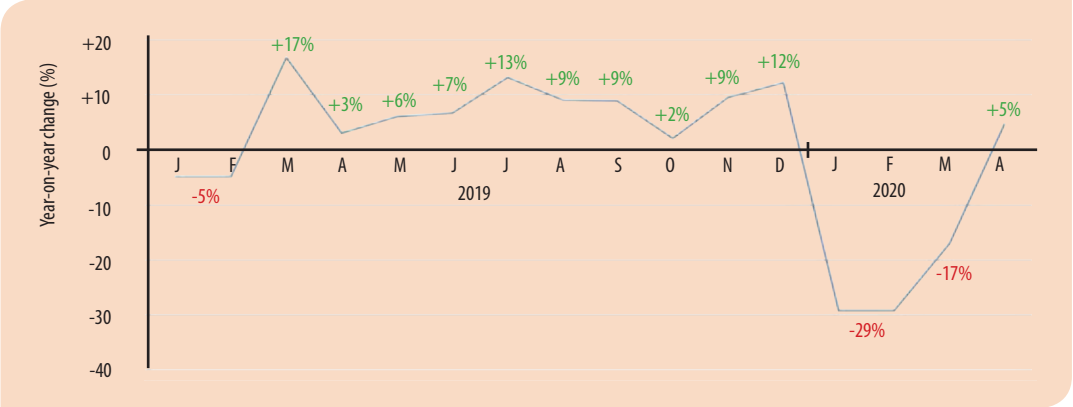
Given the potential reduction in future sales opportunities at home, it is unsurprising that Chinese cement producers continue to seek new markets. This continues a trend that first took hold at the close of 2017, when it became absolutely clear that China's domestic capacity would only decrease in the coming years. China's cement producers and world-leading plant manufacturers became involved in projects across regions associated with China's Belt and Road initiatives across central and southern Asia, as well as in Africa.

Since the start of 2018, *Global Cement* has become aware of at least 59 projects across north Africa (6), sub-Saharan Africa (15), the Middle East (3), South America (4) and central (11), north (3), south (8) and south east (9) Asia in which Chinese parties were

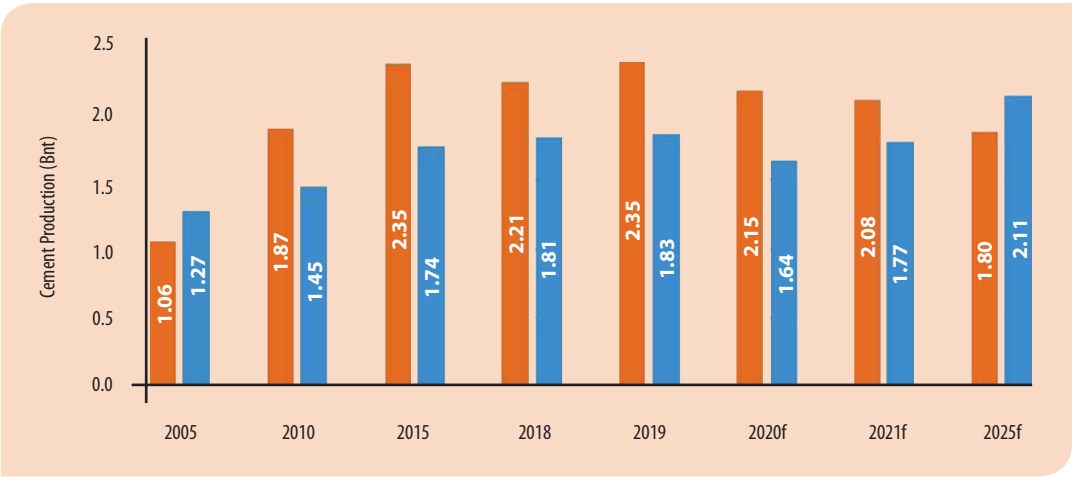
A note on prices

All-China 42.5 grade cement spot prices from sunsirs.com were US$66.48/t on 22 May 2020, around 13% lower than at the start of January 2020. Some price reduction is usual around Chinese New Year (25 January 2020), but the magnitude and length of the decrease have both been extended due to coronavirus-related closures.

Prices in late May 2020 were very similar to those of early April 2020 in both US Dollar and Chinese RMB terms, but had dipped to around US$65.55/t between 10-26 April 2020. Forecasters had earlier expected that prices would start to recover during the second half of 2020 on the back of higher demand, particularly from the recommencement of infrastructure projects. However, the main thrust of any price rise now seems to have been delayed to the third quarter at the earliest.



Left - Figure 2: Year-on-year percentage changes in cement production in China, January 2019 - April 2020
January and February figures are reported together and so are shown as a mean.
Source: National Statistics Bureau of China.



Left - Figure 3: Cement production, 2005 - 2025 (forecast).

China
Rest of World

Source: *Covid-19 Impact Analysis CIC 2025*, OneStone Consulting.

either the supplier, investor or both. They jointly comprised a total capacity of at least 74.2Mt/yr, with the bulk (52.4Mt/yr) first reported in 2018.

Africa has recently become increasingly important for Chinese-led cement projects in 2019 and 2020. Recent highlights include: the signing of an agreement between Afcham China National Consortium Material Company and Kribi Industrial Cement Plant Company for the construction of a 0.5Mt/yr integrated cement plant in Cameroon; the announcement of a 1.0Mt/yr plant to be built by Sinoma in the Democratic Republic of the Congo, and; the first cement from a Sinoma-built moveable modular grinding mill at a grinding plant in Guinea. Sinoma also commissioned a 3.2Mt/yr plant for PT Cemindo Gemilang in Indonesia in April 2020, ahead of its May 2020 completion date and despite restrictions arising from the coronavirus outbreak.

With options at home limited, Chinese cement players are now also making outright acquisitions rather than new build plants and joint-ventures. West China Cement completed its purchase of a majority stake in Schwenk Namibia for US$104m in January 2020, giving it control of Ohorongo Cement. More recently, Huaxin Cement's deal to buy ARM Cement's assets in Tanzania was completed in May 2020. If China's domestic industry recovers to the point that the major players can continue to invest, we should expect more of the same over the coming months.

