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Dear readers,

Welcome to the September 2019 issue of *Global Cement Magazine* - the world's most widely-read cement magazine! As well as a range of technical articles and case studies, this issue includes several contributions from well-known industry figures who, between them, fill in a lot of the 'scenery' around our industry at the end of the 2010s. While the major multinationals are doing alright 'on paper' (Pages 54-55 and 64), the fundamentals are somewhat shaky. Trade disputes and political tensions, extreme weather effects and rampant overcapacity continue to counteract consolidation efforts.

As Philippe Fonta (Page 24) and Trevor Sikorski (Page 58) discuss, the cost of CO_2 will also come to bear more significantly on cement production in the 2020s. (As we go to press it has been announced that even Vietnam will trial a CO_2 tax in 2020). In his NICE Economy approach, Fonta suggests the avoidance of CO_2 costs by 'closing the loop' on carbon (fuel) supplies and CO_2 emissions, so that fresh fossil fuel sources can gradually be eliminated. Another way to reduce exposure to CO_2 taxes could be to use more slag and fly ash in cement blends. However, with these in short supply, could calcined clays come to the rescue? Karen Scrivener convincingly argues 'yes' in answer to this question on Page 10.

As well as uncertain future environmental requirements and costs, the cement sector is also beset by staffing issues at all levels, especially in developed markets. Thousands of blue collar workers retire from our sector every year, leaving massive 'voids' behind them. At the same time, cement companies are struggling to compete with 'sexier' industries, even at the top executive levels. James Pope discusses these issues, and some potential remedies, on Page 18, while INFORM's Dirk Schlemper looks at aspects of workforce management on Page 20.

Last but not least, this issue will be distributed at the forthcoming 36th *FICEM Technical Congress* in Punta Cana, Dominican Republic on 2-4 September 2019. To tie in with the event, you can find an in-depth look at the cement sectors of Central America and the Caribbean (Page 70), plus a list

of exhibitors (Page 84) and an account of a technical visit to Austria by a FICEM delegation (Page 86).

Enjoy the issue!

Chivaras

Peter Edwards Editor





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Ad Index

Features

10 Eco-efficient cements: No magic bullet needed

Geology limits our options for cementitious systems, so what's the best approach?

18 Filling the void: Break the inertia of inaction

How to bridge the gap between retiring leadership and early career talent.

20 Shifting the dynamics of workforce management

The latest concepts in cement sector workforce management.

24 The New International Carbon Economy

An opportunity for cement and concrete.

28 A changing picture for basic refractories

How changes in the cement sector will affect demand for basic refractories.

Technical

32 Outlet cone casting at CRH Rohoznik

A Slovakian case-study from Izoref.

34 Automatic dispatch systems

A solution for truck flow optimisation.

36 Decades of Burnley[®] Baffles in cement making

Mideco's dust suppression system proves its worth... decades after installation.

38 Digital safety procedures enter the cement sector

The benefits of oil/gas sector safety approaches.

40 Wear protection solutions in pneumatic conveyor systems

Solutions to avoid wear in cement conveying systems.

42 Cyclonaire solution for fly ash handling project

A pneumatic conveying project for a fly ash handler in the US.

44 Intercem 100 - Reviewed

51 Concrete news

52 Products and Contracts

Europe

53 News

58 EU Carbon outlook: All about the Market Stability Reserve

Energy Aspects' Trevor Sikorski looks at recent and future trends in the EU ETS market and where things are headed.

62 Preview: 15th International Congress on the Chemistry of Cement, Prague, Czechia

Americas



70 Cement in Central America and the Caribbean

An in-depth look at the cement industries of Central America and the Caribbean.

84 Preview: 36th FICEM Technical Congress

86 Review: FICEM Delegation visits Austria

Asia

88 News

Middle East & Africa

91 News

Regulars & Comment

94 Global Cement prices

Cement prices from around the world. Subscribers get extra information.



97 The Last Word

98 Advertiser Index & forthcoming issues





GLOBAL CEMENT MAGAZINE: DIARY DATES

XXXVI FICEM Congreso Técnico 2-4 September 2019 Punta Cana, Dominican Republic www.congresotecnico2019.ficem.org

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Karen Scrivener, École Polytechnique Fédérale de Lausanne (EPFL)

Eco-efficient cements: No magic bullet needed

Against the increasingly urgent need to reduce industrial CO_2 emissions, there has been significant research into alternative cement chemistries that claim drastic reductions. However, the geological reality of the elements available from the earth mean there will be no magic solutions, although there are still lots of opportunities for improvement...



Above: Karen Scrivener is the head of the Laboratory of Construction Materials at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

Right - Figure 1: Relative CO₂ and embodied energy intensity of building materials, relative to virgin aluminium (the highest).

Right - Figure 2: The relative abundance of elements in the earth's crust, by number of atoms.

ement is critical to the built environment and will continue to be a major factor in construction over the coming decades. This is because, despite some recent bad press, concrete, the 'real' final product of the cement sector, has no comparable substitute at present. Indeed, concrete has very favourable embodied CO2 compared to other materials (See Figure 1). Not only does it come out well compared to steel, aluminium and glass, it even scores well against wood, which is riding something of a wave at the moment on the back of its apparent 'green' credentials. Even as it currently stands though, at just 15% of the size of the cement sector, wood is an unsustainable proposition. Many more forests are being cut down than planted. It cannot, in any meaningful manner, dent demand for cement and concrete.

That said, the cement and concrete sectors cannot be complacent. The world is set to overshoot the CO₂ emissions that will cause more than 1.5° C of warming compared to pre-industrial levels by 2028. Clearly we are going to overshoot and, when that happens, we will then have to remove CO₂ from the atmosphere, in addition to rolling-out largescale industrial carbon capture and storage (CCS), reforesting large areas of the earth's surface and a host of other remedial efforts. Therefore, anything we can do now to mitigate the rise in temperature is extemely valuable, not just in terms of the environment but also in terms of what we'll have to spend on fixing problems later.

The importance of concrete will not change in the future, if anything it will become more critical. As global populations grow, particularly in Africa and the Far East, urbanisation will continue to accelerate, driving further demand for cement and concrete to provide a decent standard of living. If we restrict concrete production to decrease CO_2 emissions, the world will face increased pressure from mass migration.

Ways to reduce cement CO₂ emissions

The cement sector clearly has an important role to play in CO_2 mitigation efforts and major steps have



already been made. Alternative fuels, particularly biomass, are one approach, as are supplementary cementitious materials (SCMs).

Looking ahead, CCS, which might be a cost that could be tolerated in the west, is currently economically prohibitive in developing markets. Also, some say that 50% of the emissions reduction in the cement sector could be achieved by so-called





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Right: New approaches like CCS are unlikely to come to bear in developing markets for some considerable time. A better approach is to provide practical solutions that make use of existing technologies and skills. 'innovative solutions.' Unfortunately, the geological reality of what's actually available within the earth makes many of these propositions unsuitable for large-scale use. Figure 2 shows the options: Just eight elements: oxygen, silicon, aluminium, iron, calcium, sodium, potassium and magnesium account for 98% of the earth's crust.

Clearly for a material to be used in the same quantities as cement and concrete, it needs to be based entirely on these eight elements, simply because there are insufficient quantities of everything else. This is a constraint but it also means that we don't have to exhaustively study all possible options. We have to study the options that are available.

Straight off the bat, we can discount cement systems based on sodium and potassium. Their oxides are far too soluble to ever deposit hydrates in a hypothetical cement system. On the other end of the scale, magnesium and iron are not soluble enough. They can sit in concrete structures for decades and still fail to contribute to strength development.

So, from eight elements, we're down to just three abundant oxides, those of calcium, aluminium and silicon. Within these possible systems, there are then only two main compositions that can be used for hydraulic cements: Calcium silicates (Portland cement) and calcium aluminates. The latter are of interest from a CO_2 mitigation standpoint, since they contain far less CaO. This means less limestone and less CO_2 than with Portland cements.

Unfortunately things are not as simple as we might like, as to make calcium aluminate cements, we need materials that have high proportions of aluminium and relatively low levels of silicon. These are not widely distributed on earth. 90% of bauxite, for example, is concentrated in just 10 countries. Bauxite is also expensive, because it is used primarily for the production of aluminium. Even if we took all the bauxite and dedicated it exclusively to calcium aluminate cement, we'd only be able to produce 10-15% of the current global cement demand. Calcium aluminate cements thus remain interesting for certain applications, but they won't ever replace Portland cement in a meaningful way.

From the above process of elimination, it is clear that continued production of large quantities of Portland cement production is inevitable. The sector has incredible economies of scale and the materials needed are available everywhere. The reaction kinetics are ideal for construction. We don't have any material that can do the same job.

Increased use of blended cements

In the absence of suitable alternative materials and with CCS nascent at best, the most practical answer to lowering CO_2 emissions from cement and concrete prodution is by extending the use of blended cements. This is by far the most effective lever to reduce cement-related CO_2 emissions and enhance



sustainability. However, of late SCM use has reached something of a plateau. Two of the three main SCMs, slag and fly ash, are limited in supply and are becoming increasingly scarce. This is estimated to limit the potential reduction in global clinker factor to around 70% if only these materials are considered.

Let's look at slag first. It is a fantastic SCM and you can easily make blends using as little as 30%clinker. Globally though, slag production is only 8%of what would be needed keep up with that level. Of that amount, 95% is already used in cement or concrete, so there really is no further potential for slag to dramatically reduce CO₂ emissions from cement and concrete.

Slightly more available at present, but not in a CO₂-constrained future, is fly ash. If we're really serious about tackling CO₂ emissions, then fly ash will be the first SCM to disappear. We have to stop burning coal because it represents 60% of the world's CO₂ emissions.

Of course we have very large quantities of limestone but after 15% addition of limestone we're basically just diluting the clinker. There is some potential for increased proportions of limestone but it's hard to see this as a major solution in itself. Other SCMs are out there: Vegetable ashes are available in small quantities, for example, and natural pozzolans may be the answer for some users in some locations. However, the volumes are not forthcoming.

Calcined clays provide opportunities

Without new SCMs it won't be possible to push the global clinker factor much below 70%. Thankfully, calcined clays provide an answer. They are widely available and could enable reduction to an average clinker factor of 50% or even as low as 40% for some



Left: Discarded clays could provide a valuable new source of SCMs, as shown at this Indian quarry.

formulations. What is particuarly interesting is the use of calcined clays with clinker and limestone. This approach is being investigated by the LC3 project, an EPFL-led project supported by the Swiss Agency for Development and Cooperation that began in 2013.

It has long been known that calcined clays can be pozzolanic. When used alone, the maximum substitution level is around 30%. This gives a moderate saving in CO_2 emissions. However, if we substitute a further 15% of the clinker with limestone, we get a significant reduction in CO_2 emissions, with a product that has almost identical properties to the blend containing just the calcined clay.

Strength results for Portland cement and an LC3 blend with only 50% clinker are comparable, even showing higher strength for the LC3 blend after seven days. So, the blend uses 50% less clinker, produces 30-40% less CO_2 and offers similar strength to

Portland Cement. If scaled up worldwide, this would lead to reductions of several hundred million tonnes of CO_2 per year, equivalent to those of a country the size of France. Some properties, notably resistance to chloride, are also significantly improved.

Why are calcined clays so reactive?

Clays contain kaolin, which is formed of alternating layers of silica and alumina. When heated up to 750-800°C the silica and alumina layers are disrupted and can then both react. When limestone is added too, the alumina contained within the meta-kaolin reacts with the limestone to give space-filling hydrates, particularly mono and hemi-carboaluminate. These form to a limited extent in limestone cements but the reaction can go much further in the LC3 blends.

The LC3 project has compared the strength development for various binary and ternary systems

Left: Demonstration house in India made using LC3 cement.

Below: Demonstration house in Santa Clara, Cuba, made using LC3 cement.





Right - Figure 3: Comparison of mortars made with plain OPC or binary blends with 30% replacement of calcined clay, slag or fly ash and ternary blends each with an additional 15% limestone.





(Figure 3). Already at four days the calcined clay systems are well ahead of slag and fly ash. The existing limits on blended cements are related to early strength, so this is a great improvement over the binary mixes. It can be used like Portland or blended cement, like-for-like. No supplementary equipment or training is required.



Where are the clays?

Kaolinitic clays are available in a large number of countries, particularly in Africa, Asia and Latin America, where demand for cement is likely to increase most strongly. Even outside of these, there are quality clays to use. The LC3 project has been working in Rajasthan in India, not renowned for its clays, but there is still abundant material. Indeed, many of the possible feedstocks have already been discarded from other production processes. Chinese LC3 collaborators have identified 3Bnt of 'waste' material perfectly suitable for making LC3 cement containing 50% kaolin at a single site.

The state of play

Full scale production trials of LC3 cement have already taken place around the world, particularly in Cuba and India. Processes have been developed and example structures have been built. The first commerical production of LC3 cement is due to begin in Latin America in the first half of 2020.

Concluding remarks

LC3 cements are only one part of the solution to the problem of cement and concrete CO_2 emissions. Not only do we have to look at the clinker factor in cement, but also the 'cement factor' in concrete and the concrete intensity of the built environment. If each of those can be minimised, we can take great strides towards much less CO_2 intensive construction processes.

By looking at metrics like CO_2 intensity as a function of compressive strength, we can find better ways to build using concrete. It makes sense to move away from site mixing to centralised mixing, as this provides greater control over the amount of cement used. Indeed, a shift towards higher use of pre-cast components should be encouraged for the same reasons. The amount of cement wasted also needs to be looked at, particularly arising from bagged cement. China, for example, has now banned the use of bagged cement in certain major municipalities. This is estimated to offer emissions reduction of 5% in those municipalities, just by reducing of the amount of material lost.

Finally to come full circle, as the title states, there are no 'magic bullets' for reducing cement-related CO_2 emissions. However, by working throughout the value chain CO_2 emissions could be reduced by 80% compared to 1990, without huge extra costs, all while using existing knowledge and codes.

Right: Production of LC3 blocks by KJS Concrete in Dadri, India.

Right: Ripped bags containing discarded and unusable cement abound on the world's construction sites. This waste comes with a CO₂ cost and efforts should be made to reduce such instances.

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Contents

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James Pope, Beaumont Bailey

Filling the void: Break the inertia of inaction

How the global cement industry can bridge the gap between retiring senior leadership and promising early career talent.



Above: James Pope, one of the co-founders of Beaumont Bailey, is an executive headhunter specialised in placing board level, senior functional, country and cluster leadership across the building materials industries, with a particular focus on cement.

Right: Solving the cement industry's challenges of the coming decades will require a wider range of talents than seen at present, with lessons to be learned from a wide range of other sectors. The cement and wider manufacturing industry is locked in a fierce battle for talent. By 2030 there is expected to be a global deficit of more than 7.9 million workers in the sector, with a resulting revenue loss of as much as US

In the US and European manufacturing sectors, a lot of this shortage can be attributed to ageing populations. With millions of people reaching retirement age every year, businesses must work harder than ever to fill the void created behind them.

The global cement industry is about to embark on an industry-defining period in which a generational handover will take place, from retirement age (and often *post*-retirement age) senior leaders to the next generation. However, there is a major challenge that is facing the cement industry in particular. Whereas many rival sectors are spoiled for choice when selecting candidates for senior level succession pipelines, the cement industry is struggling to find resource for even their most attractive senior assignments. A major change to talent strategy is needed: Those who embrace change and adapt are likely to succeed, while those who do not, may soon end up being forgotten.

The Void – How did we get here?

The void, or the lack of mid-to-senior level talent across the building materials industry is a challenge being faced by most manufacturers in most geographies. The void is a culmination of a multitude of factors. However, the most prominent are: a historical lack of leadership development, the 2008 financial crisis and a significant reduction in the mobility of talent.

Lack of development: The first of these is the historically unsophisticated management trainee or graduate programmes that were in place 20 or more years ago. Very much a symptom of the times, many of these programmes lacked clear long-term goals or truly objective assessment and failed to give many of their alumni the breadth of experience now deemed necessary in key leadership roles.

The crash: The cyclical nature of construction was taken to its extreme in the 2008 financial crash.

This placed significant pressure on businesses right across the construction supply-chain, including high-profile property fund closures and several construction firm collapses. The repercussions, through legacy contracts are still being felt today. Throughout this period, a substantial amount of talent left the industry to join industries with greater consistency and highly-rewarding careers. This issue was exaggerated as organisations rationalised and ultimately selected experienced leadership over leadership for the future.



The 'ex-pat' factor and globalisation: The role and use of expatriate leaders has changed substantially. Historically, multinationals would use expat assignments in emerging markets as a way of initiating early stage talent into the world of business leadership. Young, ambitious leaders hungry for adventure would be sent to smaller operations in remote locations such as Africa, Central or South East Asia to 'cut their teeth' on their first leadership assignment in 'less visible' markets, with the view to eventually coming back to larger roles in Europe or North America.

However, cheaper air fares have meant that many of these exotic locations can now be visited on a much more affordable basis than in the past. This has at least partly replaced relocating with work as a way to see the world. In addition, with many families now accommodating two 'bread-winners,' as opposed to just one, mobility is significantly more



limited. As a result, fewer 'leadership initiation' opportunities exist for promising talent.

What can business do?

Faced with these challenges, what can the cement and wider building materials industry do to secure strong leadership talent for the future of the sector?

Internal development: The first and most sustainable step business can take in tackling the void is to invest in learning and development initiatives that cover the full spectrum of the leadership career ladder. A core focus should be on creating robust and effective mid-career

talent development programmes. These must go beyond preparing employees for just their next role and instead clearly define a syllabus of knowledge, experience and behaviours that they need to gather in order to succeed and advance in the organisation.

Alongside this, business must work on developing a variety of new leadership initiation opportunities in markets and locations that are attractive to people in modern business. There is little point defining what business experiences an individual must accumulate to reach their ambition if those opportunities are not available. One example could be the use of Deputy Country or Business Leadership positions for those that are likely to succeed quickly. This can have a number of positive benefits, including the strengthening of leadership boards in particularly challenged locations, greater 'bench-strength' freedom for CEOs to focus their efforts on more strategic work and also motivating CEOs to continue to develop for their next progression move.

Looking outside: The internal processes for development must be balanced with external hiring for excellent and diverse talent. By diverse, I mean looking beyond the building materials sector to recruit individuals with differing experiences and transferable skillsets. Alongside filling the void, hiring from a broader spectrum of industries helps to tackle a number of other issues that have permeated the sector. These include a lack of diversity, slow uptake in the use of technology and a lack of customer awareness.

By distilling down what makes someone successful in a particular position beyond how many years they have done a similar or slightly smaller role for a competitor, you are able to build a job profile that transcends industrial boundaries. This can then be used to select candidates from industries renowned for their expertise in particular areas; supply chain



Left: The LafargeHolcimowned Mbeya Cement plant in Tanzania. The reduction in the cost of travelling, coupled to the increase in 'doublebreadwinner' households has led to a reduction in talent mobility within the cement sector over the past 20 years. Source: Christel Ulomi, Mbeya Cement.

professionals from the fast-moving consumer goods sector, manufacturing experts from automotive and aerospace, health and safety leadership from oil and gas or technology and e-commerce experts from consumer products.

This mixture of leadership talent will then begin to build momentum internally, as those who have been appointed into their roles due to their diverse career histories and experience will begin to look for the same characteristics in their successors.

Reward good behaviour, not just results: The last step business can take to fill the void is by redefining what success looks like in an early career. Rebalancing appraisal criteria away from 'outcome' and towards 'input' will give leaders far more effective tools when promoting candidates and create a far healthier appetite internally for difficult assignments in challenging markets.

If an employee knows that their performance in a particular role will be judged purely on output (volume, revenue, EBITDA) then a business can expect to find it challenging to fill roles in declining or adverse markets. However, if an employee knows that instead they will be judged on a mixture of their inputs (creativity, entrepreneurial spirit, commercial acumen etc) and outputs, then business will find it much easier to attract great talent into tough markets, with these market conditions then positively shaping leadership ability for the future. This will, of course, also improve the performance of the company in that market.

Do something... now!

The easiest step for many businesses is to break the inertia of inaction. The longer they wait to fill the void, the longer senior leaders need to stay in post, perpetuating the appearance of a lack of opportunity and therefore creating an even greater void.

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Thomas Bergmans & Dirk Schlemper, INFORM GmbH

Shifting the dynamics of workforce management

Algorithms are a major efficiency driver for logistics assets in the cement industry. However, many producers still lose traction when it comes to creating optimal shift schedules for their human assets. This article will explore latest developments and technology in workforce management and discuss how they can be applied across the cement sector.

n the 'olden days,' shifting gears was hard work. Back then, commercial trucks came with unsynchronised manual transmissions and drivers had to use a method called 'double-clutching' to prevent damage to the gearbox when changing gears. It took some timing and practice, and it came at the expense of extra work for your left leg. Today, auto-shift gearboxes are commonplace in heavy trucks, and changing gears requires virtually no effort at all. However, when it comes to managing shift work, many manufacturing companies still use old technology that is suited neither to synchronising the competing interests of employee needs and operational objectives, nor providing the planning comfort or intuitive logic of the latest workforce management tools. This often results in expensive overtime, non-productive idle times, lower employee morale, poor customer service and, in a worst case scenario, loss of production. Failing to adequately schedule your workforce can become extremely costly in the long-run. Before we review some potential application areas and benefits within the cement industry, let's take a look under the hood to explore the basic technology that powers the latest workforce management tools.

DI technology

Not all gearboxes are built the same, which is why there's a myriad of different and often confusing brand names. The same applies to workforce management: Rostering, staff scheduling, employee logistics, shift planning, resource planning... Almost every organisation has a different term and approach. Employee logistics, however, is quite a fitting term since the latest workforce management tools are based on the same technology that has been deployed in the building materials industry for over 25 years to optimise the use of logistics assets: Operations Research (OR) and algorithms. In the mid-1990s, Redlands in France (now Lafarge-Holcim) was an early adopter in the aggregates and ready-mix business. Six years later, Hanson Australia (part of the HeidelbergCement Group), followed. Both have been using algorithms, real-time information and automated decision-making to run their fleets of trucks ever since.

But even if there is a large number of petrolheads among your workforce, human specs are quite different compared to trucks and other logistics assets. While the logistical processes of a cement producer are usually programmed into the transport optimi-

> sation software, workforce management tools need to be more flexible to accommodate the requirements of human assets. With so-called Deductive Intelligence (DI), the representable logic and structure remain flexible. This allows experts to easily formulate requirements without touching the programming level.

Deduction is an important area of artificial intelligence (AI) and many



Right: Shifting the dynamics of workforce management.

GLOBAL CEMENT: TALENT



Left: DI Technology for workforce management.

systems rely on deduction to solve problems. With this top-down logic, conclusions are reached by applying general rules to observations. Or as the Greek philosopher Aristotle, considered by many to be the father of deductive reasoning, might say: "All cars with manual transmission have a gear stick. My car has a gear stick. Therefore, my car has a manual transmission." Workforce management tools equipped with DI technology enable planners to easily weigh factors according to their priorities, e.g. by costs, service level, shift ergonomics, or employee satisfaction. With this unique technology in mind, let's review some potential application areas and benefits within the cement industry.

Central shifts

A transmission control unit is a device that controls modern electronic automatic transmissions. It centrally collects vehicle data and by evaluating information about speed, acceleration, road grade and torque demand, it applies extreme precision to every shift. In contrast, shift scheduling in the cement industry is often managed by local teams and within their specific departments, e.g. logistics, manufacturing, maintenance, research and development and others. Some are lucky enough to have an ERP system to support them, but many still rely on MS Excel or, let's face it, pen and paper. This 'silo approach' has its limitations, including the fact that shift leaders are experts in their field of expertise, but usually lack the time and skill set to create optimised shift schedules. A centralised tool equipped with DI technology can analyse a larger range of variables than the human mind is able to, resulting in better overall decision quality. What's more, it finds the best possible balance for all legal, operational and individual requirements.

But centralised scheduling does not stop at the gate. It can span over several cement plants, quarries, depots and terminals and integrate to other vertically-integrated assets such as concrete batching plants. Again, transport planning in our industry can serve as an example: centralised planning has been an integral part of the truck fleet optimisation cases mentioned above – driving synergies and unlocking value across all corners of the business.

Flexible shifts

Fully-laden trucks accelerate more slowly than cars, take up more space for manoeuvering and need more time to come to a stop. The same applies to the corporate world: The larger the business, the slower the movement. Traditionally, many cement producers use rigid shifts and simple rotating patterns, e.g. week one early shift, week two mid-day shift, week three night shift. Rotating shifts are popular among shift managers since they can be managed easily by spreadsheet tools. However, they do not cater for the shifting needs of a younger workforce generation.¹ By 2025, millennials, workers who have only been adults in the 21st Century, will make up 75% of the global workforce. Our industry needs to find ways to be attractive for this digital-savvy generation. One thing they take for granted is flexible schedules that help them to achieve a healthy work-life balance.

However, flexible shifts are the stuff of nightmares for any shift planner. Nevertheless, with software tools based on OR and algorithms, more granular start, break, and finish times can be assigned to each individual worker, while keeping the overall staffing at an optimised level and in-sync with targeted production goals.



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Right: Algorithms help plants avoid throwing spanners into the workforce planning process.



Seasonal shifts

In cold weather, the effort it takes to shift gears can increase due to the higher viscosity of the transmission fluid. This may result in higher wear and tear of the components. When temperatures drop, cement producers are faced with the prospect of lost time due to employees who call in sick. But warm weather also places its challenges onto the workforce planning process. A summer vacation schedule that everyone can live with is hard to find. The legal position on this is clear. In most countries, cement producers are legally entitled to restrict annual leave for their staff, e.g. at high-peak periods. They can also tell their employees to take leave at certain times, for example during a planned kiln or plant shutdown. Beyond these legal guidelines, however, the key priority for any employer should be to ensure that they find a fair and consistent solution for everyone involved, that also meets the staffing requirements and shift demands.

The dilemma starts with finding a consensus on which criteria vacation requests will be approved or denied. 'Seniority', where long-term employees get a first pick of the most wanted days/weeks, is a classic example. Elsewhere, employees with schoolaged children might have a higher priority during the school summer holidays. You cannot please everyone, but software tools powered by algorithms allow you to add more constraints to the calculation, e.g. social factors, while providing a higher level of transparency at the same time.

Evaluating shifts

An electronic logging device, also called an E-log, is a piece of hardware that is installed on an engine to record a truck driver's hours of service (HoS). An E-log cannot be tampered with and it provides full transparency between drivers, hauliers and shippers. In manufacturing environments, time and attendance systems are used to track when employees start/stop their work or take a break. Some systems also allow to record the type of work they carried out. Time recording data needs to be managed and evaluated to process the payroll. Shift work with its many different allowances and premiums, however, is prone to inaccuracies. Add overtime or paid time-off compensation to it and there's enough

reason for workers to throw a spanner into the payroll works.

Payroll errors can be very costly and time-consuming to rectify. What's more, a single mistake can erode trust. Integrating workforce management tools and payroll software helps to reduce the amount of work required for the time evaluation process. This approach allows to automatically assess and correct deviations that fall within a specified tolerance range. Only cases outside this tolerance range need to be evaluated by the payroll accountant, while the system takes care of the routine work.

Technology shifts

More than 30 years after its debut, MS Excel is still an important cog in the wheel of many cement producers. It is no secret that workforce planners and accounting professionals are among the most loyal users of the iconic spreadsheet program, mostly because it is easy to configure. However, technology has evolved dramatically over the years. When it comes to preparing complex shift schedules, even the best macro cannot compete with an optimisation engine that is powered by algorithms.

Instead of clinging to ageing processes and tools, transformation is needed for cement producers to survive in a world of IoT and Industry 4.0. Producers who are content with their status quo and hesitate to invest into latest digital planning tools, can find further advice from Henry Ford, who shifted America's Industrial Revolution into overdrive, "If you need a machine and don't buy it, then you will ultimately find that you have paid for it and don't have it."

Reference

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Philippe Fonta, Scrum Consult

The New International Carbon Economy (NICE): An opportunity for cement and concrete

In the face of accelerating climate change, the world needs a new approach to reducing CO₂ emissions. Scrum Consult's Philippe Fonta presents the New International Carbon Economy (NICE) concept.



Above: Philippe Fonta, Founder and CEO - Scrum Consult.

The heatwaves that struck western Europe in mid-2019 have demonstrated that climate change is no longer a forecast. It is a reality, the consequences of which are already here. However, beyond the extreme temperatures, water scarcity, violent hailstorms, floods and health issues, some new effects are emerging. In France, for instance, nuclear plants were closed or slowed down because cooling water supplies could not be guaranteed. This is not ideal when demand for air-conditioning spikes, resulting in the potential for powercuts. Train operator Thalys had to halt its network on 25-26 July 2019 due to high temperatures and extreme weather.

As nuclear energy and high-speed trains are often promoted as low- CO_2 solutions, their frailty in the face of extreme heat is concerning. This may result in a trend towards more flexible options, like road transport and thermal energy generation, both of which produce massive amounts of CO_2 .

Decarbonation: The only game in town?

According to the International Energy Agency (IEA), global energy-related CO_2 emissions hit a new record in 2018, a year-on-year increase of 1.7%. Energy consumption grew by 2.3%, nearly *twice* the average growth rate since 2010.

Much more needs to be achieved and decarbonation should be part of the solution, However, there are various reasons that the economy cannot be completely decarbonised, at least for now. Some sectors, notably cement, steel, aviation and fertilisers, are hard to decarbonise. Others, for example fine chemicals, need carbon as a feedstock. Electric motors, while promising, cannot replace internal combustion-engines overnight.

More problematically, growing economies are often dependent on cheap and easily-available fossil fuels. The financial community still supports fossil fuels and, although there has been some



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disengagement of late, higher average oil prices in 2018 pushed global fossil fuel consumption subsidies to US\$400bn, a level last seen in 2014.

Towards capture, storage and use

As existing technologies do not allow sufficient reduction in CO_2 emissions and as CO_2 remains in the atmosphere for 100 years, CO_2 capture and utilisation / storage (CCUS) will be essential. Indeed, the IEA states that 'Paris' targets cannot be met without it. By 2060, the IEA says that 14% of cumulative emission reductions must come from CCUS to meet the 2°C scenario (2DS) and 32% for more than 2°C.

A number of CCUS analyses and roadmaps have been developed. For instance, a report by the Energy Transition Commission (ETC), a global coalition of 30 leading executives from across the energy landscape, identified that even if fossil fuel use declined immediately and fell by 33% by 2040, the world might still need to sequester 7-8Bnt of CO₂ per year. This coalition also identified carbon utilisation as an avenue that should be developed and that CO2 capture would be essential to achieve full decabonation in the cement sector. In the words of the Carbon Dioxide Utilisation (CO₂U) roadmap from the Innovation for Cool Earth Forum, "Many see CO₂U as a way to offset the cost of CO₂ capture, which is the costliest part of the CCS chain." It expands to suggest that non-fossil CO2 could replace traditional sources of carbon as a feedstock. This could provide a new route to fuels and durable materials like plastics and encourage a circular economy.

CCUS for cement

CCUS is the only technology capable of decarbonising major industries like cement production. The recent low-carbon technology roadmap for the cement sector, developed by the IEA and the Cement Sustainability Initiative (CSI) in 2018 (See Figure 1) identified that 48% of global direct CO_2 emissions reductions would come from innovative technologies like CCUS.



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Right: A Climeworks Direct Air Capture (DAC) plant. Such facilities could open up new opportunities in the NICE economy. Source: Climeworks website.



Immediate action is required by the cement sector to achieve the commercial scale demonstration of oxy-fuel CCUS technologies in cement production by 2030, as well as to gain experience of operating large-scale post-combustion technologies in cement plants. Even if the electrical intensity of cement production rises as a result, estimated by 19% by 2050, this extra power would certainly come from renewable sources by that time.

The New International Carbon Economy

We cannot afford to exclude any technology, including Direct Air Capture (DAC) of CO_2 from the atmosphere. As the production of and consumption of CO_2 is unavoidable in certain sectors, like cement, a New International Carbon Economy (NICE) should be set up. In this system, carbon reserves progressively come from captured CO_2 and no longer from fossil fuel resources, with the aim of an eventual circular economic model. NICE should not subsitute the objective of global decarbonisation but would complement it in two ways. First, it would

assist the transition. Secondly, it acts as a mechanism for sectors that cannot fully decarbonise by likely future technologies. The NICE concept is valid, as CO_2 is: abundant and increasing year-on-year; Equally distributed around the world if DAC becomes possible; Affordable, if initial incentives, research and development for cheaper technologies and market demand increase, as has been seen in the photovoltaic solar sector.

This is already happening. In the US, CCUS is being incentivised via tax credits and, in May 2019, the Carbon Capture Coalition released the first-ever national policy blueprint that outlined a comprehensive set of policy priorities to promote economy-wide deployment of CCUS.

Setting up NICE

In order to set-up this new economy, an international platform should be established, gathering all key stakeholders: These include: Pioneering industry stakeholders that emit CO_2 and/or need carbon-based products; Universities and institutues that can improve knowledge regarding storage capacity and identify additional CCU opportunities; Standard-making bodies to develop appropriate new standards for CO_2 -absorbing products and measure the extual quantity of CO_2 standard ar argument.

actual quantity of CO_2 saved or removed; Governments and policy-makers to finance research and development, to incentivise CCUS solutions, support life-cycle analyses and industrial standards and to impose a minimum of permanent storage for captured CO_2 in order to achieve CO_2 removal (negative emissions), and; Financial communities that can channel existing fossil fuel investments towards CCUS enhancement.

Concluding remarks

All stakeholders need to raise awareness, build capacity and competences, including new jobs, to enhance the acceptability of CCUS. Cement producers can play a key role, as CO_2 management will be one of the prime elements to consider in the future, especially if a price for CO_2 is finally established. Reducing emissions, capturing unavoidable emissions and using some CO_2 in the production of CO_2 -absorbing concrete would make the sector a leader in climate change mitigation and adaptation.



Right: Is the sun setting on the fossil fuel sector? In the NICE economy, fossil fuels are no longer needed as a source of carbon.

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Bernd Scheubel, Refractory expert

A changing picture for basic refractories

Bernd Scheubel looks at how changing cement sector dynamics, in particular the drive to reduce CO_2 emissions, could affect the global refractories sector.

Cement consumption has risen rapidly in recent decades, a phenomenon ascribed to the rising global population. However, *per-capita* consumption has also risen at the same time. This is due to the fact that, as a country develops, it builds the majority of its infrastructure over a relatively short period. Once developed, a country's cement use reverts to a lower level. At present, emerging populations are growing rapidly, indicating that a further increase in cement consumption is to be expected. This is estimated to be in the region of 12-23% more by 2050 relative to current levels, according to the IEA Reference Technology Scenario.

However, this is expected to incur only a 4% increase in CO_2 emissions over the same period of time, as a number of tried-and-tested ' CO_2 reduction levers' continue to be pushed hard. These include further reduction of the clinker factor, higher prevalence of biogenic (' CO_2 -neutral') alternative fuels, incremental improvements in plant efficiency, increasingly-relevant carbon capture and storage (CCS) technologies, emissions trading schemes and lower temperature clinker-forming processes. (Whether biogenic alternative fuels are actually CO_2 and climate neutral, is contentious and cannot be examined in full in these points).

Focusing on the clinker factor as the best 'lever' towards a lower CO_2 cement sector, CEM I (95% clinker) emits 870kg of CO_2 per tonne of cement. At the current global average clinker factor of 75%, CO_2 emissions are around 685kg/t of cement. If this can be decreased to 60%, as is already the case for several types of cement, emissions would be closer to 550kg/t. By changing the clinker factor from 75% to 60%, we could make 5.5Bnt of cement for the same total CO_2 emissions as we currently make 4.4Bnt. This disconnects rising cement demand from clinker production and hence, from demand for refractory products from the sector.

In the past, total sales of refractory products to the cement sector, in particular sales of basic products, have risen in line with cement consumption. However, specific refractory consumption has constantly decreased over the same period. This is due to longer-life refractory products and more stable and larger kilns. A 3000t/day kiln that changes its entire basic zone with ~350t of bricks after a 12 month campaign consumes ~350g of refractory per tonne of clinker. For a 5000t/day kiln the figure is 200g/t and for a 12,000t/day kiln it is just 130g/t. Due to the fact that the entire basic zone is not always changed and that many kilns can run for more



Right - Figure 1: Per-capita cement consumption, 1980 - 2020.





than 12 months without stopping, real-world figures can actually be lower than even this.

Even if the specific basic refractory consumptions shown in Figure 2 are somewhat uncertain, it clearly shows that demand for basic refractory products from the cement sector has peaked. Even with increasing cement demand from emerging economies, it will not continue to rise. China, in particular, will continue to consolidate its outdated cement capacity. Other economies may do the same in the future. New cement plants will be large and advanced, with lower refractory consumption rates than the plants they replace. This indicates a long-term downward trend for basic refractory products.

This will mean that higher regulation of the sector in China, one of the major global producers, is unlikely to affect the ability of the global refractory sector to supply the market. China previously closed its entire magnesite industry in 2017 and



Above - Figure 2: Basic refractory demand and specific basic refractory consumption by the cement sector, 1950 - 2040.

Note: As there are no official statistics for global refractory consumption, a number of assumptions are made. These became more difficult after the boom in cement capacity addition in the early 2000s. Therefore, two scenarios are considered post-2000, with the same clinker factor but with differences in specific basic refractory consumption.

Scenario 1 shows a consumption of 500g/t clinker in 2005 down to 200g/t clinker in 2040. This is a conservative assumption, represented by the top of the trend line. Scenario 2 starts with 450g/t clinker in 2005 and ends up with 100g/t clinker in 2040. This is represented by the bottom of the trend line.

For each scenario the total amount of basic refractory required is shown by the columns. Total basic refractory demand in scenario 1 is represented by the full height of the column. Total basic refractory demand in scenario 2 is represented by the lighter portion only.

The absolute values are up for debate but the trend is inescapable. Demand for basic refractory bricks from the cement sector is in decline.