Final thoughts

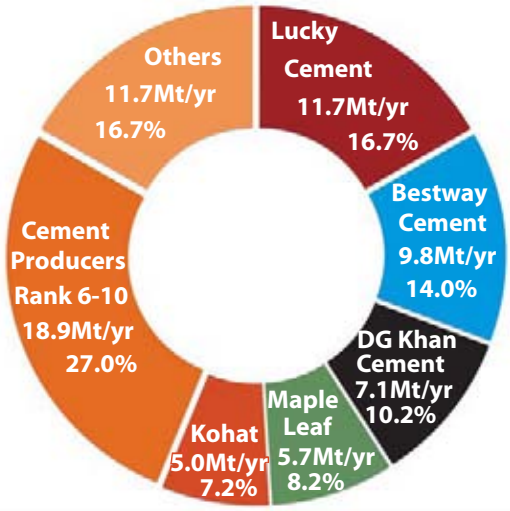
The move away from the 'worst excesses' of Chinese cement production since 2014 represents a major achievement for central planners. However, even if China makes 1.8Bnt of cement in 2025, as forecast by OneStone Consulting, and then continues to reduce output at the same rate (75Mt/yr/yr), China will still manufacture 1.4Bnt of cement in 2030. This is sufficient for every man, woman and child that lives there to have 1t (1000kg) every year, vastly in excess of consumption rates in rapidly-developing economies, (~600kg/capita/yr). Adding up the combined totals for the next 10 years shows that, by 2030, China will have consumed another ~17.5Bnt of cement.

This is exceptional in global terms. However, China is also exceptionally well positioned to take action to reduce its overcapacity. It was already on this path due to the increasing importance of environmental regulations. Now, the coronavirus outbreak may take a bite out of cement demand just as the government cuts down on the supply side. While China's cement industry is not suddenly going to shrink overnight, this opens up at least the possibility of more modest production in future years.

Peter Edwards, Global Cement Magazine

Cement in Pakistan

A look at the cement sector of Pakistan.



Right - Figure 1: Cement producers in Pakistan, as at 30 March 2020. **Source:** All Pakistan Cement Manufacturers Association.

Covid-19

Pakistan had registered 61,227 cases of Covid-19 as at 28 May 2020, with 1260 deaths across all Provinces.

The first case was confirmed on 26 February 2020, with a national lockdown from 1 April 2020 to 9 May 2020. Critics say that the restrictions were lifted too early, with fears of a second spike.

Opposite Page: Sunset over Karachi, Pakistan's most populous city. Nearly 15 million people call Karachi home.

Founded in 1947 upon the partition of British India, Pakistan is the world's fifth most populous country. It has an extensive integrated cement production base comprising 27 plants shared by 19 domestic players. Its total capacity is just shy of 70Mt/yr. A breakdown of producers is shown in Figure 1, with plants shown in Figure 3.

The largest cement producer in Pakistan by installed capacity is Lucky Cement, with 11.7Mt/yr of capacity across two plants that share a total of nine lines (6.8Mt/yr and 4.9Mt/yr). The second-largest producer is Bestway Cement, a subsidiary of UK-based Bestway Group that made its first cement in 1995. It has the most cement plants in Pakistan, with four sites and a combined 9.8Mt/yr. The third-largest producer is DG Khan Cement, a part of the Nishat Group. It operates three plants that share a combined 7.1Mt/yr of cement capacity.

Long-term production trends

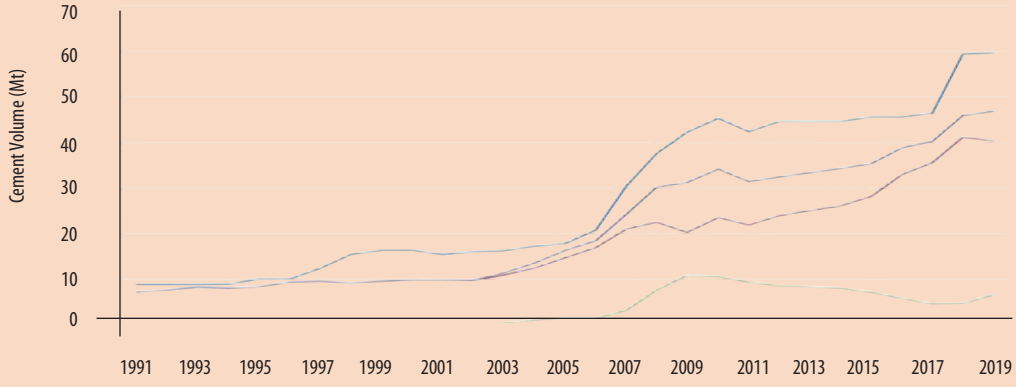
Cement production in Pakistan has grown significantly since the turn of the Century (See Figure 2). The country made 9.9Mt in its 2000 fiscal year (1 July 1999 - 30 June 2000). Volumes nearly doubled to 18.6Mt in the 2005 fiscal year, before reaching 31.4Mt, 38.9Mt and 46.9Mt, in the 2010, 2015 and 2019 fiscal years, respectively. The country has also become a major cement exporter over the same timeframe. From 110,000t in the 2002 fiscal year, exports rose 100-fold to nearly 11Mt by mid 2009. They have since reduced to 6.5Mt in the year to 30 June 2019.

Summary: The Islamic Republic of Pakistan

Population:	212.2m
GDP:	US$314.6bn
GDP/capita:	US$1482
Area:	881,913km^2

The situation in 2019 and 2020

Data from the All Pakistan Cement Manufacturers Association (APCMA) shows that cement production rose to 46.9Mt in the 2019 fiscal year, a 2.2% year-on-year rise compared to the 2018 fiscal year. However, this slight increase masks regional discrepancies. Domestic sales in the north of the country were 32.6Mt, a year-on-year rise of 4.7%. In the south, domestic sales were 7.9Mt, a year-on-year increase of 11.2%. Exports from the north, mainly



Right - Figure 2: Cement capacity, local dispatches, exports and total production for Pakistani fiscal years 1991-2019. Pakistan's fiscal years run from 1 July to 30 June and are named according to the year in which they end. **Source:** All Pakistan Cement Manufacturers Association.

to Afghanistan and India, were down by 18.1% to 2.5Mt, while exports from the south, mainly by sea, were up by nearly 141% to 4.0Mt.