Left: With new fuels, CCS and the possibility of lower-temperature clinker processes coming down the track, there are interesting times ahead for cement producers and refractory manufacturers alike. Source: Seyed Mohamad Ali Alavi, Sabzevar Cement, Iran.



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CO₂ emissions from basic refractories

With respect to CO_2 , the basic refractory industry has the same problem as the cement industry. All MgO-based refractories, whether from mined MgCO₃ or from seawater/brines, emit CO₂. Material from mined sources is treated thermally twice, first to burnt causter and subsequently to DBM, prior to firing into refractory bricks.

In the case of seawater/brines, magnesium hydroxide is precipitated by a pH change, achieved by the addition of burnt lime or, more commonly, burnt dolomite. The production of which emits CO_2 . The precipitated Mg(OH)₂ is filtered off and burned to produce MgO causter. In the second process step, high-temperature sinter is produced. Only after two thermal processes can the material, from either source, be fired into refractory bricks.

Per tonne, CO_2 emissions from the refractory industry are significantly higher than the cement sector, as the entire process chain must be taken into account and not just the final process step. Thankfully, quantities of refractory needed is several orders of magnitude lower than the amount of cement produced.



2018. This led to prices of 97%-pure dead burned magnesia (DBM) more than tripling from US\$400/t to US\$1300/t. However, this represents a short-term blip. In the future, much stricter regulations will come to bear on the sector in China, similar to what is already happening in its cement sector, which is likely to reduce supply. However, even this reduction will not keep prices high. The price peak will fall back to the 2016 level in 2020. This will have knock-on consequences for DBM demand and prices too.

Lower temperature clinker processes

Much has been written about the existing way that cement plants can reduce their CO_2 emissions: Biogenic fuels, clinker factor, increased efficiency and so on. One area that has been less well covered is lower-temperature clinker-making processes. A more familiar one is the Aether process developed by Lafarge prior to its merger with Holcim. Such processes could lower kiln temperatures to 1200-1250°C. They represent a reasonable intermediate step for lowering CO_2 emissions, between currentlyavailable 'levers' and CCS, which may become possible in the period to 2030. For its part, CCS would not dramatically alter the refractory sector. This is because most CCS concepts tackle emissions from the existing production process.

In stark contrast, lower temperature clinker processes could have enormous effects on the basic lining of the kiln. Indeed, it would no longer be necessary to have a basic lining at all. This does not necessarily mean the end for the production of basic bricks, but they will continue to lose importance. Developments in this area will, on the other hand, be positive for andalusite bricks with SiC/ZrO and also for unshaped products. This is because the requirements for the refractory lining will be lower, due to the lower process temperatures. 60-70% alumina bricks, with SiC and/or ZrO₂ for example, are used in the upper transition zone, so, why not in the entire firing zone?

Lower kiln temperatures would even have additional positive effects for the entire cement manufacturing process. As the firing temperature is lower, the kiln shell temperature also decreases. This effect is further enhanced by the lower thermal conductivity of alumina bricks. This could mean a kiln shell temperature reduction of 80°C. Lower firing and shell temperatures also mean lower energy losses and thus lower CO_2 emissions. In addition, the kiln becomes more mechanically stable.

If the demand for basic bricks is reduced by the production of lower-temperature clinker, there may be interesting consequences for DBM. If demand for basic bricks falls due to lower temperatures and, on the other hand alumina bricks have not yet established themselves, fired bricks based on caustic calcined magnesia (CCM) and DBM with a lower density may take centre stage. This is an interesting alternative. For generations, density has been a quality feature for DBM because, among other properties, their density resists attack from the alkalis associated with burning alternative fuels. Indeed, for many years the dogma, 'The higher the better,' has prevented DBM sinter with lower densities and CCM as the raw materials for basic bricks from being brought to market. Only the approach of lowering the kiln shell temperature in the basic zone will bring movement here. Compared to normal basic bricks with an open porosity of around 15%, lower density DBM/CCM products have an open porosity of around 25%. In theory, this reduces the kiln shell temperature noticeably. These bricks would make a good first choice for lower-temperature firing.

However, clinkers made using lower-temperature firing processes will have a significantly different chemical and mineralogical composition to existing OPC clinker. Low temperature process means not only lower firing temperatures, but above all a different melting phase. Their melting phase is much





Above: Alternative fuels, which have relatively high levels of alkalis, have long ruled out refractories with low-density DBM. Could lower temperature processes lead to lower refractory density?

richer in iron and therefore less viscous. This raises questions about the coating behaviour, infiltration and reactions with the refractory material. Viscosity and the amount of the melting phase are kinetically vital to forming the necessary minerals at lower temperatures. So this may argue *against* highly-porous bricks being used in lower-temperature processes.

A worrisome question for the refractory sector arises at this point: Are *any* of the the existing common refractory products, basic and high-alumina, actually suitable for lower-temperature processes at all? The cement producers that have already carried out research into lower-temperature processes may already know the answers, but some refractory producers might have to play 'catch-up'. If the new President of the EU Commission 'keeps her promise' to reduce CO_2 emissions in the EU by 55% by 2030, rather than by 40%, compared to 1990, the pressure to deliver new ways to reduce CO_2 could be higher than anyone has previously anticipated. The effects on the cement sector, and hence refractory sector, could come more quickly than we think.

Summary

Cement demand, which has been relatively stable in recent years, will not be subject to earth-shattering 'factor of X' increases in the future. This is because rises in some regions of the world will be compensated by a decline in demand in China. This will lead to reduced CO_2 emissions not only from the cement sector, but also from lower demand for basic refractories, especially if lower-temperature clinker production processes can be realised commercially.

These factors may accelerate the long-established decline in demand for basic bricks, with a switch in focus to other refractory materials. As the situation develops, the fortunes of cement refractory producerswwwwww will become increasingly decoupled from cement production volumes. Changing demands in both sectors will give rise to new technologies that will both challenge established practices and present new opportunities for cement producers and refractory manufacturers alike.



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GLOBAL CEMENT: REFRACTORIES

Cosmin Todoran, Izoref Construcții Refractare

Outlet cone casting at CRH Rohoznik

Izoref reports on an outlet cone installation at the CRH Rohoznik plant in Slovakia.

Right - Figure 1: Kiln shell deformation prior to installation of the new monolithic refractory.

Right - **Figure 2:** Casting installation of the monolithic refractory.

Right - Figure 3: The finished lining was installed within three days.

The CRH Rohoznik plant was experienceing technical issues with cooling around the outlet part of the kiln due to a high temperature and resulting shell deformation. It created mechanical stress to the VDZ-standard shapes installed in the area, which led to refractory failure. It was impossible to install the ISO and VDZ-standard shapes that are normally used in the area, because of uneven roundness of shell. It was also necessary to stop the kiln throughout the year, disrupting the plant's production schedule. The deformation of the shell can be seen in Figure 1.



In early 2018, Izoref was contracted to supply a solution that would enable the kiln to operate until its next scheduled plant shutdown in early 2019, without the need for intermediate stops. It proposed to replace the area with a one-piece monolithic refractory.

The installation was made by casting/vibrating over a steel mould (Figure 2). To speed up installation, shotcreting can be used to install the entire section, providing a similar refractory performance. The Thermbond 7200 series, which has the ability to be installed by casting, gunning, shotcreting or ramming, was used. Installation took place over three days in February 2018.

The material performed well with only minimal wear marks. After 12 months the wear was even smaller than the VDZ-standard shapes close to the lining. However, there were some surface marks related to mechanical stresses from adjoining refractory. These were repaired by small patch works within two hours. The heat transfer found on the shell was not affected. The kiln has since entered another 12 month campaign that is due to run until early 2020.

The CRH Rohoznik plant has been able to avoid the cost of replacing the shell and no longer needs to replace the outlet cone casting with expensive VDZ-standard shapes. Expensive downtime and unplanned stoppages due to refractory issues have also been avoided.





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Dialogue: This aspect covers all the devices that enable dialogue with the vehicle's driver or operator. The equipment ranges from simple signaling lights to mobile devices and / or smartphones, touch screens and other displays. In most cases the equipment is used outdoors and so systems with high-brightness LEDs, rear-illuminated LCD screens or SRM screens must always be used.

Weighing: Weighing equipment will be found at each of the plant's

Below: A complete automatic dispatch system.

s part of their constant drive to improve the Aquality of service to customers, cement manufacturers are automating truck transit and bulk loading systems to dispatch cement. Several aspects need to be addressed in order to introduce such a system. The first is automatic control of bulk loading, so the truck loads the required quantity, while not exceeding the maximum permitted vehicle weight. It is also becoming increasingly common to request loading at unusual times, such as at night or the weekend. This is often the case for plants near large cities, where traffic is at a standstill during normal working hours. With an automated facility, trucks can load at any time of day or night to avoid delivery delays.

Automatic dispatch systems:

The solution for truck flow optimisation

optimisation and better customer service in cement plants.

Josep Barrera, CEO of Vidmar, explains how an automatic dispatch system contributes to

The most important characteristic of this type of system is the strength of the equipment, which must be able to withstand harsh working environments. It is essential to use industrial equipment that guarantees stable operation 24 hours a day. Vidmar has come to understand the needs of the cement industry and has applied the technologies offered by the market in order to develop automatic systems for controlling truck transit and bulk loading/unloading and dispatch.

To these ends, Vidmar has developed TRS.Net, an automatic system that manages the flow of trucks inside the cement plant. This enables companies to roll-out automatic control of entry/exit to the facilities, loading/unloading, weighing and finished product dispatch, both for bulk cement and packed product. It can also control the movements of workers', visitors' and contractors' movements within the plant.

To do this, the system must have the capacity to provide the necessary key performance indicators (KPIs) to be able to measure parameters of reliability, times, workloads, etc., which, in turn, allow appropriate decisions to optimise the process and the flow of trucks. The system adapts to the requirements of the moment, always using commercial equipment and implementing applications that are fully upgradable and have a long period of validity.

Successful operation lies in the system/human dialogue, which must be facilitated by the equipment. This can be divided into the following areas: identification, dialogue, weighing, automation and printing solutions.

Identification: Identification provides the basis for automating the dispatch control system. Radiofrequency identification (RFID) is the most commonly used method. In recent years, 2D or 3D readers for smartphones, automatic number plate recognition (ANPR) systems and even biometric systems have been developed. The objective is to enable the truck driver to be self-sufficient and not need the plant to provide them with a permanent ID in order to load the truck.





Contents

weighing systems in the form of entry/exit scales and/or loading points. Vidmar's systems are set up to use any weighing equipment on the market and can be adjusted to any model that the customer may have.

Automation: Automation covers the controls that will enable the required manoeuvres to be carried out at the vehicle entry/exit and loading/unloading processes.

Printing systems: The most practical approach is to locate ticket printing systems and delivery notes at the height of the truck cabin. Most reliable systems

are thermal or laser printers that are fully integrated into terminals and kiosks.

TRS.Net Process

The truck transit process is based on self-service, automatic or manual operations. Different levels of automation can be achieved depending on the equipment installed.

There are two types of vehicles: Regular and non-regular. Regular vehicles are those with their own identification system, through which the data associated with the vehicle can be used by the main TRS.Net system. As regular visitors, they will only require some data to be entered, either automatically or by the driver. Non-regular vehicles must operate through a kiosk or be attended to manually.

The TRS/Net system is normally based at the primary entry point or points into the plant. Here, regular and nonregular vehicles are identified and the data that the system requires to carry out the transaction is selected and a ticket with relevant significant data is issued.

After registering its arrival, the truck must remain in the

waiting area until the system calls it to enter the plant. This waiting time avoids congestion within the plant itself. The system will direct vehicle entries in accordance with the product to be loaded, its availability and the number of trucks already in circulation. Once the truck has been called, it must go onto the entry weighbridge to measure the tare, and then go to the allocated loading/unloading point. In the case of bulk loading, once in position there must be a signal to indicate that it is safe to start loading. This will be done completely automatically, as the system will have informed the corresponding PLC of the exact amount to be loaded, and the origin of the material.

For bag loading, the forklift operator will have a mobile device that can select the truck and see what should be loaded onto it. It can also be used to modify the load order with the final quantity loaded if it differs from the ordered amount. In case of unloading raw materials, the dispatch system can send a permit to the automation PLC to obtain authorisation.

> If there are any errors in the steps described, the system will inform the driver and the operator so that the problem may be resolved. Once the loading/unloading process is complete, the vehicle must go to the exit zone to obtain the corresponding delivery note. All the control is carried out by an application and database server.

> As peripherals and communications are very important, Vidmar's applications have tools for easy diagnosis of any kind of fault for use by maintenance staff, as well as logs of incidents and errors that the system may detect during operation.

Customer ERP

The dispatch system must be closely related to the customer's management system to ensure rapid and full data exchange between the two parties. The most common method is webservices.

Third party systems

A third party system such as a traffic management system (exterior to the plant), security access, etc., can be linked with the TRS.Net system, to enable total integration of plant access control.

Conclusion

With an automatic dispatch system, a better service availability may be offered to the customer, as significant improvement will be obtained in terms of waiting times, total flexibility of loading/unloading schedules, the optimisation of truck flows and ease of traceability of all the transactions carried out. Left: A Vidmar TRS.Net self-service kiosk.



Subscribe

Olha Lyeskakova, Mideco

Decades of Burnley® Baffles in cement making

Cement production is a complex process that's associated with multiple safety concerns. Management of respiratory risks is a priority, as dust is released during every stage of product manufacturing. In addition, handling and transporting can also result in significant amounts of airborne dust and therefore requires its own system of controls.

The quantity of cement dust is a significant problem, but it is the type of dust that is released during cement production and handling, which makes occupational dust exposure in the sector a particular problem.

Cement contains a particularly harmful type of dust: crystalline silica. Working with silica-containing materials increases the risk of developing lung cancer. Silica dust particles, invisible to the eye as they are so small, scar the lung tissue, which results in permanent damage. Long-term exposure may lead

to silicosis, chronic obstructive pulmonary disease and kidney disease, with horrific consequences for those affected.

However, cement dust exposure is now most often managed to prevent these medical conditions. Investment in smart dust control solutions that are effective, flexible and easy to install and maintain make a major difference to the quality of air and employees' health at any cement facility.



One solution for cement dust suppression comes from Australia. Burnley[®] Baffles, a unique dust suppression system, has been developed by Mideco, an engineering company that specialises in dust control solutions for mines, quarries and any commercial environment where dust is a problem.

Mideco has over 60 years of experience in the area of dust control and has vast knowledge that has led to innovative and unique solutions.

> Burnley[®] Baffles is Mideco's internationallypatented dust suppression system. It is specifically designed to reduce the escape of dust from dump hoppers and chutes that handle dry granular bulk raw materials like cement and clinker. When applied to a hopper alone Burnley* Baffles can eliminate up to 80% of dust. With an additional dust collector applied directly to the hopper, up to 100% dust suppression is possible.



Right: Aerial view of Burnley® Baffles in use by Cement Australia in Tasmania. The system was supplied in the early 1980s.

Right: Trucks being loaded from a hopper operated with Burnley[®] Baffles by Cement Australia in Tasmania. The system was supplied in the early 1980s.
GLOBAL CEMENT: DUST SUPPRESSION

Why are Burnley® Baffles so effective?

Firstly, the design of this system makes this a flexible tool suitable for a hopper of any size at any site. It consists of a set of modules with blades that fill the open inlet face of a hopper. During loading or unloading, the baffles strip the air moving into the hopper away from the product particles. This is because the air pressure on all sides of the baffles is constant. The air is not heavy enough to open the blades, allowing only the product to enter. This keeps the dust below the blades. The design of the system is unique and uses the principles of air movement. No complicated installation is needed and there is hardly any maintenance required.

Secondly, Burnley® Baffles are highly customisable, meeting the challenges of various applications, from heavy to light. There are five models available for different products. The system can also be manufactured from different materials. For example, baffles can be created from thick steel to withstand high bulk density and corrosive materials over the long term.

Mideco has designed dust control systems for different stages of cement manufacturing and handling with numerous cement producers. Some systems are still operating 20 years later, providing clean air at project sites and protecting employees' health.

For example, Mideco built and implemented a dust control system at Devonport, Tasmania for Cement Australia in the early 1980s. For this particular project, the baffles were completed in 3mm galvanised steel on a Model 2 system, the most popular model for ores and cement. To increase the effectiveness of the overall system the baffles were complemented with a dust collector. The system is still at work today.

Another cement facility in which Burnley® Baffles have withstood the test of time is at Kooragang Island, New South Wales. In this particular case, Mideco equipped the baffles and accompanying dust collector with wheels in the early 1980s. This innovation made the dust collection system mobile so it could be moved from port to port. It is currently active at Port Darwin.





These are just two examples of Burnley® Baffles streamlining the handling of dry granular bulk materials and creating a safe workplace. It is a wellestablished dust suppression system with hundreds of installations in Australia and around the world. They are currently installed at various facilities in Canada, US, New Zealand, Uzbekistan, China, UK and Ireland, among others.

Burnley® Baffles can be used in ship, rail and truck unloading, bag tipping, drum tipping and front end unloaded material transfers. Regardless of the dust issue or application, this system can suppress up to 80% of dust without additional dust collection equipment.

Concluding remarks

All employers have a responsibility to protect their staff's health through the use of appropriate personal protective equipment and dust suppression equipment. With the increased focus on the occupational lung diseases and workplace safety around the world, employers need to be aware of the most effective and flexible dust control solutions that are able to make a difference in any workplace.

Above and below left : Images of a mobile Burnley[®] Baffles system supplied in the early 1980s

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Ad Index

Henning Stalheim, SAT Vision Software

Digital safety procedures enter the cement sector

In recent decades new operating environments have emerged for the offshore oil and gas industry, including the SATOS Software Solution from Norwegian company Satvision Software. Rapid developments in the field of information and communication technology have presented new opportunities for the sector, giving rise to a broad focus on digitalisation. After a successful introduction, it is apparent that SATOS can be applied to a diverse set of industries, including cement production. It is all about keeping track of tasks and events in a compliant manner, ensuring safe and efficient production.

Norwegian company Satvision Software has developed SATOS, an application for handling all operating procedures, checklists and associated tasks. SATOS is primarily a procedure and checklist handling system. It is a web-based tool for carrying out procedures, handling checklists and coordinating interaction and cooperation. SATOS also has modules for competence management, shift and crew handovers, to-do lists and laboratory.

The software gives operators easy access to the information they need to perform their day-to-day tasks, as well as easy access to updated procedures for ongoing operations. SATOS is used on a daily basis to help operators keep track of all the necessary steps in a procedure. It ensures that the correct sequence

is followed and that workers avoid misinterpretations and oversights. Online status for start-up or other procedures is available for all employees who have access to the system. All progress is saved automatically and a report that describes each step will be generated once all the steps in a procedure have been completed. The long-term advantage of this is that all operations can be analysed to optimise training. This will lead to increased competence, site safety and efficiency.

SATOS shows the procedures that are active at any time, how much progress has been made in a certain procedure and also the steps that require action from specific individuals. This means that a field operator has a much better chance to be proactive and prepare for future tasks, for example by assisting the central control room (CCR) operator before the request for help is made. For example, if a simple visual check is needed before a piece of equipment can be started, the field operator can perform this check *before* the CCR operator has reached that step in the procedure. When the field operator ticks off the relevant step, the CCR operator will observe that this step has already been carried out.