The first half of the 2020 fiscal year was also strong, with cumulative sales of 24.8Mt, a 6.9% rise year-on-year. January and February 2020 were also strong, with combined sales of 8.6Mt against just 7.0Mt a year before, a 22.8% year-on-year increase.

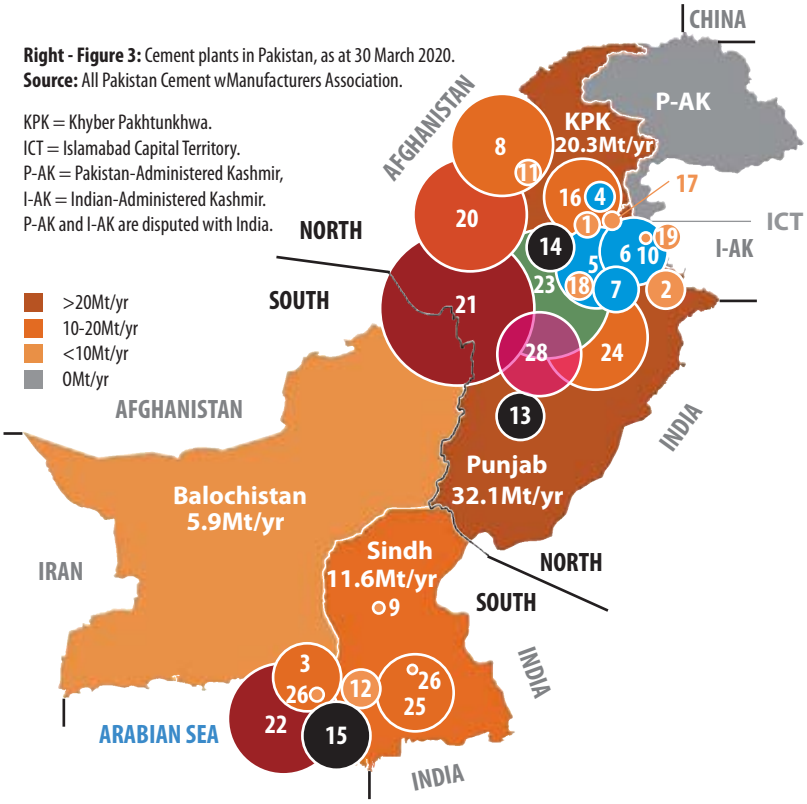
However, the coronavirus oubreak stopped this progress in its tracks in March 2020 (See summary opposite page, far left). Total sales in March 2020 were 3.2Mt, 17% lower than the 3.9Mt sold in March 2019. Exports rose by 5% for the month, but this has not been sustained. Producers dispatched 3.5Mt of cement in April 2020, down by 24% year-on-year from 4.6Mt in April 2019. Domestic consumption was 3.3Mt, down by 19% from 4.0Mt. The All Pakistan Cement Manufacturers Association (APCMA) said, "The decline in construction activities around the world contributed to a downfall in demand. However, the cement sector, even otherwise, was already operating under acute distress." Producers have long complained of high taxes and imported coal costs.

Future

In its April 2020 World Economic Outlook, the International Monetary Fund forecasts that Pakistan's economy will contract by 1.5% in 2020, due to the coronavirus outbreak. This is half of the expected 3.0% global contraction but worse than the IMF's 1.0% contraction forecast for emerging economies. For 2021 the IMF expects Pakistan's GDP to recover by 2%, more than eliminating the losses seen in 2020. This will hopefully mean relatively benign changes to construction and the continuation of cement demand in this dynamic and growing market.

Right - Figure 3: Cement plants in Pakistan, as at 30 March 2020.
Source: All Pakistan Cement wManufacturers Association.

KPK = Khyber Pakhtunkhwa.
ICT = Islamabad Capital Territory.
P-AK = Pakistan-Administered Kashmir,
I-AK = Indian-Administered Kashmir.
P-AK and I-AK are disputed with India.



1. Askari Cement, Wah, Punjab, 1.1Mt/yr.
2. Askari Cement, Nizampur, KPK, 1.7Mt/yr.
3. Attock Cement, Hub Chowki, Balochistan, 3.0Mt/yr.
4. Bestway Cement, Hattar, KPK, 1.2Mt/yr.
5. Bestway Cement, Chakwal, Punjab, 3.6Mt/yr.
6. Bestway Cement, Farooqia, Punjab, 3.0Mt/yr.
7. Bestway Cement, Kallar Kahar, Punjab, 2.0Mt/yr.
8. Cherat Cement, Nowshera, KPK, 4.5Mt/yr.
9. Dadabhoy Cement Limited, Dadu, Sindh, 0.5Mt/yr.
10. Dandot Cement, Jehlum, Punjab, 0.5Mt/yr.
11. Dewan Hattar Cement, Hattar, KPK, 1.1Mt/yr.
12. Dewan Cement, Dhabeji, Sindh, 1.7Mt/yr,
13. DG Khan Cement, DG Khan, Punjab, 2.1Mt/yr.
14. DG Khan, Chakwal, Punjab, 2.1Mt/yr.
15. DG Khan, Hub, Balochistan, 2.9Mt/yr.
16. Fauji Cement, Fateh Jang, Punjab, 3.4Mt/yr.
17. Fecto Cement, Sangjani, Punjab, 0.8Mt/yr.
18. Flying Cement, Lilla, Punjab, 1.2Mt/yr.
19. Gharibwal Cement, Jehlum, Punjab, 2.1Mt/yr.
20. Kohat Cement, Kohat, KPK, 5.0Mt/yr.
21. Lucky Cement, Pezu, KPK, 6.8Mt/yr.
22. Lucky Cement, Karachi, Sindh, 4.9Mt/yr.
23. Maple Leaf Cement, Daudkhel, Punjab, 5.7Mt/yr.
24. Pioneer Cement, Khushab, Punjab, 4.6Mt/yr.
25. Power Cement, Nooriabad, Sindh, 3.4Mt/yr.
26. Thatta Cement, Thatta, Sindh, 0.6Mt/yr.
27. Zeal Pak Cement, Hyderabad, Sindh, 0.4Mt/yr.
28. Pioneer Cement, Chenki, 3.7Mt/yr (u/c).