SATOS consists of several components. The procedure module contains all the required procedures and checklists. The archive module documents the use of the procedures and checklists to ensure compliance. This can be used to check, '*Who did what... and when?*' The competence module secures adequate training for all operators. The daily shift and crew handover module keeps track of key events. The task module makes sure that no task is missed or delayed. The laboratory module documents and reports on key parameters, properties, qualities and quantities.



Right: A worker using SATOS in the field.

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Contents

Ad Index

GLOBAL CEMENT: *PNEUMATIC CONVEYING*

Bernd Gawron, Th. Scholten GmbH & Co. KG

Wear protection solutions in pneumatic conveyor systems

Pneumatic conveyor systems are used in many industrial sectors where highly abrasive bulk solids are conveyed. The range of bulk solids materials is diverse and, in the cement sector, may include cement, sand, lime, fly ash and pulverised fuels. These are highly abrasive substances that cause wear.

Pneumatic conveyance refers to the transport of bulk solids by air or other gas in a closed pipe system. Transport is usually carried out by transferring material from high to low pressure. There are three main methods of conveyance: Float, streak and plug flow.

Float flow: The bulk solids float through the pipe by being blown or sucked. The speed is generally quite high, usually >20m/s. The ratio between conveyed media and gas is usually <15kg/kg.

Streak flow: Part of the conveyed media flows in a streak along the bottom of the pipe and is propelled by finer particles flying above, like a sand dune. The gas speed is 15–20m/s and the load range is 25-40kg/kg.

Plug flow: The conveyor line is filled with enough conveyed material to completely plug the pipe. It is



forced through the pipe by high pressure conveying gas. Loads of 100kg/kg or more are possible. Material is forced through the pipeline by the conveying gas. The gas speed is low, in the range of 3-10m/s.

Wear protection options

In all three methods, gas and material flows are deflected and slowed down at direction changes. This will cause high levels of abrasive wear in the pipe elbows and sections of pipe immediately afterwards. This can incur high costs in cement plants, so wear protection measures are essential, particularly in regions where solids come into contact with the pipe walls.

A variety of wear protection materials have proven successful. Most frequently,

Right: Pneumatic conveying lines are vital in cement plants.

Right: Cross section of alumina-lined pipe section.



Mortar

Alumina

ceramic

segment

(20mm thick)

GLOBAL CEMENT: PNEUMATIC CONVEYING



mineral or ceramic lining materials are used, such as cast basalt, alumina or zirconia ceramic. Metallic solutions have also proven successful in some applications.

Cast basalt, with its favourable cost efficiency, and the industrial ceramic materials with their extremely long service life, are installed as a cylinder

Th. Scholten designs, produces and installs early leak detection systems as an integrated solution, alongside wear-protected pipe systems and other wear-protected components, such as cyclone and mill linings, all from a single source. within the pipe casing. They provide enormous cost savings to the cement industry every year. For example the annual cost for a 3mm diameter hole at 8 bar pressure, are estimated to be Euro3000-10,000/ yr, for the energy loss alone.

Early leak detection is vital

Early-warning leak detection systems allow plants with pneumatic conveying systems to detect leaks at the very early stages via a warning signal. If the ceramic is destroyed by wear, for example inside a pipe bend, the sensor system reacts without delay.

During visualisation, the pipe component is displayed and the information required to obtain a spare part is indicated. Frequently, the repair can be carried out during standby mode, so that a shutdown of the plant, which would involve further losses in uptime and production, can be avoided.



Mike Colella, Cyclonaire

Contents Subscribe Ad Index

Cyclonaire solution for fly ash handling project

Cyclonaire outlines a pneumatic conveying project for a fly ash handler in the US.

Right: Two Cyclonaire CB-150 vacuum-loaded Blend-Veyors were used in the project, along with other equipment. Headquartered at the Salt River Pima-Maricopa Indian Community's Chaparral Business Park near Scottsdale, Arizona, the Salt River Materials Group (SRMG) is a leading supplier of Portland and masonry cements, fly ash, other pozzolans and aggregates throughout Arizona and the southwestern United States. With its strategically located manufacturing facilities, a large fleet of railcars and an extensive network of rail-served bulk terminals, SRMG delivers products and services to the construction market.

SRMG has contracts to receive fly ash from nearby coal-fired power plants, a byproduct from the coal burning process. Two types of fly ash, Class C and Class F, are by-products of different types of coal. Blending Class C and Class F fly ash can produce high-quality and consistent Class F fly ash.

Need for new fly ash handling equipment

SRMG serves its ready mixed concrete producer customers from strategically-located sources and terminals. The company's 19th Avenue Terminal is located along a railway line to the south of downtown Phoenix. A facility upgrade was needed to blend and make more Class F fly ash available to the market. The end result was an engineered system that included Cyclonaire pneumatic blending/conveying products. By modifying the terminal, SRMG was able to boost the output of fly ash by blending

Project profile

Client:	Salt River Materials Group		
Project:	Terminal fly ash blending system		
Location:	19th Avenue, Phoenix, Arizona, US		
Completed:	October 2017		
Objective:	Weigh, batch, blend and convey fly ash		
	to destination silos		
Cyclonaire equipment:	2 x CB-150 vacuum-loaded Blend-Veyors		
	Two blower packages		
	System controls		



Class C and Class F to create a Class F that meets ASTM C618 requirements.

Cyclonaire solution

Cyclonaire approached the project from an efficiency perspective. Its goal was to simplify SRMG's production process with a system that was easy to maintain, achieved production goals and complemented the existing flow. The company provided a CB Series Blend-Veyor semi-dense conveying system with batching and blending capabilities. The system included two CB150 Blend-Veyors, two blower packages and system controls. These components allowed SRMG to weigh, batch, blend and convey material in one unit.

With Cyclonaire's CB-150 Blend-Veyors, Class C and Class F fly ash can be weighed and blended in the same vessel. The two Cyclonaire pneumatic conveyors run simultaneously to ensure ongoing production, even if one of the conveyors is down for scheduled maintenance or repair. After blending, the material is pneumatically conveyed into a silo for discharging into a truck or rail silo.

Since all maintenance takes place at grade on the unit and replacement components are relatively inexpensive, it is easier and more economical to maintain this system than a mechanical system that has many moving parts. With this Cyclonaire solution, which processes 50t/hr per pod, SRMG can increase fly ash production by efficiently weighing, batching, blending and conveying material in one pneumatic unit.

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Ad Index

Global Cement Magazine

Review: Intercem 100

GLOBAL CEMENT: REVIEW - INTERCEM 100

The 100th Intercem Conference has taken place in Istanbul, with over 400 delegates from more than 40 countries in attendance. Here *Global Cement Magazine* reports on proceedings.

Malcolm Shelbourne, founder and CEO of the Intercem events, first welcomed attendees from the more than 40 countries in attendance and secondly thanked the combined companies, associations and organisations that make up the Turkish cement industry for their hospitality and support over the years and for this event in particular.

Nihat Özdemir, chairman of the Turkish Cement Manufacturers' Association, the TÇMB, opened the conference by stating that Turkey's economy slowed through 2018 and into 2019. Despite this the industry's 55 integrated plants produced 71Mt of clinker in 2018, which was the largest production total in Europe. Around 10% of production is exported, earning US\$614m in 2018. Future priorities will include the promotion of concrete roads, concrete barriers, the use of waste heat recovery and increasing the use of alternative fuels. Turkey's thermal substitution rate from alternative fuels is only 6%, leaving plenty of room for improvement. Additionally, there are 21 waste heat recovery systems in 12 plants, with a total capacity of 120MW, all operating without government subsidy.

Suat Çalbiyik, chairman of the Cement Industry Employers' Association, pointed out that the cement industry in Turkey makes a huge contribution to employment in the country, with 18,000 direct employees. Despite the current period of 'economic ambiguity,' the industry is moving forward, partly through increasing its exports. Cement-specific educational institutions have been established in Turkey to increase the level of training, safety and professionalism in the industry.

Ismail Gülle, chairman of the Turkish Cement Exporters' Assembly, pointed out that China is having a huge effect on global trade, effectively rebuilding the world's infrastructure with its 'Belt and road' project, which brings trade to China and from China to the rest of the world. Turkey exports its cement and clinker to 115 countries around the world, helped by its long coastline and strategic position. Turkey's population will pass 100m in around 2040, and its working population will pass 60m, making it an enduring destination for trade and investment.

Deputy minister of trade **Mr Riza Tuna Turağay** next gave an official welcome, pointing out that Turkey's youthful population, average age 30 years, promises economic growth in the coming years.

Murat Tabanlioğlu a renowned Turkish architect, next spoke on 'Urban form and social structure.' Interestingly, his designs rely not just on concrete, but also on glass, steel, wood, water and aluminium, each being used to its maximum utility in its own niche.

Yassine Touhari of On Field Investment Research next gave some hints of the coming 'new world order' in the global cement industry. In the 1990s,



1: Delegates were able to enjoy the warm welcome and hospitality of the Turkish cement industry at the 100th Intercem meeting.

GLOBAL CEMENT: REVIEW - INTERCEM 100









the end of the Cold War opened the world to global investment. Cement companies that had previously invested in diversification instead divested non-core businesses to focus on globalisation, particularly in Asia. However the global financial crisis put a halt to three decades of global expansion since their cash generation collapsed just after they had piled-on huge quantities of debt (most notably Cemex, which paid heavily for buying Rinker just before the crash). Without enough cash to finance capital expenditure, their market share eroded in most emerging markets. Strong regional and national cement companies have since emerged to challenge the operations of the multinationals. New entrants have multiplied, often encouraged by Chinese cement equipment suppliers (and backing).

Arnaud Pinatel, also of On Field Investment Research, next pointed out the rise of protectionist tariffs around the world, alongside existing and new CO_2 regulations. With a collapse in demand throughout the Middle East due to the weak oil price, the area is becoming increasingly important as a source for exports, while Turkey is becoming a growing source of supply of cement for the USA. Independent grinding plants could represent 10-15% of EU production in the coming years, taking advantage of the possibility of producing clinker outside of the region covered by the EU ETS, in the absence of 'border adjustments'



or carbon taxes levied at the bloc's borders on incoming cement and clinker. Arnaud forecast that there will be a shortage of around 34Mt of CO2 allowances by 2025. Environmental regulations in China have led to a reduction in production and an increase in imports, meaning that the Chinese are not worried about losing the US as an export market. Arnaud pointed out that there has been a regional decoupling in cement selling prices denominated in US\$, with Asia increasing and MENA and South America reducing. Yassine Touhari returned to point out that the Chinese are now the undisputed heavyweight cement champions of the world, being the largest and most cash-generative cement industry on the planet. However, cement demand has now stalled in China, so the Chinese are starting to invest abroad: Chinese producers now own over 90Mt/yr of production capacity outside of China. Chinese cement producers are also busy investing in vertical integration in China, as well as in e-commerce and precast concrete capacity. Anticipating the inevitable Chinese internationalisation, the current multinationals are taking a selective approach to emerging markets alongside a greater focus on vertical integration, as well as on value-added products and building solutions for mature markets. The new world order will involve two spheres of influence, that of China (including Africa and Southeast Asia), and of Europe Australasia and the Americas. Industrial diversification for the 'cement' multinationals may be about to become a theme once more.

Feyyaz Ünal of the Turkish Cement Exporters' Assembly next spoke about trends in the Turkish industry. Exports of cement and clinker have grown continuously since 2015, to top 15Mt in 2019. The industry is making great efforts to reduce its environmental impact, to improve its health and safety record, and to improve the sustainability of the buildings that are built with its products.

Terry Pavlopolous of Cement Business Advisory Ltd next asked how to manage the developing overcapacity in the Mediterranean rim. Potential supply is 470Mt, while demand is only 263Mt, suggesting a 53% capacity utilisation rate. Nearly all of the countries bordering the Mediterranean have an oversupply situation. Terry pointed out that when there are fewer players in each

country (suggesting greater consolidation in the industry), there is a higher level of profitability in the industry. Reducing the excess capacity will come from increasing domestic demand, closing plants or exporting. However, increased industry consolidation and the concomitant improvement in market behaviour can improve 2: Malcolm Shelbourne, Intercem founder, welcomes delegates to the event.

3: Corné van Aalst of Van Aalst Bulk Handling BV on one of the many exhibition stands at the event.

4: Ad and Marcia Ligthart, who have been frequent participants at the Intercem conferences, were celebrating the 20th anniversary of the founding of their own company, Cement Distribution Consultants.

5: Delegates enjoyed a Gala Dinner at the Shangri-La Hotel, on the shores of the Bosporus.

6: Moisés Nuñez of Cemengal, on his exhibition stand.









7: The new Intercem logo was unvelied at the 100th edition of the conference series.

8: Çimsa was one of several cement-producing companies to exhibit at the event.

9: Istanbul airport is an outstanding example of the use of concrete as a building material.

10: Mondi had an impressive exhibition stand at the event, as well as company representatives from a variety of production facilities.



in destination markets. Companies should consider mergers and acquisitions once again: they can lead to industry consolidation, capacity closures and restructuring, and can produce real synergies. However, value expectations are often out of sync, with sellers misjudging the value of their business. Values may be based on emotional arguments and deals can be paralysed by book values and/or initial costs. On the other hand, buyers also often have an unrealistic approach to potential deals, assessing targets on short term criteria, and only considering acquisitions when markets are booming. Benjamin Sporton of the Global Cement and Concrete Association, the GCCA, next spoke about making concrete the sustainable choice. The association has been formed to promote the positioning of concrete, to increase the industry's sustainability and to promote innovation. Benjamin pointed out that the global cement industry has reduced CO₂/t of cement by 18% since 1990. Reducing the clinker factor, fuel switching, thermal energy efficiency, electrical energy efficiency and innovative technologies will all be used to reduce the industry's environmental impact in the future. Any future replacement for con-

profitability despite overcapacity. Terry pointed out

that the Mediterranean rim countries have added

both new capacity and have increased the number

of market players since the financial crisis, leading to a negative 'double whammy' on profits. Many more

countries have moved into an exporting situation,

but exporters now fight for fewer and fewer export destinations. He suggested that exporters should

eschew 'arms-length' trading and instead consider

investing in relationships with cement consumers

crete will need to have all of concrete's many positive

attributes and Benjamin suggested that actually a re-imagined concrete, or 'concrete 2.0' will be the best option for the global building industry. Benjamin concluded that cement is 'building the future.'

Hakan Gürdal of HeidelbergCement/HC Trading next asked, "What's next for the global cement industry?" Starting in April 2018 there has been a marked slowdown in global trade and a weakening in global growth. China's economy has slowed, possibly more than the official figures suggest, and its domestic debt is heading towards 300% of GDP. At the same time, China's infrastructure investment has fallen sharply. There is huge volatility in oil and coal prices, and freight rates have fallen substantially in recent months. Hakan suggested that China's cement industry is now being driven, from above, by a renewed emphasis on emissions reductions, and with continued closure of capacity. He also suggested that the global cement industry is no longer 'under the radar' when it comes to its CO₂ emissions. Smaller companies that do not have the financial strength to take the coming pain from increased carbon emission costs and cannot afford to modernise will be pushed out of the industry. For the majors in a good financial position, plant upgrades will improve their cost position and also improve their environmental footprint. Supply cuts and capacity closures will increase utilisation rates and margins in the long term. China's nationwide ETS will be fully operational over eight sectors by 2020, including for building materials, and around 100Mt/yr of capacity will be closed each year in the future. Worldwide, further rationalisation and decommissioning will be ongoing.

Charles Zeynel of ZAG International next gave an overview of the current cementitious materials situation around the world. Granulated slag supplies have now largely been contracted by users, leading to 'spot market' shortages in availability around the world. Around 515Mt of flyash is produced each year, but much of it is not usable by the cement industry. However, reductions in the clinker factor will drive continued demand for flyash. The value and hence cost of Supplementary Cementitious Materials, SCMs, will continue to increase as the producers 'move down the value chain' and progressively capture more of the advantages of the use of GBFS, flyash and other SCMs.

Bharat Sharma of Dalmia Cement Ltd next outlined India's extraordinary cement development story. The first cement production was only in 1914, with a 100t/day plant at Porbandar. By 1935 the industry was making 1.5Mt/yr, but was beset by price wars until production and price discipline was established by the Associated Cement Companies, ACC. During the partition of India in 1947, 21 of the 24 plants remained in India. By 1976 there were 54 plants in the country, with 21Mt/yr of capacity,





15. TÇMB International Technical Seminar & Exhibition

15th TÇMB International Technical Seminar and Exhibition will be held in Kaya Palazzo Golf Resort Belek, Antalya, Turkey between 8th and 11th October, 2019.

The program is open for both national and international attendees from cement industry, service and technology providers. The event is important for the manufacturers to follow up the recent developments and creates an opportunity for the participants to consider the new investments while having a chance to benchmark their business for every two years.

14th TÇMB International Technical Seminar and Exhibition held in 2017 was found very successfull by global cement industry with the participation of more than 576 participants, also 131 foreign and national companies from cement and related industries.

Main Theme:

Towards Circular Green Economy and Digital Transformation **Sub-Themes:**

- Energy Recovery from Urban Solid Waste
- Industry 4.0
- Innovative Production Technologies
- Industrial Symbiosis
- Zero Waste



Turkish Airlines is the "Official Airline" of 15th TÇMB International Technical Seminar & Exhibition and special discounts will be offered on certain booking classes.

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GLOBAL CEMENT: REVIEW - INTERCEM 100





11: Delegates enjoyed the networking opportunities afforded by coffee breaks and lunches.

12: Assembled dignitaries and VIPs from the Turkish cement industry and the wider world listened intently to the conference presentations.

and the sector eventually became the world's second largest around 2002, now with a total of 500Mt/yr of annual production capacity. Housing provides 65% of total demand, due to rapid urbanisation. Around 20% of demand comes from infrastructure, including roads, railways and ports. Commercial and industrial demand accounts for 15% of demand. Capacity utilisation is currently around 60%, with an oversupply of around 120Mt/yr. A new land acquisition law has led to a slowdown in capacity additions and higher barriers to entry for new entrants, so the future oversupply can be expected to moderate. Auctioning of limestone resources, rather than allocation, has also reduced the number of entrants, while a credit squeeze and changes in insolvency laws have also led to a concentration of capacity within middle- and larger-sized companies. Due to the modern production facilities of the Indian cement companies, and their use of SCMs, they are among the lowest CO₂ emitters in the world per tonne of cement.

Farid Fazal of DG Khan Cement Company gave an overview of trends in Pakistan's cement industry. When Pakistan was formed in 1947, it inherited 0.5Mt/yr of capacity. In 1990 with a capacity of 8.9Mt/yr, the industry was privatised and a spate of new facilities were built, now totalling around 60Mt/ yr, with another 9M/yr of capacity in the pipeline by mid-2020. Supply and demand are currently more or less in balance, while exports account for around 5Mt/yr. Per capita cement consumption is currently around 180kg/capita.