New plants, upgrades and other highlights

January 2020: Pioneer Cement announced the completion of a new 3.7Mt/yr line with a 12MW waste heat recovery (WHR) power plant and 24MW coal-fired power plant at Chenki (28 in Figure 3). It said that production and dispatch would start 'in due course' but has not yet announced this.

August 2019: Fauji Cement completed the installation of a 12.5MW solar power plant at its Fateh Jang plant (17 in Figure 3). It is the world's largest solar power station devoted to a cement plant, with 37,905 panels delivering an estimated annual total of 19,750MWh of energy. The company has additionally installed two waste heat recovery plants of 12MW and 9MW and two large reservoirs for water recycling and rainwater harvesting.

November 2019: DG Khan Cement asked the Punjab government if it could expand the capacity at one of its cement plants by 12,000t/day.

Interview by Peter Edwards, Global Cement Magazine with translation and assistance by Ganzorig Orosoo, Cement-Lime JSC

Cement-Lime JSC: One of Mongolia's largest and most modern cement plants

Global Cement recently spoke to Demchigjav Avid, Production Director at Cement-Lime JSC in Khutul, Selenge Province, Mongolia...

Above: Demchigjav Avid has worked at Cement Lime JSC since 2006. The company's unwritten rule is, it does not matter how knowledgable you are, every single new university graduate student should start from an operator or machinist position. Demchigjav started at Cement Lime JSC as a kiln machinist. The reason is that the directors should know how all steps of production work. In 2008 he moved to wet kiln maintenance and from 2012 to 2014 he was a commissioning engineer on the dry line upgrade project. He now works as Production Director at Cement-Lime JSC.

***Global Cement (GC):* Please could you introduce Cement-Lime JSC for our readers?**

Demchigjav Avid (DA): On 27 May 1976 a contract was signed between the Mongolian People's Republic and the USSR for the Cement-Lime JSC industrial complex at Khutul, construction of which began on 13 June 1980. The cement plant began operation in 1986 with two wet kilns and a production capacity of 0.5Mt/yr. A 65,000t/yr lime plant had already begun production in 1984.

In 2011 the company decided to update the plant to the dry production process to save energy, increase production and achieve more stable output quality. The new production line was commissioned in 2014, doubling the plant's production capacity to 1.0Mt/yr.

The company has now worked successfully with this line for nearly six years and we have to give a big hand to all of our employees. The company was bestowed with the 'Altan Gadas' medal which means 'Pole Star' by the President of Mongolia. This is a real source of pride for the company. Pole Star awards are a big honour in Mongolia.

Plant and process

***GC:* Please could you outline the new production process?**

DA: The company has two open pit quarries: Khutul 1st mine and Khutul 2nd mine. The distance between the plant site and the quarries is 4-5km. The raw materials from the quarry are routed via a plant laboratory where they are analysed so that the correct proportions of limestone and clay can be mixed. The raw material from the quarry has a grain size of <600mm. The primary crusher is a double Dodge crusher, with a capacity of ~950t/hr. It reduces grain-size into <75mm. To prevent the dust pollution, bag filters are also employed in the discharge points of the primary and secondary crushers.

The next step is our ~70,000t limestone stockpile, where we have a longitudinal bridge scraper stacker. This method segregates the material with fine particles at the centre of the pile and coarse particles on the surface and at the bottom of the pile. In order to ensure proper blending, a stockpile must be reclaimed from the face of the pile by working in a cross-sectional pattern.

The plant has four silos to store limestone and clay and two silos for iron ore. Material from the limestone and additive silos are fed to respective weigh feeders to dose the material as per the set ratio and quantity, which is then fed to the raw mill inlet with help of conveyors. The raw material is ground before being fed into the kiln for clinkering. This grinding is done by a 210t/hr vertical roller mill. The product fineness is ≤12% 0.08mm square mesh screen residue. After filling the powdered materials from the raw mill to a certain level in the blending silos, this mixture is blended for 2-3hrs using compressed air. After blending, the material sample is collected and analysed in the laboratory. If the composition of the filled material is not appropriate, the required quantity

Below: Overview of Cement-Lime JSC.

Location:	Khutul, Selenge Province, Mongolia
First cement:	1986
Initial capacity: (2 wet kilns)	0.5Mt/yr
Capacity: (1 dry kiln)	2500t/day (0.8Mt/yr) (clinker) 3000t/day (1.0Mt/yr) (cement)

Sparsely-populated Mongolia has a population of 3.2 million that cover an area of 1.56million km^2. This gives it a population density of just over 2 people per km^2. This may be one reason why, despite bordering China and Russia, its coronavirus outbeak has been very limited. As at 8 June 2020 there had been just 193 confirmed cases and zero deaths from the virus.

Product Capacities

PC 42.5:	0.7Mt/yr
OPC 42.5:	0.2Mt/yr
PC 52.5:	0.1Mt/yr
Bagged:	40%
Bulk:	60%

Raw materials

Limestone:	Khutul 1st / 2nd quarries, Selenge Province	1.2Mt/yr
Clay:	Khutul 1st / 2nd quarries, Selenge Province	0.36Mt/yr
Iron ore:	Tumurtel mine, Darkhan Province	17,000t/yr
Coal:	Eldev, Tavan Togol and Alag Tologl coal mines	0.18Mt/yr
Gypsum:	Delgerkhangai sum Dornogobi Province, Russia	85,000t/yr
Fly ash:	Khutul Power Plant	80,000t/yr

of corrected material is again filled into the blending silo after changing the ratio from the raw mill. Again the material is blended for 2-3hr and the sample is analysed in the laboratory. After correction, the material is fed into a 9000t silo.

Before the kiln itself, there is a 5-stage suspension preheater. The discharge points of the first cyclones are connected to the rotary kiln (L = 60m, Ø = 2.4m). Everything is 100% fired by coal.