Vladimir Bespalov of VTB Capital Research gave the final presentation of the first day, on the possibility of a new chapter for the Russian cement industry. The industry has 58 plants and around 100Mt/yr of capacity. However, fuel is cheap and investment is expensive, so a significant part of the industry is technologically obsolete. The vastness of the country means that rail transport is widely used, with the average distance of transport being over 700km. Due to the 'tyranny of distance,' the Urals, Far East and Siberia have the highest transport costs. Cement production was approximately 53Mt in 2018, a capacity utilisation of only around 50%. Per capita consumption was 366kg in 2018. The latest statistics suggest that there is a trend toward increases in demand and some recovery in pricing levels, which currently range from US\$50-65/t ex-factory. Government-led projects in housing and road safety are set to drive demand over the next five years. However, in the domestic sector, low household incomes and high interest rates are a significant challenge to increased investment in the housing stock. The government is set to spend US\$170bn on transport infrastructure to 2024, with concrete roads being a particular emphasis for the industry. Imports and exports amounted to less than 3% of total volumes.

In the evening of the first day, delegates enjoyed a gala dinner sponsored by the Turkish cement industry, at the Shangri-La hotel, on the Bosporus.

Second day

The conference continued the next day with a presentation from Koen Coppenholle, CEO of CEMBUREAU, the European Cement Association, on the challenges and opportunities for the cement industry in a changing global environment. Koen suggested that there will be a drive towards the electrification of economies, as well as an increased focus on resilience in infrastructure. Population growth and urbanisation are the strongest trends worldwide, but there is an increasing emphasis on reduction of environmental harm. Global per capita cement consumption is currently around 565kg/capita, and is more or less stable. There is a drive in the EU to become 'climate neutral' by 2050, not just for heavy industry but including all citizens and systems, based on the accomplishment of the circular economy. Koen pointed out that the financial community is looking to increase sustainable investment, and that the cement industry needs to be ready to answer some tough investment questions coming its way. The cement industry needs long-term legal certainty, access to affordable and renewable energy and potentially, in the case that CCS becomes viable, access to a CO₂ pipeline infrastructure.

Louis Redshaw, Redshaw Advisors Ltd, next spoke about trends in the EU ETS. Under the scheme, any company that does not have an emission permit for its CO_2 emissions is fined Euro100/t and must

GLOBAL CEMENT: REVIEW - INTERCEM 100









buy the 'missing' permits, which is a strong incentive to comply with the rules. When the EU ETS was founded, the emissions price was around Euro33/t, but this collapsed to less than Euro10/t for the last few years, due to an oversupply of permits. However, the price has jumped to around and beyond Euro25/t in the last two years, due to progressive under-allocation. The EU has a target of a reduction of 40% in GHG emissions by 2030, a reduction of around 2.2%/yr from 2021. In the future the allocation of free permits will become more restricted, with industry benchmarking rules becoming tougher: Unless your plant is in the top 10% most efficient installations in your industry, your free allocation will drop in the EU ETS. The EU wants the prices to be higher to incentivise investment in technology. The Market Stability Reserve (MSR) mechanism has been designed to mop-up the oversupply of allowances, at a rate of 24% of the previous year's excess for the first five years, and then reducing to around 12%/yr if required. The MSR does not operate if the excess is less than 833Mt, to maintain liquidity in the system. However, the MSR has been nicknamed the 'Market Instability Reserve,' since it has caused severe perturbations in the markets: the EU ETS will be substantially short for at least the next three years. Electricity prices are also rising. He suggested that the ultimate price of permits will tend towards Euro200/t. Louis suggested that the Paris Accords mean that all countries will eventually be obliged to act to reduce carbon emissions, but he suggested that the establishment of a global emissions trading scheme is - in practice - just a fantasy, due to the contrasting aims and ambitions of the world's different regions and countries. Multinationals are under pressure from shareholders, activists and customers alike to act on the environment and the steadily increasing cost of emissions will spur them to action. Turn to Page 58 for more on the EU ETS.

The shipping and logistics session was started by **Simon Cox** of Howe Robinson Partners with a few observations on the freight market. The Baltic Dry Index of freight costs is at an historically low level and has been on a slow downward trend for some decades. This is partly because the bulk fleet has grown by 600m Dwt in the last 20 years, or 224%, far beyond what is needed. Bunker fuel is set to become significantly more expensive, due to incoming super-low sulphur content standards of less than 0.5% sulphur. Simon pointed out that bulk tankers for cement and clinker are tending towards larger sizes.

Ad Ligthart of Cement Distribution Consultants, a company celebrating its 20th anniversary in 2019, gave an overview of the history and future trends of the industry. A variety of trends are currently underway: Australia and New Zealand are closing clinker production capacity and are turning to the international clinker markets; East Asia is the world's largest export base; Bangladesh has the largest clinker imports; Europe has a strong regional trade with a growing share of cementitious materials; Africa has over 100 grinding plants and growing; the USA is the world's largest cement importer; and the US imports the majority of its cement from the EU, but future CO₂ prices may have an impact on the economic viability of this trade. Ad suggested that Africa has the possibility of quadrupling its cement consumption, but there are large political and economic issues; clinker imports will continue to increase in the meantime. Rather than becoming a massive exporter as its demand dropped, China has become a importer, since it has closed its capacity at a much higher rate than expected. Ad suggested that the sensible response of the industry to the use of larger ships will be larger storage facilities onshore, or floating transshipment solutions (like the coal industry). Ad suggested that floating grinding plants might become viable (possibly based on KHD's grinding press technology, using decommissioned handymax vessels), and might incorporate their own bagging plants onboard. He concluded that the money is sometimes not made in the trade of cement and clinker, but rather in improving the utilisation factor of the clinker production facilities. "It is sometimes strange to see that producers are willing to invest millions of dollars in production line improvements for benefits of maybe US\$0.5/t and by lack of investment in logistics face delivery costs that could be several dollars higher than needed."

13: Benjamin Sporton of the Global Cement and Concrete Association, the GCCA, next spoke about making concrete the sustainable choice of building materials.

14: Koen Coppenholle, CEO of Cembureau, the European Cement Association, spoke about future trends in the industry.

> 15: Deputy minister of trade Mr Riza Tuna Turağay gave an official welcome.

16: Nihat Özdemir, chairman of the board of the Turkish Cement Producers' Association, the TÇMB, gives details of the country's cement industry.







17: The organisation and design of the conference was impressive.

18: Malcolm Shelbourne, founder of Intercem, made delegates welcome at the 100th event.

Javier Martínez of GlobBulk in Spain next looked at future challenges in clinker handling. Dust emissions from substandard loading and unloading facilities are still prevalent and the industry must invest in improved environmental performance, while at the same time upgrading loading rates (to 10-15,000t/day) and capabilities for receiving larger ships with deeper draughts. However, the largest ships, Panamax class, generally do not have their own unloading equipment. Plants that have previously been used for exports will need to invest in new port facilities to be able to receive larger vessels for loading. CO₂ emissions will shape new export patterns: Algeria and Tunisia will have to improve their export facilities and internal logistics will need to be improved in importing countries.

Christian Landes from Ecement GmbH spoke about his company's online trading platform. Ecement is a daughter company of N1 Trading, a developer of B2B trading platforms. Digitalisation potential in the cement industry includes AI, IoT, BIM, Industry 4.0 and in improved platforms and systems. "Today we talk about 'mobile-first,' whereas in the future we will talk about 'AI first.' Ecement offers an online toolbox of different capabilities, including cement trading, auctions, ordering and payment options. Future developments will include the integration of logistics, sales forecasts based on progress on construction sites, and the implementation of 'Bob,' the first conversational AI for construction trading platforms.

Bart van der Woerd of Basilisk next spoke about self-healing concrete. This is based on the dispersal of bacterial spores and nutrients in the concrete. In the presence of oxygen and water, such as in case of a crack forming, the newly-energised bacteria metabolises calcium lactate into limestone, which 'heals' the crack. A product has been developed for retrofitting, for concrete repair, but the main product offered by the company is a 'self-healing agent' that can be added to virgin concrete. Bart said that "you have to accept a shrinkage crack in concrete, but relax, with this solution it will heal." Total lifecycle costs for selfhealing concrete are lower than for normal concrete, with lower maintenance costs, and also with a decreased requirement for reinforcement steel.

François Avet from the EPFL in Lausanne, Swit-

zerland, next spoke about LC3 (limestone calcined clay) cements. LC3-50 and LC3-65 (the numbers referring to the clinker content) are the main current options, both blends performing better than OPC, due to additional synergistic reaction effects, extra hydrates and a denser microstructure. LC3 cements show better chloride resistance compared to OPC, as well as the elimination of alkali-silica reaction. CO₂ emissions are 30-40% lower than for OPC, with equivalent reductions in production cost. François suggested that by 2050, 26% of the world's cement could be LC3 cements. (*Turn to Page 10 for more*).

The penultimate presentation was given by **Gian Luca Barone** of Zaha Hadid Architects, UK. The essence of his presentation, 'structure as skin,' is that exposed concrete is an authentic, functional and attractive construction material. There is a total absence of cladding in this approach, 'trusting' in concrete alone.

Aydin Özçekiç of Botmore Technology gave the event's final presentation, on the centrality of data in the future application of AI in the construction sector. Aydin suggested that a wide variety of sources of data will be used for inputs for AI, including BIM, project management documents, emails, the IoT, ERP information, photos, standards, reports and coordination information. Today's machine learning algorithms can interpret 'dark' or unstructured data (such as photos) much as a human might, in order to 'understand' the situation on the ground. Such an AI can then create notifications and suggestions that can help workers on a construction project. In addition, the AI can make forecasts of the requirements of building materials based on many different factors, such as weather, workforce availability and so on. AI-driven robots could be used for construction, but also for measurement of progress, using 3D scanning on autonomous drones or mobile land-based robots.

Conclusion

The Intercem conferences, first established in 1985, have become well known around the world for bringing together producers, shippers and traders of cement and clinker. *Global Cement Magazine* congratulates the organisers on the milestone of their successful 100th event.

US: Cemex ready-mix plants earn ISO 14001:2015 certification

Ad Index

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Nine of Cemex USA's ready-mixed concrete plants in the San Francisco Bay Area of Northern California have earned ISO 14001:2015 certification for their environmental management systems (EMS). The company says these are the first ready-mix concrete operations in the US to achieve the designation. The nine plants are in Berkeley, Concord, Oakland, Pleasanton, San Carlos, San Francisco, San Jose, Union City and Santa Clara. They were each awarded certification after Lloyd's Register, an accredited third-party organisation, audited Cemex USA's West Region management system at corporate and site level.

UK: Plant relocated and upgraded

Cemex has invested around Euro1m on relocating and Cupgrading its Eversley ready-mixed concrete plant in Hampshire. The plant will now be located at the nearby Bramshill Quarry, reducing the need for truck journeys to the former site nearby. The unit is being replaced with a Liebherr 2.25 mobile mix plant. The plant will have a storage capacity of 300t of cement, and 240t of aggregates. It will increase production from 24m³/hr to 80m³/hr. The inclusion of a central mixer will also enable special products, increasing the site's product range.

Mexico: Concrete sales website

GLOBAL CONCRETE: NEWS

Cemex Mexico has launched a new website to sell concrete. It is intended to serve builders, contractors, small business owners, architects, construction entrepreneurs and the general public for any size of project, from 1m³ upwards.

The site includes an online calculator to help customers work out the amount of concrete required for a project and technical support to aid the transaction. It also supports scheduling delivery at a specific time and date, as well as having visibility and tracking of the order in real time. The company says it is the first concrete sales channel in Mexico with 'express' service and full coverage.



World: 7% CAGR for ready-mix to 2029

The global ready-mix concrete market is expected to show a positive outlook over the 10 years to 2029, according to a new report from Persistence Market Research (PMR). The increase will be due to rising demand from infrastructure, as well as residential projects across various geographies.

India and China, as well as other south east Asian nations, are expected to witness substantial growth throughout the forecast years, supported by various governmental initiatives towards development. By contrast the ready-mix concrete market in North America is expected to witness a below-average growth rate over the same period.

US: Hawaii DoT to use CO₂-rich concrete

H awaii's Department of Transportation (DoT) plans to use CO_2 -injected concrete for new projects, including a new structure to protect a highway tunnel from rockfalls. The DoT tested CO_2 -injected concrete on an access road project with CarbonCure Technologies in May 2019.

The latest decision follows a resolution by state legislators that city administrators 'consider' using CO_2 -injected concrete in city and county infrastructure in which concrete is used.

Germany: New Holcim RMC plant

olcim Deutschland has opened a new 110,000Mm³/yr ready-mixed concrete (RMC) plant at Weil am Rhein in Baden-Württemberg. The unit was built over a nine month period at a cost of around Euro4m. The plant will be managed by Lars Essert.

UK: London Concrete blocked by Extinction Rebellion

Climate change protestors from the Extinction Rebellion group have been arrested for blockading a ready-mixed concrete plant operated by London Concrete at Bow, London in mid July 2019. Concrete from the plant is being used to supply a major road tunnel project at Silvertown beneath the River Thames.

The group blamed concrete production for being a major source of CO_2 emissions and also has concerns about dust pollution. Seven people were arrested by the Metropolitan Police for aggravated trespass. London Concrete is part of LafargeHolcim Group and operates 12 concrete plants across Greater London.





Ivory Coast: Intercem Engineering unloading system commissioned for CIMAF

The expansion of the existing ship unloading system for the CIMAF cement grinding plant in San Pedro, Ivory Coast (right), has been completed. The project started in May 2018, with commissioning completed by Intercem Engineering in April 2019.

The EPC-based contract included a 3D scan of the existing system to ensure reliable planning, as well as engineering, foundation works, supply of components for belt conveyors (including three feed hoppers and two belt conveyor systems with truck loading hopper), installation and commissioning.



US: Major contract for Humboldt Wedag, Inc.

Humboldt Wedag, Inc., a US subsidiary of Germany's KHD, has signed a contract with Lehigh Cement in relation to the upgrade of the Mitchell cement plant in Indiana. The EP contract with an order volume of more than Euro100m includes engineering, supply of equipment and structural steel, as well as advisory services related to erection and commissioning of the cement plant.

UK: Alternative fuels projects

Fairport Engineering is working on an alternative fuels storage and feed system for Cemex's Rugby cement plant. The project underwent feasibility studies in 2018 and 2019 and is now seeking planning permission and final capital sanction.

Meanwhile, Tarmac has ordered a solid recovered fuel (SRF) handling system from Saxlund International to increase the capability to utilise alternative fuels at its Dunbar integrated cement plant in Scotland. The SRF system will be installed in the second half of 2019. It is designed for the reception of trucks and storage of fuel in two bunkers. The new system includes processing of fuel to remove ferrous and oversize particles before weighing and dosing into a pneumatic conveying system for kiln injection. The Dunbar plant will use SRF supplied by Hamilton - Solid Recovered Fuel.

Sri Lanka: Gebr. Pfeiffer order for Lanwa Sanstha Cement

anwa Sanstha Cement has ordered two MVR 5000 C-4 type roller mills from Germany's Gebr. Pfeiffer. The vertical roller mills will be used for the production of various cement types based on clinker, gypsum, granulated blast-furnace slag and fly ash. The end customer is part of Onyx Group, which mainly operates in Sri Lanka and the UAE. The contract was signed in February 2019. No value for the order has been disclosed.

UK: Precia Molen weighbridge

Quinn Industrial Holdings has installed an automated weighbridge system supplied by Precia Molen at its limestone quarry at Crievehill near Fivemiletown in County Tyrone, Northern Ireland. The new weighbridge was completed in June 2019. It includes the company's VS310CS pour-onsite surface weighbridge, complete with driver-operated control systems.





UK: New SHIELD Lite SPS from Hycontrol

Silo protection system producer Hycontrol has launched the SHIELD Lite SPS system (left), which protects powder storage silos from the dangers caused by excessive pressure during tanker deliveries. The launch comes two years after the SHIELD SPS. The Lite version comprises a new, compact panel for simple operation and easy understanding. It gives users new monitoring and diagnostic tools that indicate when the system is suffering from blocked filters or non-compliant practices by delivery staff.

Contents

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Mediterranean: UK firms in new SRF contract

Andusia has formed a partnership with Mid-UK Recycling to export over 20,000t/yr of solid-recovered fuel (SRF) to two unnamed cement plants in the Mediterranean region. Mid-UK Recycling is part of Beauparc Group. It incorporates Panda and Greenstar in Ireland and Mid-UK Recycling, WSR, Scotwaste and AWM in the UK. The group produces over 0.5Mt/yr of SRF.

"We have been assisting Mid-UK Recycling with their RDF offtake in recent years and are delighted to now be able to take their SRF as an alternative fuel," said Stewart Brackenbury, director and founder of Andusia.



UK/Ireland: Geminor and MSC SRF and RDF contract

Geminor says it has been engaged in a partnership with MSC transporting refuse-derived fuel (RDF) and solid-recovered fuel (SRF) from the UK and Ireland since February 2019. The first shipments were transported from Barking and Nottingham, UK to Aalborg, Denmark. This will be followed up by container shipments from Birmingham, UK to Habberstad, Sweden and from Dublin, Ireland to Greece. The shipments are based on so-called 'backload,' where empty containers are used to reduce the price.

Italy: Alpacem buys Trieste terminal from Italcementi

A ustria's Alpacem purchased a terminal and bagging plant at Trieste in Italy from Italcementi in April 2019 for an undisclosed sum. The unit will be run by the company's Slovenian Salonit Anhovo subsidiary with support from its Italian subsidiary W&P Cementi. Cement processed at the terminal will be delivered from the Salonit Anhovo integrated plant in Slovenia for sale in Slovenia, Italy and Croatia.

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53

Switzerland: LafargeHolcim boosted after Asian divestments

afargeHolcim's divestments in Southeast Asia have coincided with a positive first half to 2019 for the group. Its net sales rose by 3.5% year-on-year on a like-for-like basis to Euro12bn in the first half of 2019 from Euro11.8bn in the same period in 2018. Its recurring earnings before interest, taxation, depreciation and amortisation (EBITDA) rose by 7.2% in real-terms to Euro2.41bn from Euro2.25bn. Its cement sales volumes rose slightly by 0.7% on a like-for-like basis to 104Mt and sales of ready-mixed concrete decreased by 2% to 23.6Mm³.

"We have achieved a strong first half of the year and successfully continued our profitable growth strategy. All business segments have contributed to this success and to the continued over-proportional growth in profitability," said CEO Jan Jenisch. LafargeHolcim attributed the growth to 'successful' pricing and growing cement volumes.

Italy: Buzzi buzzing in first half of 2019

Buzzi Unicem sales revenue grew by 13.6% year-onyear to Euro1.52bn in the first half of 2019 from Euro1.34bn in the same period in 2019. Its net profit rose by 9.8% to Euro135m from Euro123m. Its cement sales volumes increased by 7.1% to 13.9Mt from 12.9Mt but ready-mixed concrete sales fell slightly to 5.8Mm³.

The building materials producer said that 'lively' activity levels in the US had driven its sales so far in 2019. This was mainly caused by falling imports in the face of weak domestic demand and 'considerable production

Germany: HeidelbergCement results hit by non-recurring effects

HeidelbergCement's profit fell in the first half of 2019 due to non-recurring effects related to the divestment of its assets in Ukraine. Its profit fell by 33% year-on-year to Euro291m in the first half of 2019 from Euro435m in the same period in 2018. Its revenue rose by 9% to Euro9.21bn from Euro8.43bn. Cement sales fell slightly to 61Mt but ready-mixed concrete sales volumes grew by 6% to 24.4Mm³. Its profit fell by 33% to Euro435m.