Clinker grinding is carried out by three ball mills that operate at 45t/hr each. Cement is stored in four 4000t silos and cement is packed into 50kg bags and conveyed to trucks and railway wagons for bulk dispatch.

Markets and future

***GC:* Where are the plant's main markets and how is cement supplied to them?**

AD: The plant's main market is infrastructure projects and building works in Mongolia. In 2009-2011 and again in 2014 and 2015, we exported OPC42.5 cement to Russia. In 2015 the Mongolian government made the decision to only supply domestically-made cement to Mongolia.

Some large building and infrastructure projects have been carried out using our products, for example: Mongolia government place and government office in Ulaanbaatar, Chinggis Khaan International Airport, the Marshall Bridge in Ulaanbaatar, the Wrestling Palace and other major works in Ulaanbaatar.

***GC:* How has the plant been affected by the coronavirus outbreak?**

AD: Our original plan for the year was to begin production on 1 March 2020. However, the outbreak delayed this until 1 April 2020 instead. Production has now begun and we are supplying the market. We have tried to keep prices stable for our customers, not increasing them since 2018.

We have been proactive in handling the outbreak, providing clear information about the virus to staff and appointing an emergency team to monitor staff and handle any potential outbreak at the plant.We are following the advice from the Mongolian Health Ministry, provide masks for all staff and maintain strict social distancing, We thank all of our staff for following the rules regarding the coronavirus and for their patience during this time.

The Mongolian Government and the Mongolian Ministry of Health are working very hard. They have taken good care of the national health picture during the outbreak. We are very thankful to the authorities.

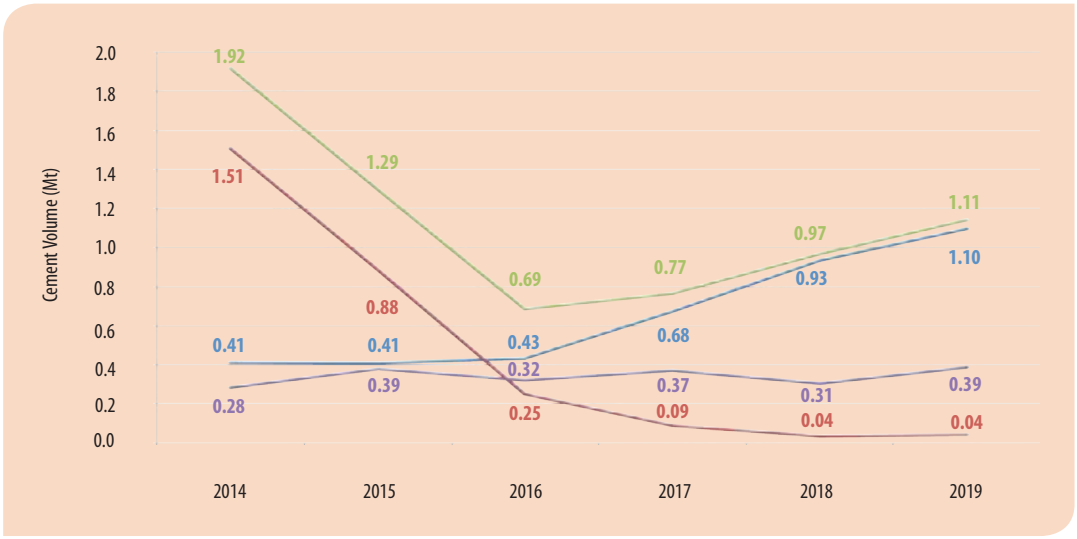
Below: The assembled workforce of Cement-Lime JSC.

Right: Mongolian cement production, imports, apparent consumption and volume produced by Cement-Lime JSC, all Mt, 2014-2019.

Apparent consumption
Production
Import
Production (Cement-Lime JSC)

Percentage of apparent consumption supplied by Cement-Lime JSC:
2014 = 14.7%
2015 = 29.2%
2016 = 46.9%
2017 = 48.4%
2018 = 31.6%
2019 = 33.9%

Source: Cement-Lime JSC.



Above: View of workers and the plant.

Above right: In the control room.

***GC:* Will the plant have any upgrades in the near future?**

AD: We are planning to build a waste-heat recovery plant to reduce our CO_2 emissions. We also plan to build a small add-on plant for finished concrete products.

***GC:* What are the biggest threats to the plant in the next five years?**

AD: The size of the Mongolian cement market is decreasing but, at the same time, new cement plants are about to be built. We are also affected by rising coal and oil prices, against which we are trying to maintain our sales prices. All this will lead to demand for lower prices in the future and will eat into our margins. From a practical standpoint, we are also faced with the loss of experts from the cement sector, as they retire.

***GC:* What are the biggest opportunities for the plant over the same time frame?**

AD: Our product is of a high quality: Due to the fact that part of the Mongolian MNS974:2008 Standard requires ILAC-accredited laboratories to ISO/IEC17025 standard, our products pass the international EN197 standard for cement. We are also in a good location and two open pit quarries that are connected with asphalt roads. Transportation is not an issue for us, unlike in other parts of Mongolia. We can send material out by truck and train.

The company, as I mentioned at the beginning of our discussion, is also blessed with 800 hard-working employees. Some have worked here since the start of the wet lines back in 1986. They are very experienced in both dry and wet cement manufacturing. Others are the sons and daughters of previous employees and we expect them to 'pass on the baton' to their own children in years to come.

As part of this, Cement-Lime JSC also provides scholarships for employees and their children to obtain higher education. Some of these students have already graduated and taken up positions within the company. In our own Education Center, we encourage our employees to increase their knowledge. We train up our own operators, maintenance teams, chemists, machinists, electricians, welders, etc...

And, of course, we have a very modern kiln line. It is energy efficient, with a stable output. This is the best possible position we could be in, considering that the market is shrinking and the situation will become more competitive.

***GC:* Thank you so much for your insights.**

AD: You are very welcome indeed and thank you for the opportunity.

Oman: Al Sahawah taking bids for Duqm until mid July

Oman Cement subsidiary Al Sahawah Cement has said that the deadline for bids for two tenders for engineering, procurement and construction (EPC) of its new Duqm integrated cement plant's 5000t/day kiln lines and mill will last until mid July 2020. The Oman Daily Observer newspaper has reported that Al Sahawah Cement will commission the grinding plant in September 2021, with full commissioning of the integrated plant to follow in March 2022. The company is also tendering for bids for a third EPC contract for the supply and installation of a 30MW waste heat recovery (WHR) power plant. The entire plant is expected to cost US$212m.

Morocco: Q1 sales plummet for Ciments du Maroc

HeidelbergCement subsidiary Ciments du Maroc made sales of US$88.4m in the first quarter of 2020, down by 9.8% year-on-year from US$100m in the corresponding quarter of 2019. Cement volumes fell by 9.9%. Ciments du Maroc said that it increased its capital expenditure by 43% to US$1.51m from US$824,000 a year earlier.

DRC: Sinoma announces Lubudi plant

China-based Sinoma International Engineering has announced the construction of a 1.0Mt/yr-capacity integrated cement plant in Lubudi Territory, Lualaba Province in the Democratic Republic of the Congo. Dow Jones Newswire has reported that the cost of the plant, which includes a lime production line, will be US$236m.

Tanzania: Huaxin completes Maweni purchase

Huaxin Cement has announced the completion of its acquisition of Kenya-based Athi River Mining (ARM) Cement's Tanzanian subsidiary Maweni Limestone. Reuters has reported that Huaxin Cement will invest US$30m on upgrades at the company's plants in addition to an investment of US$116m to settle Maweni Limestone's debts.

Saudi Arabia: Saudi Cement profit jumps 12%

Saudi Cement has reported sales worth US$39.3m in the first quarter of 2020, up by 12% year-on-year from US$35.3m in the corresponding period of 2019. Sales grew by 15% year-on-year to US$120m from US$104m. The company attributed the increased profit margin to greater demand, which offset higher general, administrative, selling and distribution expenses.

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Egypt: No new private construction licences to be issued for six months

The Ministry of Local Development has announced the start of a six-month period in which it will issue no construction licences for private buildings in Greater Cairo, governorate capitals and major cities from 27 May 2020. Egypt Today has reported that the suspension also affects licences for building modifications and extensions. President Abdel Fatah al-Sisi has ordered that mega-infrastructure projects should continue, subject to additional protective measures against the Covid-19 outbreak.

Credit: aleks333 / Shutterstock.com.

Gabon: Gabonese cement demand rises 10% in 2019

Data from the Directorate General of Economy and Tax Policy shows that national cement production rose by 10.6% year-on-year to 0.54Mt in 2019. The improving trend has been attributed to better use of existing manufacturing equipment and the resumption of activity at the CimGabon plant in Ntoum, according to the L'Union newspaper. Clinker imports also grew, by 14.6% to 0.44Mt. Overall cement sales increased by 8.5% to 0.53Mt.

Kenya: Bamburi fights sluggish 2019 trend

Bamburi Cement's profit before tax grew by 17% year-on-year to US$6.9m in 2019 from US$5.8m in 2018. It attributed the result to cost cutting and an optimisation initiative under its 'Building for Growth' plan. It said that this was achieved in spite of a decline in the Kenyan cement market and lower selling prices.

Guinea: Modular Sinoma plant starts running

Sinoma Construction has reported that the first batch of cement has been produced from a moveable modular grinding (MMG) mill at a grinding plant in Guinea. Sinoma Construction produced and pre-assembled the mill in China. It said that this method 'reduces installation time by 56%, reduces CO_2 emissions by 43% and reduces the necessary labour by 70%.' Sinoma Construction said that the project's safe completion demonstrates that, "the project department is doing a good job in epidemic prevention and control, overcoming difficulties and successfully completing the commissioning of equipment."

Nigeria: Dangote keeps up rapid pace in first quarter

Dangote Cement has recorded earnings before interest, taxation, depreciation and amortisation of US$293m in the first quarter of 2020, up by 2.2% year-on-year from US$287m in the first quarter of 2019. Sales rose by 3.8% to US$639m from US$616m. Cement sales volumes fell by 0.6% amid a total suspension of South African operations from late March 2020 due to the coronavirus lockdown.

Dangote Cement chief executive officer (CEO) Michael Puchercos said, "2020 started strongly, with growth across the board despite the early effects of the Covid-19 pandemic. We are closely monitoring all markets according to the guidance provided by the authorities in each country. We continue to provide superior services and deliver high quality products to our customers."

Nigeria: Lafarge Africa issues Covid-19 warning for Q2

Lafarge Africa says it is preparing for reduced revenue in the second quarter of 2020 due to subdued activity in the construction sector caused by lockdown measures related to the coronavirus outbreak. Its revenue grew by 10% year-on-year to US$164m in the first quarter of 2020 from US$149m in the same period in 2019. Its profit after tax more than doubled to US$20.8m. First quarter sales were driven by growing cement sales that compensated for slowing aggregate and concrete sales. Managing director Khaled El Dokani said that, despite short-term disruptions due to the epidemic, the subsidiary of LafargeHolcim was confident of the resilience of its business.

These pages give *Global Cement Magazine*'s monthly review of global cement prices - in US$ for easy comparison. Some price information is only available to subscribers to *Global Cement Magazine*. Subscribe on Page 64. In this issue subscribers receive information from Ghana, Nepal, Mali, India, Argentina, Pakistan, Ethiopia, Trinidad & Tobago, Nigeria and The Gambia. Prices are for metric tonnes unless otherwise stated. US$ conversions from local currencies are correct at the time of original publication.

UAE: The average price of cement in the UAE increased by 0.9% month-on-month in April 2020. The UAE has placed a 67.5% import levy on cement.