"Market dynamics weakened slightly in the second quarter in comparison with the first quarter," said Bernd Scheifele, chairman of the managing board of HeidelbergCement. "Nevertheless, we were able to improve our result in the second quarter because of our strong global positioning. Good margins in Asia, as well as Western and Southern Europe, more than compensated for the weaker business due to adverse weather conditions in North America and the Africa-Eastern Mediterranean Basin Group area."



and logistical difficulties' in June 2019 caused by flooding of the Mississippi river. A slight recovery in Italy was also noted, with growing cement sales volumes and strengthening prices. Elsewhere, growth was recorded

> in most territories apart from Luxembourg, Czechia and Slovakia.

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Italy: Cementir volumes fall

ementir Holding has blamed poor performance in Turkey for falling cement sales volumes, although it said that positive trends in Scandinavia, the Baltics and Belgium had partly compensated for this. Its sales volumes of grey and white cement fell by 12.2% year-onyear to 4.32Mt in the first half of 2019 from 4.92Mt in the same period in 2018. Ready-mixed concrete sales dropped by 21.3% to 2Mm3 from 2.54Mm3. Its revenue rose slightly by 0.6% to Euro592m from Euro589m. Its earnings before interest, taxation, depreciation and amortisation (EBITDA) grew by 14.7% to Euro110m from Euro96m.

NEWS: EUROPE

Greece: Titan turnover rises

Titan Group's turnover rose by 10% to Euro785m in the first half of 2019 from Euro713m in the same period of 2018. The building materials producer attributed this to improving markets in Greece and Southeastern Europe, as well as continued 'strong' performance in the US.

Its earnings before interest, taxation, depreciation and amortisation (EBITDA) remained stable at Euro122m but its net profit fell by 46% to Euro13.3m from Euro24.8m. In its Eastern Mediterranean region the group described market conditions as 'challenging,' with falling demand in Egypt and Turkey. In Brazil it said that cement sales volumes were stable but that revenue had risen due to an improving market.



France: Vicat rises on Ciplan deal

Vicat's sales rose by 4.6% year-on-year to Euro1.34bn in the first half of 2019 from Euro1.28bn in the same period in 2018. This was mainly due to its acquisition of Brazil's Ciplan in late 2018. At constant scope and exchange rates its sales fell by 0.6% due to poor markets in Turkey, Switzerland, India and West Africa. Its earnings before interest and tax fell by 9.4% to Euro97m from Euro107m. Cement sales volumes dropped by 4.9% to 10.8Mt from 11.4Mt and concrete volumes decreased by 6.7% to 4.3Mm³ from 4.57Mm³.

UK: Breedon revenue up by 18%

Breedon Group's revenue grew by 18% year-on-year to Euro502m in the first half of 2019 from Euro424m in the same period in 2018. Its earnings before interest, taxation, depreciation and amortisation (EBITDA) rose by 22.3% to Euro90.9m. Cement sales volumes increased by 11% to 1.0Mt and ready-mixed concrete sales fell by 6% to 1.5Mm³. With HARDTOP Wear Castings you always hit the nail on the head!

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Belgium: LEILAC plant fired up

The Australian technology company Calix says the Low Emissions Intensity Lime and Cement (LEILAC) consortium has successfully demonstrated CO₂ separation with more than 95% purity at its pilot unit at HeidelbergCement's cement plant in Lixhe. Calix reported that preliminary test runs have been completed on the pilot. The technology concept has been shown to work on both lime and cement meal, with calcination near to target levels and high purity CO₂ successfully separated at the top of the reactor, although not yet at full design capacity.

It added that it was still working on fixing commissioning issues. Testing will run until the end of 2020 to assess the risk of potential longer-term issues such as tube health and process robustness. In parallel,



Right: An overview of the CBR cement plant at Lixhe. Source: HeidelbergCement.

planning has commenced on the next scale-up of the technology, including conceptual design and engagement with funding partners.

Spain: Consumption falls....again

Cement consumption has fallen in June 2019 following slowing rates in April and May 2019. Data from the Spanish cement association Oficemen indicates that consumption in June 2019 fell by 2.9% year-on-year to 1.21Mt. Oficemen President Jesus Ortiz attributed the slowdown to slow update of government infrastructure projects.

Spain: Manufacturers lobby for more infrastructure projects

The Association of Cement Manufacturers of Andalusia (AFCA) has lobbied the Regional Government of Andalusia to invest more in infrastructure projects. At a meeting the cement producers asked the local government to support the sector, according to Europa Press. The region's consumption of cement grew by 8.5% year-on-year to 2.5Mt in 2018 but it is still at a historically low level. Exports fell by 30% to 1.6Mt in 2018 due to rising costs associated with the EU Emissions Trading Scheme and high local electricity costs.

Spain: New Malaga clinker conveyor

FYM-HeidelbergCement has launched a new clinker conveyor at the Port of Malaga. The new Euro2.5m project started by loading 4800t of clinker onto a ship bound for Ireland. The conveyor will continue to be tested in August 2019 with 30,000dwt and 40,000dwt vessels. The enclosed conveyor has a load capacity of 650t/hr. The project also included setting up two storage areas in the Pescadería area of the city.



Italy: Giampiero Pesenti dies

The former chairman of Italcementi, Giampiero Pesenti (above), has died at the age of 88. The grandson of one of the brothers who created the company in 1906, he took a degree in mechanical engineering from the Polytechnic University of Milan and then started working for Italcementi in 1958. He became chief operating officer and chief executive officer (CEO) before becoming its chairman. He was known informally at Italcementi as 'Engineer Giampiero.' Notably, the Italian cement producer purchased Ciments Francais in 1992, under his leadership, greatly increasing its size. Italcementi was purchased by Germany's HeidelbergCement in 2016.





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GLOBAL CEMENT NEWS: EUROPE

Germany: Strong sustainability report for HeidelbergCement

H eidelbergCement's specific CO_2 net emissions per tonne of cementitious material fell by 1.4% year-on-year to 599kg CO_2/t in 2018 from 608kg CO_2/t in 2017. Despite this its absolute gross CO_2 emissions increased by 3% to 76.7Mt from 74.2Mt as clinker, cement, aggregate and concrete sales volumes all grew in 2018. The group has published the data in its Sustainability Report for the 2018 financial year.

The company has set itself the target of a 30% reduction in its specific net CO_2 emissions per tonne of cement by 2030, compared with 1990. HeidelbergCement says it intends to realise its vision of CO_2 -neutral concrete by 2050 at the latest.



UK: Leese to leave Cemex

Chris Leese has decided to leave Cemex UK after 30 years with the company. His varied career at Cemex saw him take responsibility for a broad range of activities, notably as Vice President of Readymix and more latterly as Vice President of Aggregates.

Leese has been a long-standing champion of health and safety improvements, taking a lead role at Cemex and the broader industry. He was the chair of the MPA Health and Safety committee for over nine years.

Other figures of note in the report include an alternative fuels substitution rate of 21.7% in 2018 compared in 20.8% in 2017. NO_x, SO_x and particulate matter emissions all fell. However, total water withdrawal rose by 8% to 65.4Mm³ from 60.4Mm³, although water consumption fell.

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EU Carbon outlook: All about the Market Stability Reserve

Energy Aspects' Trevor Sikorski looks at recent and future trends in the EU ETS market and where things are headed...



Above: Trevor Sikorski presenting at the 2nd *Global FutureCem Conference* in Brussels earlier in 2019. The 2018 'super bull run' seen in EU ETS Allowance (EUA) prices, that saw prices rise from Euro8/t to Euro25/t over the course of 2018 was all in anticipation of the tighter market fundamentals that were expected to persist, starting in 2019. The experience of 2019 has been less extreme, with EUA prices showing high levels of its characteristic volatility but the market has not really priced down, going through the first half of 2019 with an average price of some Euro23.85/t. While less spectacular in terms of price movement, it does point to a market that has established itself at a higher pricing point, reflecting a fundamental change in market expectations.

All about the Market Stability Reserve

The expected tightness in the EUA market comes from the start of the much-anticipated Market Stability Reserve (MSR) in 2019. The MSR is a new aspect of the EU ETS that aims to reduce the spare volume of EUAs in circulation, which was formally agreed back in 2016. It then saw one of its key parameters revised again in the Phase 4 package of 2017. The mechanics of the MSR are that the European Commission assesses how much surplus carbon is in circulation once a year afer the annual compliance cycle. That spare total level of EUAs in circulation (TNAC) is calculated as the aggregate of total supply (free allocation, auctioned volumes, offsets submitted) in the market since 2008 compared to the aggregate level of verified emissions since 2008.

30 20 10 0 2016 | 2017 | 2018 | 2019 If that TNAC is above an upper threshold set at just over 800Mt, then the EC will reduce the allowed level of auctions in the following year by a proportion of that volume, set at 24% in the first five years and then 12% in subsequent years. If the level of TNAC is below a lower threshold of 400Mt, then the Commission will add back 100Mt into the next year's auctions.

The first two determinations of the TNAC came in around the 1.6Gt level, which means that for both 2019 and 2020, the annual volume of allowed auction volumes will be reduced by around 400Mt/yr. Subsequent years will see less in the way of annual reductions to the auction pot as the TNAC begins to reduce, and this will be reducing the level of supply buffer the market has to deal with shocks. It is this tightening that is driving a bullish view of EUA prices.

2019 less of a bull as Brexit looms

Still, the first half of 2019 has seen the upward price trend become muted. However, daily volatility is still high. While the EUA market has shifted to a higher trading range (Euro21-27/t) than characterised most of the fourth quarter of 2018 (Euro17-22/t), it has yet to establish a strong upward trend. Some of the reluctance to surge like 2018 can be put down to a number of less supportive developments that are helping to moderate the market's outright bullish call.



Right - Figure 1: EUA prices, Euro/t. Source: Reuters, Energy Aspects.

Far right - Figure 2: EUA price daily ranges 2019, Euro/t. Source: Reuters, Energy Aspects.





One of these developments was Poland's decision to sell 55.8Mt of additional EUAs in its auctions in 2019, EUAs that have not been allocated to its power sector under the power sector derogation rules. This figure is likely to be repeated in 2020 and could even be higher. Norway's decision to auction 46.8Mt of EUAs in 2019-2020, which is its auction quota from 2013–2018, adds further supply to the balance over the next two years.

However, the big potential downside comes from Brexit, with the fate of UK installations no clearer now than on the day Article 50 was triggered. All that is clear is that the Brexit process is still a mess and the UK has no consensus on what it wants, either at the political or the popular level. Brexit will play out over the coming months, and as long as the option of a no-deal Brexit is on the table, the EU ETS will have a potential bearish episode hanging over it. The downside expected to come from Brexit comes from the UK government position that, under a no-deal exit, UK installations would immediately exit the EU ETS and not have compliance obligations for 2019. As such, the UK power sector that has been hedging future carbon emissions exposure will now have surplus EUAs to sell, as will UK industry. While that is bearish, more bearish is the reduction in emissions expected to come from the economic disruption caused by a no-deal Brexit to the EU economy. Further bearish pressure will also come as no-deal Brexit is a risk-off event for Europe and all European asset classes will be sold off. That would include EUAs. All in all, we expect an abrupt fall in EUA prices in the event of a no-deal Brexit. With so much Brexit risk around the high volume of speculative capital heading to EUAs, such as we saw in 2018, has simply not materialised so far in 2019.

Compliance needs less supportive in 2019

Adding into the less supportive developments in 2019 have been the increasingly relaxed balances in the European gas market, stemming largely from a significant rise in LNG supply. With the gas market easing, it has priced down in relative terms, going to the levels almost where a gas-fired plant with no efficiency advantage over a coal-fired plant gets into

merit. At these price levels, all of the short-term emissions abatement we expect to see from gas-fired power generators running at higher utilisation to replace coal-fired generation should happen over the second and third quarters of 2019. With prices at this low level set to persist all summer, the bulk of the available European coal-to-gas switch is going to be delivered regardless of the CO_2 price. For the entirety of 2019, this is likely to cut EU power sector emissions by 40-50Mt year-on-year, which would follow the 60Mt year-on-year drop in EU ETS emissions recorded in 2018. These two years alone could potentially reduce the compliance need for EUAs by the power sector by 100Mt.

The lower compliance need of EU power will also cut the demand for EUAs for future hedges as well. As a rule of thumb, we tend to expect EU power utilities to hold about 2.0x to 2.5x their annual compliance demand as hedges for the future. As compliance demand falls, so will the future demand for EUAs that the market experiences today. As such, there is less price support coming from the power sector.

While power has not been very supportive, neither has been industrial demand. European industrial output has been producing low readings over 2019 so far, with overall EU industrial production (IP) only coming in some 0.3 percentage points higher over the first four months of 2019 (the latest data available). IP for some of the more energy-intensive EU ETS sectors was down far more, with refining 2.0 percentage points lower year-on-year and metals down by 1.0 percentage point year-on-year. IP numbers have been getting lower as we go through the year with the markets in a slowdown, with European markets starting to catch a chill from the fall-out of the China-US trade war. The low level of EU Industrial Production and the high price of EUA means that we think that the industrial sector will see its emissions drop by around 6.5Mt year-on-year in 2019.

German coal commission: Another bearish announcement

The German coal commission's recommendations on the timing of Germany's exit from coal-fired generation in late January 2019 was another bearish

GLOBAL CEMENT: EMISSIONS





Far right - Figure 6: EUA prices and forecasts, Euro/t. Source: Reuters, Energy Aspects.

Actuals and forecasts
Forward curve





factor. The headline numbers were that 12.5GW of coal-fired capacity (5GW of lignite and 7.5GW of hard coal) should be closed by 2022. This was underlyingly bearish, as lignite is otherwise hard to shift out of the merit order and closure would mean the removal of highly carbon-intensive baseload capacity. How bearish it will be depends on how Article 12.4 of the EU ETS Directive, which allows member states to voluntary cancel allowances from their auction pots if they have other policies that reduce power sector emissions, is interpreted. The coal commission recommended cancellation, but it is really up to the German government to determine how many EUAs to cancel (a maximum is specified) and for how long (not specified) and the market has no clarity on that yet.

Free allocation - Lower in Phase 4

Free allocation to industrial sectors is changing in Phase 4, although the biggest impacts will come from the overall reductions in the cap that will be increasing compliance burdens. The changes to free allocation that happened as part of the Phase 4 legislative package include an additional distinction between high and low exposure to international competition, although almost all sectors still fall into the high exposure category that will still get 100% of the efficiency benchmark.

The 54 benchmark values that determine the level of free allocation will be updated twice during Phase 4, once for 2021 and once for 2026, which will reflect the latest increases in plant efficiency, thereby reducing the free allocation level associated with that benchmark. An annual reduction rate will be determined for each benchmark that will vary between a minimum annual rate of 0.2% and 1.6%, depending on the speed of uptake of innovation in that sector. In addition, allocations to individual installations are to be adjusted annually for either increases or decreases in production that are at least of a 15% magnitude assessed on the basis of a rolling average of two years. As such, free allocation could be adjusted downwards much more quickly than in Phase 3.

One thing that could help ease the reductions in free allocation is the rules to help avoid the applica-

tion of a cross-sectoral correction factor (CSCF) that sees a free allocation buffer being created that will have 3% of the total quantity of allowances in the phase. Before the CSCF is applied, the buffer will be deployed by reducing the share of allowances to be auctioned over Phase 4. Lastly, free allocation to combined heat and power (CHP) will be limited to either high-efficiency co-generation or to those CHP where the resulting heat is used in district heating. As such, the total free allocation to industrial CHP will be lower in Phase 4 than it has been over most of Phase 3.

Increasing price, increasing industry exposure

Despite the litany of not very supportive factors for 2019, the EUA market has held its levels. While 2020 could have some similar factors to 2019, including weak gas markets and a slow global economy, Brexit may not figure as highly and the MSR will take another 400Mt out of supply. So, the market will be tightening as the spare levels of EUAs shrink and this will begin to push the EUA market to a point where it will need to start to encourage short-term reductions. With power and industrial participants wanting to also hold EUAs to cover future exposures, the market will tighten to the point where it needs short-term abatement well before it gets to the point where it has no additional surplus. At current hedging numbers, that could happen when the TNAC starts to approach the 800Mt threshold. That could happen as early as 2022. As such, prices would start to be pushed upwards again from where we are now, and that will increase compliance burdens.

For the industrial sector, even in an industry that is highly exposed to international competition, like cement production, the combination of an increase in EUA prices and decreases in the level of free allocation, even at the margin, has fairly big monetary implications. For an industrial installation with annual emissions of 25,000t, and a 15% shortfall in free allocation under current free allocation levels, a 2017 compliance spend of around Euro22,000 in 2017 could balloon to around Euro200,000 in 2021.



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Preview: 15th International Congress on the Chemistry of Cement, Prague, Czechia

The quadrennial *International Congress on the Chemistry of Cement* (ICCC) comes to the Prague Congress Centre on 16-20 September 2019. ICCC 2019 is the leading global academic event for state-of-the-art cement chemistry as well as major trends in cement application. Around 1000 participants from more than 100 countries attended ICCC 2015 in Beijing, China and the organisers anticipate similar attendance in 2019. *Global Cement* lists the keynote presentations...

Opening speech

Progress of cement chemistry: The last hundred years and next *Fred Glasser, University of Aberdeen, UK*

Process technology and clinker chemistry

The cement industry on the way to a low carbon industry Martin Schneider, ECRA / VDZ, Germany

Alternative fuels to clinker properties Anjan Chatterjee, Conmat Technologies, India

Hydration, structure and thermodynamics of Portland cements

Overview *Karen Scrivener, EPFL, Switzerland*

Thermodynamics *Barbara Lothenbach, EMPA, Switzerland*

Microstructure and its characterisation Paulo Monteiro, UC Berkeley, USA

Supplementary cementitious materials

Overview Maria Juenger, University of Texas at Austin, USA





Characterisation of SCM reactions Jørgen Skibsted, Aarhus University, Denmark

Fly ashes and granulated blast furnace slag *Zbigniew Giergiczny, Silesian University of Technology, Poland*

Other binders and their application

Overview *Caijun Shi, Henan University, China & John Provis, University of Sheffield, UK*

Hybrid cements Angel Palomo, Spanish National Research Council, Spain

Yeelimite-belite binders Mohsen Ben Haha, HeidelbergCement, Germany

5. Chemical admixtures and fresh concrete (Fresh and hardened concrete)

Overview *Liu Jiaping, Southeast University, China*

Right: Professor Fred Glasser will open proceedings in Prague. He is shown here presenting at the 13th ICCC meeting in Madrid, Spain in 2011.

Opposite page: ICCC 2019 will once again feature a series of busy poster sessions.

Right: The event will cover all aspects of cement and concrete chemistry.





 Rheological properties of ultra-high-performance concrete

 Kamal Khayat, Missouri University of

 Science & Technology, USA

Concrete in 3D printing *Robert Flatt, ETH Zürich, Switzerland*

Early age concrete properties Ippei Maruyama, Nagoya University, Japan

Rheology and modelling *Nicolas Roussel, IFSTTAR, France*

6. Concrete durability

Overview Mike Thomas, University of New Brunswick, Canada

Modelling and service life prediction *Mark Alexander, University of Cape Town, South Africa*

Cracking and chloride migration *Kefei Li, Tsinghua University, China*

Concrete as a sink of CO₂ *Ronny Andersson, Cementa AB, Sweden*

Durability of concrete in infrastructure Jason Weiss, Oregon State University, USA

7. Testing methods – Standardisation and new approaches

Cement standardisation *Doug Hooton, University of Toronto, Canada*

Concrete performance in concrete standards Vanderley John, University of São Paulo, Brazil

63



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Mexico: US weighs on Cemex and GCC performances during first half of 2019

Cemex's sales have fallen in all regions except for Europe. Its net sales fell by 4% year-on-year to US\$6.72bn in the first half of 2019 from US\$7bn in the same period in 2018. Its operating earnings before interest, taxation, depreciation and amortisation (EBITDA) dropped by 11% to US\$1.21bn from US\$1.36bn. Cement sales volumes decreased by 9% to 31.3Mt and ready-mixed concrete volumes by 3% to 24.9Mm³.

"The second quarter was impacted by the challenging global economic environment. Weakerthan-expected industrial activity and continued trade conflicts have resulted in lower investment in several of our markets," said Cemex's CEO Fernando A Gonzalez. "Mexico in particular has been affected by these factors, which led to lower-than-expected volumes. Adverse weather in the US also translated into muted activity during the quarter. In contrast, we are very pleased with the favourable performance of our Europe region. Gonzalez added that earnings were expected to pick up in the second half of 2019 due to improved government spending in Mexico, higher prices and sales volumes of cement in the US and Europe, stabilising energy prices and the group's 'Stronger Cemex' plan.

GCC's results for the first half of 2019 were also negatively affected by poor weather in the US. Its net sales grew slightly by 1.3% to US\$404m from US\$399m in the same period in 2018. Sales fell in the US but they rose in Mexico. Its earnings before interest, taxation, depreciation and amortisation (EBITDA) fell by 5% to US\$109m from US\$115m.



"While GCC's US operations continued to be adversely impacted during the second quarter by an above average precipitation, below-average temperatures and construction labour shortages, the substantial backlog at our US operations underscores strong demand for our products. We've begun to reap the benefits early in the third quarter, as the US weather has finally cleared," said GCC's CEO. He added that the group had 'successfully leveraged' its new Trident plant in Montana and improved production levels at its Rapid City plant in South Dakota following a stabilisation process. Oil well cement shipments from its Chihuahua Plant to a new terminal at Fort Stockton in Texas have also begun.

Bolivia: ECEBOL plant inaugurated

Empresa Publica Productiva Cementos de Bolivia's (ECEBOL) new integrated cement plant at Caracollo in Oruro has been inaugurated. President Evo Morales attended the event for the 1.3Mt/yr plant, according to the Correo del Sur newspaper. The project had an investment of US\$306m and it was built by a consortium of Sacyr, Imasa and Polysius.

Peru: Pacasmayo sales rise 5%

Cementos Pacasmayo's sales grew by 5.3% year-on-year to US\$193m in the first half of 2019 from US\$183m in the same period in 2018. Its consolidated earnings before interest, taxation, depreciation and amortisation (EBITDA) increased by 5% to US\$57.1m from US\$54.5m. Cement production at its three plants rose by 10.6% to 1.2Mt from 1.1Mt. The cement producer attributed the growth in sales to higher sales in the public sector, El Niño reconstruction and a revival of infrastructure projects.

US: Request to delay Alaska terminal

Companies comprising the informal Port of Alaska Users Group at Anchorage have requested that the local government delay plans for a US\$220m petroleum and cement import terminal. The group, which comprises eight companies, including cement distributor Alaska Basic Industries, are concerned that the project will incur tariffs that could damage their businesses.

Costs for the proposed marine terminal have become uncertain due to damage caused to the site by an earthquake in late 2018.



Above: Anchorage, Alaska during winter.



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Canada: Lafarge launches first phase of CO₂MENT capture project

afarge Canada has launched the first phase of its CO_2MENT project. The objective is to build a fullcycle solution to capture and reuse CO_2 from a cement plant. The project is a partnership between Lafarge Canada, Inventys and Total.

"LafargeHolcim is committed to reducing CO₂ emissions and we are excited to join forces with Inventys and Total through Project CO₂MENT. We hope to discover ways to capture emissions from our production processes and reuse them in our products, advancing a circular economy even further than today. The recent launch of the new lower carbon fuel (LCF) system at our Richmond plant aims to make the facility the most carbon efficient cement plant in Canada," said René Thibault, Region Head North America for LafargeHolcim.

Over the next four years, Project CO₂MENT will demonstrate and evaluate Inventys' CO₂ Capture System and a selection of LafargeHolcim's carbon utilisation technologies at its Richmond cement plant in British Columbia (right). The project has three phases and is expected to be fully operational by the end of 2020. Subject to the pilot's success, the vision is to scale up the project and explore how the facility can be replicated across other LafargeHolcim plants.

US: Summit hits a plateau

Summit Materials' revenue rose by 3% year-on-year to US\$739m in the first half of 2019 from US\$717m in the same period in 2018. Its adjusted earnings before interest, taxation, deprecation and amortisation (EBITDA) grew by 4% to US\$147m from US\$141m. Cement sales volumes increased by 2% to 1Mt from 0.97Mt. Tom Hill, the CEO of Summit Materials, noted that flooding on the Mississippi River had presented 'significant' challenges for its cement business during the second quarter of 2019.

Summit Materials is active in the aggregates, asphalt and concrete sectors. It owns Continental Cement, a cement producer that runs two integrated cement plants at Hannibal, Missouri and Davenport, Iowa.



During the first phase the partners will work on purifying the cement flue gas in preparation for CO_2 capture. The second phase will focus on the separation of CO_2 from flue gas using a customised-for-cement version of Inventys' carbon capture technology at pilot scale. As part of the final phase, the captured CO_2 will be prepared for reuse and support the economical assessment and demonstration of CO_2 conversion technologies onsite, such as CO_2 injected concrete and fly ash.



Canada: McInnis refinancing deal

McInnis has closed a US\$380m refinancing deal. US\$230m will be provided by an increase in McInnis' senior loan from a syndicate of 11 Canadian and international banks and the remaining US\$150m comes in the form of a loan by the Caisse de dépôt et placement du Québec (CDPQ) and Beaudier. This refinancing also makes it possible to repay a bridge loan granted by BlackRock in 2016.

The cement producer also provided details on various projects it is undertaking. Two new cement silos will be built at the company's integrated cement plant at Port-Daniel–Gascons (below left). Nearly 200 workers will be mobilised on the site during the peak construction period of the two silos, during the third and fourth quarters of 2019.

Its Bronx Terminal in New York, US has doubled its loading capacity for customers. A second truck-loading lane is now fully operational. A new 40,000t warehouse is currently under construction at its Providence Terminal in Rhode Island, US bringing the total storage capacity to 75,000t. A new truck-loading lane will also be added and commissioned in time for the 2020 spring construction season. McInnis has also confirmed the charter of the NACC New Yorker, a 24,000t self-unloading vessel, in conjunction with Nova Marina Carriers. It will join other vessels in its fleet including the NACC Quebec (14,000t), the Cielo di Gaspesie (35,000t) and the Resolute unloading barge.

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GLOBAL CEMENT NEWS: THE AMERICAS

US: PCA changes executive team

The Portland Cement Association (PCA) has made appointments to its executive teams in Government Affairs, Communications and Finance.

Sean O'Neill has been appointed as the Senior Vice President of Government Affairs. He joins the PCA from the Associated General Contractors of America as Vice President of Congressional Relations/Infrastructure Advancement. Previously he served as Director of Government Affairs at the International Association of Fire Fighters, Special Assistant to Secretary Elaine Chao and Chief of Staff for Congressman John Sweeney.

Nick Ferrari has been appointed Senior Vice President of Communications and Media Relations. He was previously Director of Publishing and Content Development at the American Society of Mechanical Engineers. He was also the chief executive officer (CEO) of Erdos and Morgan, a marketing and media research company and Executive Vice President at American Business



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Media. He has also held senior positions at Crain Communications.

Debra Adlis has been appointed as the chief financial officer (CFO). She will serve as treasurer and CFO for PCA, while also serving as Executive Vice President of Finance for the National Ready Mix Concrete Association. Adlis has led non-profit finance teams at the National Foundation for Credit Counseling, the Immune Deficiency Foundation and the Baltimore Symphony Orchestra. Previous to those roles Adlis worked with the National Hospice and Palliative Care Organization and the National Association of Real Estate Investment Trusts.

Argentina: Holcim to use 35% wind power in 2020

In olcim Argentina has signed a deal with YPF Luz for the supply of wind power to its cement plants. The supply agreement is planned for the start of 2020. It is intended to provide 35% of the company's energy requirements by the end of the first half. YPF Luz will provide electricity from its Los Teros Wind Farm at Azul in Buenos Aires province. The contracted supply is for 142GWh from a 30MW installed base.



Argentina: Exports 'not competitive'

Sergio Faifman, the chief executive officer (CEO) of Loma Negra has said that his company does not export cement because Argentina is 'not competitive.' He cited logistical issues with transport of clinker and cement to ports, in an interview with the Ámbito Financiero newspaper. He also noted that the costs per tonne of cement in Brazil and Egypt were 30% and 50% respectively cheaper than in Argentina, in part due to depreciation of the local currency in 2018.

Colombia: Cemex denies corruption

Cemex Latam Holdings has denied that it has an office dedicated to illegal activity following accusations of bribery in the local media. In a statement to the Superintendencia Financiera de Colombia, the company said that its Enterprise Risk Management office "supports the decision-making process by anticipating and coordinating risk management that could make it difficult for Cemex to reach its strategic objectives and identify short, medium and long-term opportunities." It added that risk management was an institutional process followed by companies around the world to anticipate and mitigate potential business hazards.

Cemex Colombia has been linked by Semana magazine and other outlets to payments to political figures in return for preferential treatment on construction contracts. The cement producer has also faced a long running investigation by local and US agencies into unusual payments relating to its Maceo cement plant project in Antioquia.

Argentina: Sales down

Cement sales fell by 6.4% year-onyear to 5.51Mt in the first half of 2019 from 5.89Mt in the same period of 2018, according to data from AFCP, the local cement association.

The trend was driven by a fall in local sales. Local sales fell by 6.6% to 5.46Mt but exports rose by 28% to nearly 50,000t.

Argentina: Barker to stay open with reduced hours

oma Negra has signed an agreement with the Asociación Obrera Minera Argentina (AOMA) union and the government to keep its Barker cement plant open after three months of negotiations. The cement producer wanted to reduce the number of shifts

> at the grinding plant. It previously said it had started to close the plant in early-June 2019 but the plant will now continue to operate with 160 staff on reduced shifts, along with other concessions.

US: Mississippi Lime buys Southern Lime

Mississippi Lime has completed its acquisition of Southern Lime, the lime business of Covia based in Calera, Alabama.

The purchase increases Mississippi Lime's production facilities to nine locations, supported by a network of distribution sites throughout the country. The Southern Lime business and its Calera plant will be fully integrated into Mississippi Lime. No value for the transaction was disclosed.



GLOBAL CEMENT NEWS: THE AMERICAS

Peru: UNACEM holds steady

US\$296m in the first half of 2019 from US\$292m in the same period in 2018. Its profit grew by 20.5% to US\$74.3m from US\$61.7m. Cement production increased by 8.5% to 2.62Mt from 2.42Mt. The cement producer also said that clinker exports from its Conchán pier fell by 22% to 0.45Mt from 0.58Mt.

Mexico: Burner upgrade

A ustria's Unitherm Cemcon has been awarded the supply of a MAS DT burner to an unnamed cement plant in Mexico. The burner is designed for coal, natural gas and liquid secondary fuel operation. To optimise the maintenance work, the burner is equipped with a divisible jacket tube. A satellite burner, with the supplier's adjustment system, will be mounted on top of the main burner to improve solid secondary fuel utilisation.

Jamaica: New palletiser for Caribbean Cement

Caribbean Cement Company (CCC) has commissioned an automatic palletiser at a cost of US\$66,500. It is part of a US\$9m investment on capital projects in 2019. The cement producer is planning to increase its output to 1.2Mt/yr by December 2020 compared to 0.95Mt/yr at present.



Above: CCC's plant in Rockfort, near Kingston, Jamaica. Source: Loesche GmbH.

Peter Edwards, Global Cement Magazine



Cement in Central America and the Caribbean

Global Cement turns its attention to the cement industries of Central America and the Caribbean to coincide with the *36th FICEM Technical Congress* in Punta Cana, Dominican Republic on 2 - 4 September 2019...

This article will predominantly consider the cement industries of seven Central American nations (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama) and nine larger Caribbean countries and territories (Barbados, Cuba, Dominican Republic, Guadeloupe, Haiti, Jamaica, Martinique, Puerto Rico and Trinidad & Tobago), as well as considering selected developments in 18 other nations and territories in the region.

Only 15 of the 34 nations and territories have any cement capacity. They are host to a total capacity of 40.2Mt/yr, 33.1Mt/yr integrated and 7.1Mt/yr grinding. 13 have one or more integrated plants and eight have one or more grinding plants. Seven territories: Dominican Republic, Guatemala, Honduras, Costa Rica, Panama, Puerto Rico and Nicaragua have both integrated and grinding facilities. The total capacity is split 55/45 between the Caribbean islands (22.3Mt/ yr) and continental Central America (17.9Mt/yr).

Cement producers

The region's producers comprise a mixture of 14 local (21.9Mt/yr) and three multinational players (18.3Mt/yr). The main cement producer by installed capacity is, by some distance, Mexico's Cemex. It operates 10.1Mt/yr of capacity across six integrated plants (7.5Mt/yr) and four grinding plants (2.6Mt/ yr), around 25% of the region's capacity. It is present in four countries (Costa Rica, Guatemala, Nicaragua and Panama) under the Cemex name, as well as by Trinidad Cement, in which it has a 69.8% stake, in Trinidad & Tobago, Barbados and Jamaica.

The second-largest cement producer is Swiss multinational LafargeHolcim, which operates 5.5Mt/yr of capacity (13.7% of regional capacity) across three integrated plants (4.4Mt/yr) and three grinding plants (1.1Mt/yr). The third-largest producer by installed capacity is Cementos Progreso, which operates two integrated plants in Guatemala (3.1Mt/yr). A further 14 cement producers are active in Central America and the Caribbean, sharing a total of 16.2Mt/yr of capacity across 24 facilities. The majority of these are small operators based in local markets, with the exception of Colombia-based Cementos Argos.

Central America

Belize

Independent from the UK since 1981, Belize is the only country in continental Central America without a cement industry.



Belize imported US\$13.2m worth of cement in 2018. At a price of US\$100/t, this translates into imports of around 132,000t. Given a population of around 380,000, consumption would be around 350kg/capita/yr. Local press reported that, between 1 January 2017 and 30 June 2017, US\$5.7m-worth of cement was imported from Guatemala alone. This indicates that more than US\$10m-worth of cement (<75% of national imports) are likely to have come from that country over the course of the year. These imports come despite a long-standing territorial dispute between the two countries in which Guatemala claims more than 50% of Belize's southern territory.



Costa Rica

Costa Rica is one of the most economically developed and politically stable countries in Central America. A previous



Right: The Baron Bliss Lighthouse in Belize City, the capital of Belize.



Spanish colony, it gained independence along with the rest of Spain's Central American territories in 1821 following Spain's defeat in its war with Mexico.

Costa Rica has two integrated cement plants, which are both currently co-owned by major international cement producers: LafargeHolcim and Cemex. The LafargeHolcim plant at Cartago retains the Holcim Costa Rica name from prior to the merger of Lafarge and Holcim in 2015. The plant, originally established as Industria Nacional de Cemento SA, (INCSA) in 1964, was upgraded by the local company in 1994, 1999 and 2002 to reach 0.9Mt/yr. Holcim became involved in Costa Rica in the 1990s but took a majority stake in 2003. The plant then underwent a major overhaul in collaboration with Fives FCB, which installed a 3000t/day dry process line. The plant is equipped with a zero-NO_x pyro-system and makes extensive use of alternative fuels.

Costa Rica's other integrated plant was commissioned by Edica Ltda in 1979 at Colorado de Abangares. It has a capacity of 0.9Mt/yr and was partly owned by Cemex during the 1990s. In 1999



Cemex took its stake to 95.3%. The plant primarily supplies the Costa Rican market but is also a strategic exporter of cement to Nicaragua, where Cemex does not have any cement production capacity.

In addition to its integrated plant, Cemex also operates a 0.9Mt/yr grinding plant in the capital, San José. The fourth, and most recently commissioned, plant in the market is the new 0.3Mt/yr Gebr. Pfeiffer Ready2Grind vertical grinding plant at Salinas Esparza in Puntarenas. The plant is a joint venture between Mexico's Cementos Fortaleza and fibre cement producer Plycem.

Imports have also become an increasingly important factor in Costa Rica in recent years. The amount of cement imported into the country increased by a factor of 10 between 2015 and 2016, from around 10,000t to over 100,000t, with 97% from China.

Indeed, Chinese cement imports gave rise to a long-running political scandal in Costa Rica during the summer of 2017, following the opening of the Costa Rican market to cement imports in 2015, a move ostensibly made to lower cement prices. The long-standing duopoly between Cemex and Holcim was disrupted by imports, including those from

Territory	Integrated (Mt/yr)	Grinding (Mt/yr)	Total (Mt/yr)	Type / Location
Barbados	0.3		0.3	Independent / Caribbean
Costa Rica	2.0	1.2	3.2	Independent / Central America
Cuba	5.7		5.7	Independent / Caribbean
Dominican Republic	6.9	1.3	8.2	Independent / Caribbean
El Salvador	3.3		3.3	Independent / Central America
Guadeloupe		0.4	0.4	French Overseas Dépt / Caribbean
Guatemala	3.1	1.1	4.2	Independent / Central America
Haiti	0.6		0.6	Independent / Caribbean
Honduras	3.0	0.3	3.3	Independent / Central America
Jamaica	3.5		3.5	Independent / Central America
Martinique		0.4	0.4	French Overseas Dépt / Caribbean
Nicaragua	0.6	0.4	1.0	Independent / Central America
Panama	2.1	0.8	2.9	Independent / Central America
Puerto Rico	0.8	1.2	2.0	US Protectorate / Caribbean
Trinidad & Tobago	1.2		1.2	Independent / Caribbean
Totals	33.1	7.1	40.2	

Sinocem Costa Rica. At the time, Cemex and Holcim both questioned restrictive new limts, taxes and regulations that appeared to give imported cement an advantage over domestically-made material.

However, in June 2017 it emerged that a US\$31.5m loan had been granted by national bank Banco de Costa Rica (BCR) to Sinocem Costa Rica in November 2015. An investigation into Sinocem Costa Rica's Juan Carlos Bolanos and certain officials from BCR was launched and eventually expanded to encompass a number of public officials that may have sought the approval of the loan against the public interest. The investigation concluded in December 2017 and recommended various sanctions against 29 individuals. Various subsequent investigations have been carried out or are currently taking place.