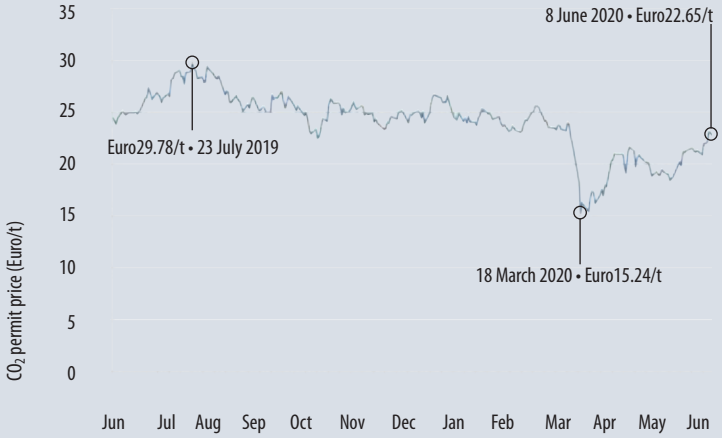
China: All-China 42.5 grade cement spot prices from sunsirs.com. 2-3 June 2020 = US$67.89/t; 4-7 June 2020 = US$67.75/t. Prices are currently around 12.2% lower than at the start of January 2020 when they were US$77.30/t. Some price reduction is usual around Chinese New Year (25 January 2020), but the magnitude and length of the decrease has been marked in 2020.

Egypt: Ordinary Portland cement prices as at 7 June 2020: Arabian Cement Co (Al Mosalah) = US$45.90/t; Arabian Cement Co (Al Nasr) = US$44.55/t; Cemex (Al Fahd) = US$43.93/t; Minya Portland Cement (Minya) = US$44.55/t; Minya Portland Cement (Horus) = US$44.36/t; El Nahda Cement (Al Sakhrah) = US$44.67/t; Wadi El NIle Cement = US$44.67/t; Lafarge (Al Makhsous) = US$44.86/t; Medcom Aswan Cement (Aswan) = US$44.86/t; Arish Cement (Alaskary) = US$46.87/t; Sinai Cement (Sinai) = US$44.24/t; Suez Cement (Al Suez) = US$44.86/t; Helwan Cement (Helwan) = US$45.47/t; Misr Beni Suef = US$48.374/t; El Sewedy Cement = US$45.29/t; Misr Cement Qena (Al Masalah) = US$44.55/t.

White cement prices as at 7 June 2020: Sinai White Cement (Alabid Elnada) = US$154.04/t; Sinai White Cement (Super Sinai) = US$151.57/t; El Menya Cement (Super Royal) = US$147.26/t; El Menya Cement (Royal Elada) = US$149.72/t; Menya Helwan Cement (Alwaha Alabiad) = US$149.42/t.

Blended cement prices as at 7 June 2020: Sinai Cement (Al Nakheel) = US$41.47/t; El Menya Cement (Al Omran) = US$41.47/t; Helwan Cement (Al Waha) = US$42.08/t. Sulphate-resistant cement prices as at 7 June 2020: Arabian Cement Company (Moqwem Mosalh) = US$53.30/t; Cemex (Al Mukawem) = US$48.98/t; Minya Portland Cement (Asec Sea Water) = US$47.14/t; Lafarge (Kaher Al Behar) = US$47.94/t; Suez Cement (Al Suez Sea Water) = US$47.14/t; El Sewedy Cement (El Sewedy Al Mukawem) = US$47.44/t.

EU ETS: CO_2 emissions permits cost Euro22.65/t on 8 June 2020, a 8.4% rise week-on-week from Euro20.90/t on 1 June 2020, a 17.5% rise month-on-month from Euro19.28/t on 8 May 2020 and a 7.3% fall year-on-year from Euro24.44/t on 7 June 2019. Prices have recovered from as much as a 25% year-on-year decrease in late March 2020.



Below: EU ETS credit prices, June 2019 - June 2020. **Source:** Ember Carbon Price Viewer.

Do you have your finger on the cement price pulse where you are? If so, *Global Cement Magazine* needs you!

Contact: Peter Edwards
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Regular contributors receive a free subscription to *Global Cement Magazine*!

Aren't you glad it's not Covid-89?

Peter Edwards Editor, *Global Cement Magazine (peter.edwards@propubs.com)*

The Covid-19 pandemic is unprecedented in modern times, both in terms of its effects on individual health and the global economy. While SARS, MERS, Swine Flu and Ebola outbreaks have been devastating for those affected, there has not been a full-blown pandemic since 1918-1919.[1] Thankfully, we are extremely unlikely to reach the estimated 50 million deaths seen due to that pandemic during the current outbreak, although the situation remains very bad indeed.

There are many reasons why we are better prepared for a pandemic in 2020 rather than in 1918 and many lives have been saved as a result. There has been a Century of medical breakthroughs and, on the organisational side, we have the WHO and the UN. The EU has marshalled over US$10bn of donations[2] to help fund the research needed to beat the pandemic.

However, more has happened in the past 20-30 years than in the prior 70-80 years that enables our society to continue to function in the face of the pandemic, albeit at a reduced capacity. Firstly, modern modelling and behavioural research continues to inform our knowledge of how to not catch Covid-19, adding to previous advice on social distancing and the need to close schools and workplaces, first seen in 1918-19.

Once someone *is* infected however, modern healthcare systems have, broadly speaking, not been overloaded through careful planning and allocation of resources. Antigen (*do I have it now?*) tests have been developed at incredible pace. Gene sequencing allowed us to study the virus to screen drugs that may limit its spread and/or effects. This recently led to the approval of the anti-Ebola drug Remdesivir being approved for extreme Covid-19 cases in the UK.[3] While the world still awaits a reliable antibody (*did I have it before?*) test for Covid-19, it is generally accepted as being a matter of time. Having been warned in early 2020 that a vaccine may be 12-18 months away, we are now told of candidates that could be available in September.[4]

To illustrate the pace of change, one study will sequence the DNA of 35,000 Covid-19 patients to find out why some are unsympthomatic and others have multiple organ failure.[5] For comparison, the original Human Genome Project lasted from 1990 to 2003.[6] The above approach would have been a non-starter just a few years ago. In our time-sensitive efforts to learn more about the virus, rapid and (relatively) inexpensive research has already saved many lives.

Also in the medical sphere, diverse manufacturers have been able to design and supply medical ventilators in weeks rather than years. They used computer-aided design and cheap, ubiquitous broadband. The latter has enabled many office workers to continue in their jobs in a way that would have been impossible prior to 2010. This has prevented economic damage being even more severe. Meetings have migrated online and cement kilns have operated with skeleton staff. Indeed, remote connections now allow equipment suppliers to commission systems from off-site locations (Page 24).

The internet has also been crucial to limiting transmission, and hence deaths, by providing social outlets. After a few weeks of lockdown, everyone misses their friends and family, even *with* social networking and video calls. Imagine the temptation to visit them in the pre-smartphone world! This would likely have led to lower lockdown compliance and problems with enforcement. Mental health has also taken a knock during lockdown. We should be grateful that discussing it is no longer taboo in many countries.

Modern connectivity has also ensured that supply chains have broadly avoided major disruption, including in the cement sector. After an initial 'wobble' brought on mainly by panic buying, deliveries have reached supermarkets and pharmacies as planned, while online orders continue to zoom around the streets.

Even when people have to venture out of the house, many can walk through an automatic door and pay contactlessly, in many cases not even coming face to face with a cashier at all. While we shop and exercise, our anonymised smartphone tracking provides a proxy for individual movement that feeds directly into governments' calculations of the crucial virus reproduction (R) rate and, hence, their anti-virus measures. Phone Apps could yet help us navigate back to normality.

So, while 'Lockdown 2020' is having very detrimental effects on so many aspects of our lives, it will not be as long, fewer people will die and the economic fall out will not be as severe, as a hypothetical 'Lockdown 1990.' Thankfully we are faced with Covid-19, rather than 'Covid-89.'

1. https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html

2. https://www.bbc.co.uk/news/world-europe-52525387

3. https://www.bbc.co.uk/news/health-52805828

4. https://www.telegraph.co.uk/global-health/science-and-disease/vaccine-news-covid-19-coronavirus-us-uk-trials/

5. https://www.genomicsengland.co.uk/genomics-england-genomicc-nhs-covid-19/

6. https://www.genome.gov/human-genome-project

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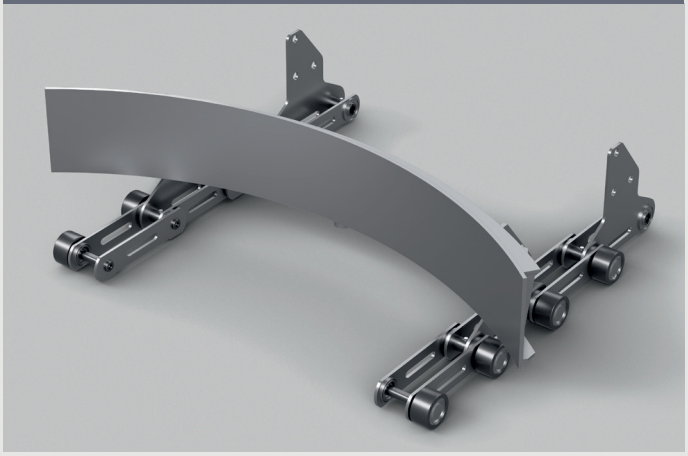
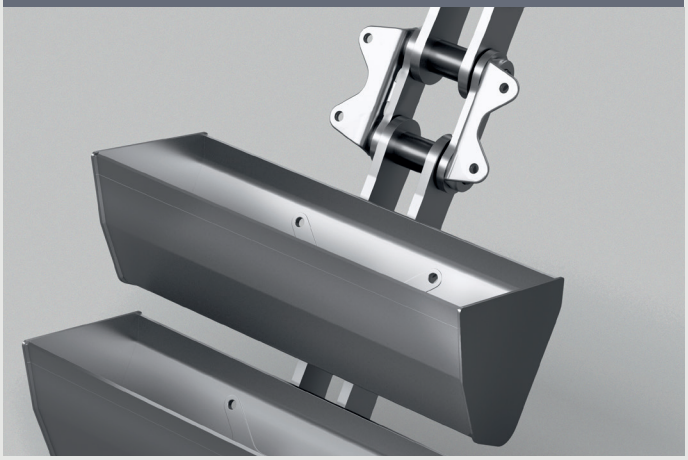


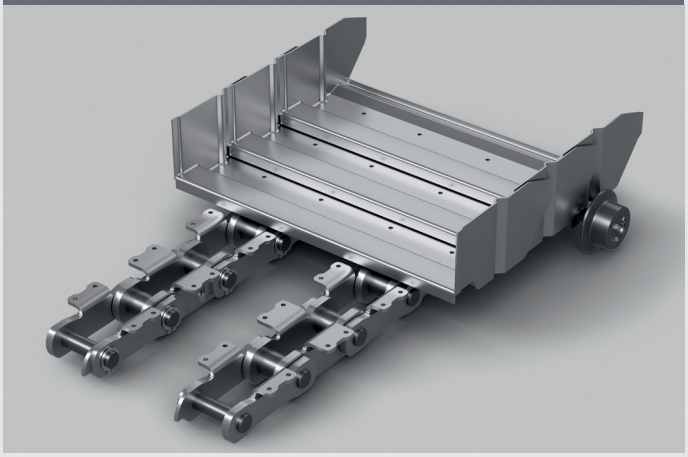
» SCS PO – Sealed chain system Permanently Oiled
» Maintenance-free oil-tight support roller using an HE seal – Click-On system required
» FEM-based design of the weight reduction
» Including accessories

Forged bucket elevator chain



» Sealed Chain System – Labyrinth Grease (SCS LG), initial lubrication
» FEM-based development of the chains to ensure maximum fatigue strength
» Sustainable increase of the energy efficiency by reducing the weight – by up to 15 %
» Including accessories

Chains for pan conveyors



» Sustainable increase of the energy efficiency by reducing the weight – FEM-based
» FEM-based development of the chains to ensure maximum fatigue strength
» Low-maintenance sealed roller for protection against environmental conditions.
» Including accessories

Service

» Wear analysis of chains on-site
» Destructive testing of fatigue strength and breaking load
» Component optimization with finite element method (FEM)
» Supervision of chains and sprockets on site
» Operating and maintenance instructions

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