A fresh dispute came to the fore in July 2019, when Cemex took legal action to query a local 5% tax on the sale of cement in the Provinces of Cartago, San José and Guanacaste. It did so due to the location of the new Cementos Fortaleza / PlyCem plant in the Province of Puntaenas, where the tax does not apply.

El Salvador

El Salvador is the smallest country in the continental Americas. A former Spanish colony, El Salvador gained stability since a civil war that ended in



1992 and, despite its diminutive size, now has the third largest economy in Central America after Costa Rica and Panama.

Above - Table 1: Cement producing nations in Central America and the Caribbean.

> Left: The Holcim Costa Rica plant at Cartago. Source: Holcim Costa Rica website.

GLOBAL CEMENT: CENTRAL AMERICA

Right - Figure 1: Central American and Caribbean countries, colour-coded by cement production capacity (Mt/yr). Source: Global Cement Directory 2019.

Right - Figure 2: Central

American and Caribbean countries, colour-coded by cement production capacity divided by population (kg/capita/yr). **Source:** *Global Cement Directory 2019* and population data from World Bank Data Indicators.



El Salvador's cement industry traces its history back to 1949 and the establishment of Cementos de El Salvador. It began production at the nowclosed Playa las Flores plant in 1953. A second plant was built between 1965 and 1970 at El Ronco and the company acquired its Maya plant in 1993.

Today the El Ronco and Maya plants are the only ones in operation in El Salvador. They are controlled by Holcim El Salvador, a part of Lafarge-Holcim. As the name suggests, the assets came from the Holcim side of the merger with



Lafarge, the Swiss firm having gradually increased its stake from 20% in 1998 to 90% by 2010. The two LafargeHolcim plants generally provide enough cement for El Salvador's domestic demand, with consumption and demand closely matched at roughly 1.0Mt/yr.

However, a new entrant will shortly enter the El Salvadorean market in the form of Guatemala's Cemento Regional. It will launch its 0.1Mt/yr Cemengal-supplied Plug&Grind Classic modular cement plant in the coming months.

Right: Guatemala's Cemento Regional will launch its new plant in El Salvador later in 2019.
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Above: Austria's Doppelmayr provided a RopeCon conveyor system for Cementos Progreso's new San Gabriel plant near Guatemala City. The 1.6km conveyor is intended to transport 2100t/ hr of limestone from a quarry to the plant across wooded terrain and rises up to a height of 200m off the ground using four tower structures.

Right: Cementos Argos upgraded its grinding plant at San Lorenzo at the start of 2017.

Guatemala

Another former Spanish colony until 1821, Guatemala was part of the Mexican Empire until 1840. The country remains marred by long-



standing political tensions between socialist and right-leaning factions. While an uneasy 'peace' was restored in 1996, violence remains incredibly high, both as a result of political tension and very uneven wealth distribution.

The Guatemalan cement industry comprises two integrated plants (3.1Mt/yr), both operated by Cementos Progreso, and three grinding plants (1.1Mt/ yr). Cementos Progreso has operated since 1899 and made its first cement in 1901 from its plant in La Finca Le Pedrera plant in Guatemala City, now with a capacity of 0.2Mt/yr. The company operated the plant for 73 years before launching its 2.9Mt/ yr San Miguel plant in 1974. Holcim (now Lafarge-Holcim) bought a 20% stake in Cementos Progreso in 2000.

As of March 2019 Cementos Progreso reported that its new US\$500m San Gabriel cement plant was undergoing testing. Plant manager Heber Barrios Valenzuela said that this stage of its set-up began in 2018 and will continue throughout 2019, according to local press. The new integrated cement plant will have a clinker production capacity of 4500t/day (1.5Mt/yr) when fully operational. It is unclear if this new capacity will affect the smaller of Cementos Progreso's two existing plants.

Key features of the San Gabriel plant include a 1.6km, 2100t/hr overhead RopeCon conveyor from Austria-based Doppelmayr to take material from the quarry to the plant. After raw material grinding, pre-heating, the kiln and the cooler, the production line has a 70,000t clinker silo. This is followed by two vertical cement grinding mills, each with a capacity of 220t/hr. The plant has four cement silos: two 10,000t silos for bulk cement and two 5000t silos for bagged cement. The plant also uses a 0.15Mm³ rainwater reservoir to store water to cool machinery.

Guatemala's grinding plants are run by Mexico's Cemex (2 plants, 1.0Mt/yr) and Cemento Regional (1 plant, 0.1Mt/yr). The Cemento Regional plant is, as with the forthcoming El Salvadorean plant, a Plug&Grind Classic modular grinding plant from Spain's Cemengal.

Honduras

A colony of Spain until 1821, Honduras was briefly part of the Mexican Empire. It became a republic in 1838, although political uprisings



have marred the country since that time. Honduras remains one of the poorest nations in the Americas, above only Haiti and Nicaragua in GDP/capita terms.

Honduras has two integrated cement plants (3.0Mt/yr) and one grinding plant (0.3Mt/yr) operated by two producers. The larger is Cementos del Norte, which operates one of the two integrated plants (2.0Mt/yr). Its plant at Rio Bijao is the oldest in the country, tracing its history back to 1958 as part of the former Cementos de Honduras. The plant received US\$29m of investment, including a new finish mill and improvements to storage capacity and alternative fuel processes, in March 2018.

The other integrated plant (1.0Mt/yr) and grinding plant (0.3Mt/yr) are operated by Cementos Argos. Both assets were part of the former French cement producer Lafarge until September 2013 when Cementos Argos bought them for US\$232m.

In May 2019 it was announced that a new producer, in the form of Colombia-based cement grinding company Ultracem, would enter the market. It stated that it would build a new grinding facility in Cortés, but no timeline or supplier for the plant was publicised.



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GLOBAL CEMENT: CENTRAL AMERICA

Right: The Cemex-operated Rafael del Sur plant in Nicaragua. The company is 18 years through a 25 year lease on the plant from the national government.



Nicaragua

Nicaragua is the largest country in Central America. A former Spanish colony, it was also occupied



by the US from 1912 to 1933. Following the departure of the US, Nicaragua fluctuated between dictatorships and periods of revolution during the 20th Century. Nicaragua is the second poorest country in the Americas, ahead of only Haiti in GDP/capita terms. Political tension, inequality and crime are very high.

Nicaragua's cement needs are met by three plants (1.3Mt/yr): one wet integrated plant run by Cemex Nicaragua (0.6Mt/yr) under a 25 year lease from the government, and two grinding plants (0.7Mt/yr), which are are operated by Holcim Nicaragua (0.3Mt/ yr) (80%-owned by LafargeHolcim) and Cemex Nicaragua (0.4Mt/yr).

The integrated plant at Rafael del Sur made its first cement in 1942 as Compañía Nacional Productora de Cemento CANAL. Cemex is now 18 years into its 25-year lease (2001 - 2026) and has made significant improvements in terms of operational efficiency, health and safety and new technology. It has so far spent more than US\$100m on the plant. Even though the plant is one of the few Cemex-run facilities that uses wet technology, this inherent technological inefficiency has been reduced as much as possible, with biomass fuels introduced in the early 2010s.

Cemex's 0.3Mt/yr grinding plant at Ciudad Sandino has been in operation since 2017. The plant is close to the capital Managua to serve this important market. The 0.4Mt/yr grinding plant at Naragote became part of Holcim in 1997 and has been part of the LafargeHolcim group since 2015.

Panama

Panama, is the southern-most country in Central America. It was colonised by Spain until 1821 and was also occupied by neighbouring Colombia until it



declared independence in 1903. Following a series of military regimes, Panama is now a representative democracy that has grown rapidly so far in the 21st Century. It has the highest GDP/capita ratio in Central America. Much of the country's relatively new wealth has been due to it taking over control of the Panama canal in 1999, prior to which the US was in control, and, more controversially in the modern era, its position as one of the world's best known tax havens.

Panama has one integrated cement facility at Bayano, which is operated by Mexico's Cemex (2.1Mt/ yr). The plant was built on a turnkey basis by the Danish cement plant manufacturer FLSmidth on behalf of the Panamanian government in 1978. Cemex acquired a majority stake in 1994 and, similar to the case in Nicargua, had introduced efficiency measures and upgraded production within a few years. It switched to using petcoke in the kiln and undertook one of the group's first automation systems installations anywhere in the world. This could be seen as the start of Cemex's drive to focus on highly-automated cement production, a trend that has accelerated in the past 12-24 months. In 2003 Cemex overhauled the Bayano plant's dust control systems and new mills and kiln upgrades have since taken the plant's capacity to over 2.0Mt/yr.

There used to be a second integrated cement plant, the Cemento Panamá plant in Panamá City. The plant was first established in 1948 but has only ground cement since 2001. It is run by Cementos Argos. Cementos Argos also operates a 0.8Mt/yr plant in Colón.

Recently, the Ministry of Commerce and Industries (MICI) announced that it would introduce regulations testing cement imports for hexavalent chromium. Edgar Arias, MICI's Director of Standards and Industrial Technology, said at a trade forum that the new rules had been agreed. At present cement is tested at the discretion of the importer. Under the new regulations cement will be tested before it leaves its country of origin, when it arrives in Panama and for a third time at the point of sale at the discretion of the authorities. Panama imports, 10,000 – 20,000t/ month of cement from countries including China, Turkey and Vietnam.



Right: Downtown Panamá

City and Pacific waterfront.



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Right: Rock Hard Cement has made a big splash in the Baijan market since it started

importing cement in 2015.

Source: Rock Hard Cement website.

Caribbean

Barbados

Barbados is a small island nation in the east of the Caribbean. It gained independence from the



UK in 1966 and has since transformed itself into a modern, service-led economy, with an emphasis on tourism. It has one of the highest standards of living in the Caribbean.

The island has one 0.3Mt/yr integrated cement plant, run by Arawak Cement, part of Trinidad Cement, in turn majority-owned by Cemex. The plant, located at Checker Hall, St Lucy in the extreme north of the island, was built by Austria's Voest-Alpine in 1984. It produced clinker until 1991 when local conditions led it to operate as a grinding terminal. It was then bought by Trinidad Cement in 1993 and the kiln was renovated and restarted in 1997 following around US\$7m of investment.

The owners continue to invest in new technologies, with a solar plant announced in 2017. The plant manager stated that the cost of electricity in Barbados was the highest of any location that Cemex operates. While information on this development is scarce, the large solar field located adjacent to the plant's main quarry on satellite imagery appears to indicate that this has indeed come to fruition. A new bag filter was fitted to reduce dust emissions, a long-standing local issue, in 2018.

The plant is the only clinker production site between Trinidad & Tobago and Puerto Rico, 350km and 940km away respectively. It exports around 80% of its cement and is an important source of clinker for grinding plants up and down the eastern Caribbean. It has customers in Anguilla, Antigua, the British Virgin Islands, Dominica, Grenada, Monserrat, St Kitts, St Lucia, St Martin/Maartin, St Vincent, Suriname and the US Virgin Islands.

However, the dynamic within the Barbadian cement market has shifted in recent years, following the launch of the importer Rock Hard Cement in 2015. Rock Hard and Arawak Cement entered into a fierce public dispute in 2016 regarding the quality of each others' products. Rock Hard's presence challenged Arawak's traditional position in the country and wider region and had caused sales prices for ce-



to help Rock Hard. In December 2019 the Caribbean Court of Justice ruled in favour of Arawak / Trinidad / Cemex, provided that the imported cement was 'hydraulic'. However, Rock Hard successfully claimed that the imported cement could be classed as 'other hydraulic cement,' taxed at 5% rather than 60%. With no further ways to appeal, it appears that Arawak Cement is stuck between Rock Hard and a hard place.

Cuba

Cuba has been a socialist state since its famous revolution of 1959. Despite the fall of the formerly supportive USSR in 1989, this 'commu-



nist outpost' retains support from China. Although market reforms made their impact in some parts of the economy in the 2010s, more than 85% of the economy remains controlled by the state.

Cuba's six integrated cement plants are part of this 85%. Four of the six plants are operated by Corporacion Cementos Cubanos, the national producer, with one relatively modern Cuban-run plant, Cementos Cienfuegos, and another, Cementos Curazao, which is 50%-owned by Mexico's Cemex. The formation of Cementos Curazao was necessary for Cemex to comply with US-led sanctions. The four wet process and two dry process plants indicate that, like the old cars in Havana, Cuban cement plant technology has aged somewhat over the past 60 years, also due to sanctions. Although the six plants have a capacity of 5.5Mt/yr, it is highly unlikely that Cuba is making such high amounts of cement at present.

However, there have been some investments in cement facilities of late. A new 1600t rail terminal

ment to fall by 30% within its first 12 months of operation. Arawak was forced to reduce its workforce in October 2016, citing excess capacity in the region. In May 2018 Arawak and Trinidad Cement took legal action against the government, accusing it of reducing import rates from 60% to 5% in order



Right: Like the old cars of Havana, cement technology in Cuba is becoming somewhat antiquated.

GLOBAL CEMENT: CARIBBEAN

was reported to be coming for Ciego de Ávila in May 2018. In line with the country's resourcefulness, the University 'Marta Abreu' of Las Villas (UCLV) started to operate a 7t/day calcined clay cement plant in May 2019 as part of the international LC3 project that is researching ternary cements comprising clinker, calcined clay and limestone. *More on this topic can be found on Page 10.*

Dominican Republic

The Dominican Republic occupies around two thirds of the island of Hispanola, with Haiti occupying the other third. Its economy, once



dependent on sugar exports, is now geared strongly towards the service sector. The country has one of the most developed telecommunications sectors in the world and has become the most popular Caribbean tourist destination due to its extensive beaches, some of which might be sampled by delegates at the forthcoming FICEM Conference in Punta Cana.

The Dominican Republic has five integrated cement plants (6.9Mt/yr) and three grinding plants (1.3Mt/yr), with each facility operated by a different producer. The largest producer is Cemex Dominicana, which operates a 2.4Mt/yr integrated plant, the country's largest. The Mexican giant entered the Dominican cement market in 1995 when it took over Cementos Nacionales. It began building the current 2.4Mt/yr San Pedro de Macorís line in 2003 and the plant made its first cement in 2005.

Cimentos Cibao, located in Palo Amarillo, close to Santiago, is the second-largest cement producer by installed capacity (2.0Mt/yr). The company was first established in 1964 but construction was unable to begin until 1973 due to political instability. The plant has been upgraded extensively since, with a series of wet kilns eventually replaced by the current 2.0Mt/yr dry line in 2009.

The joint third-largest producers are Domicem and Cemento Panam, both with 1.0Mt/yr integrated plants. The Domicem plant was the first overseas turnkey project carried out by China's Sinoma / CBMI Construction. It is one of the most modern in the Caribbean and began production on schedule in October 2005. Domicem also operates a cement storage facility in Port-au-Prince in Haiti and a terminal in Kingston, Jamaica. The Cemento Panam plant is operated by Estrella Group, primarily engaged in real-estate and development. It was first realised as a 0.5Mt/yr grinding plant in 2013, with a 0.75Mt/yr clinker line arriving in 2015. In 2017 a new mill was added to the site, taking cement capacity up to 1.0Mt/yr.

The remaining players in the Dominican cement sector are: Cementos Andino Dominicanos, which



Left: Bags of cement from Cemento Panam being unloaded at the job site. Source: Estrella Group website.

Left: The Lafarge Ciments

Source: Lafarge Ciments

Antilles plant in Jarry, Guadeloupe.

Antilles website.

operates a 0.5Mt/yr integrated plant in Pedernales; Cementos Argos subsidiary Cementos Colón en Repúblic Dominicana, which runs a 0.5Mt/yr grinding plant at Bella Vista, Santo Domingo, and; Cementos Santo Domingo, which produces cement at its 0.4Mt/yr grinding facility in Hatillo, around 100km from Santo Domingo. The Cementos Argos plant received a new packaging plant in June 2019. The unit has a capacity of over 1000bags/hr and has reduced dust emissions at the site.

Guadeloupe

Guadeloupe is a former French colony that has been a full Overseas Départment of France since 2007. It has a 0.4Mt/ yr grinding plant oper-



ated by Lafarge Ciments Antilles, a 59.73%-owned subsidiary of LafargeHolcim. It has been present in Guadeloupe, initially as a Lafarge subsidiary, since 1971.



Haiti

Haiti occupies the western third of the island of Hispaniola, which it shares with its larger and wealthier neighbour, the Dominican Republic. It



gained independence from France after a bloody and



Right: Shanty constructions in Port au Prince, Haiti.

Right: CCC's plant in Rockfort, near Kingston, Jamaica, remains the island's only cement producer. Source: Loesche GmbH.



complex war, fought in part alongside Spain, in 1804. The country's long-standing position as the poorest country in the Americas was reinforced in January 2010, when the capital Port-au-Prince suffered extensive damage in an earthquake. Many residents remain displaced nearly 10 years on from the disaster.

The only cement plant in Haiti, the 0.6Mt/ yr wet-process integrated Cimenterie Nationale plant in Aubry, is approximately 30km from Port-au-Prince. It is owned by Cementos Argos. The plant began production in 1952 as Ciment Haiti.

In response to calls to improve Haiti's cement production facilities, the government has held extensive talks with a Belgian engineering company regarding a US\$300m 2.0Mt/ yr integrated plant to be located at Gonaives. However, this project has not been reported upon since May 2017 and prior to that, was presented as a new idea in December 2015. It is unclear as to whether or not the project is still under development.

Jamaica

Jamaica is an island nation in the Caribbean Sea. It became independent from the UK in 1962 after more than 300 years as a colony. Jamaica's mixed economy is steadily

economy is steadily heading towards services, but the agriculture and mining sectors, notably bauxite and highquality limestone for cement production, remain important.

Jamaica has one integrated cement plant, which is located near to the capital, Kingston. It is operated by Caribbean Cement Company (CCC), which, like Arawak Cement in Barbados, is part of Trinidad Cement, itself within Cemex. CCC claims that 90% of all structures on the island of Jamaica have been built using its cement, which it first produced in 1952.



In April 2012 it was reported that Canada's Cemcorp would build a new cement plant under a new subsidiary, Cement

Jamaica, to be located in Port Esquivel. The project, initially budgeted at US\$340m, rose to US\$570m in 2014, the year it was supposed to have been commissioned. To date the plant has not been built and it is unclear if it will ever get off the ground.



Martinique

Like Guadeloupe, Martinique became an Overseas Département of France in 2007. It also has a 0.4Mt/yr grinding plant, which has been run by Lafarge Ciments Antilles since 1971.



Below: The Lafarge Ciments Antilles plant in Pointe des Carrières. **Source:** Lafarge Ciments Antilles website.





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Right: Hurricane Maria

in September 2017.

makes landfall in Puerto Rico

Puerto Rico

The Commonwealth of Puerto Rico is an island in the Caribbean archipelago between Hispanola to the west and the Virgin Islands to the



east. It was ceded to the US by Spain as a result of the Spanish-American war and internal self government was achieved in 1952. Puerto Rico remains a US Commonwealth territory despite numerous referenda that asked whether or not the territory should seek full US statehood.

Puerto Rico has two cement plants that support its four million inhabitants, with a combined cement capacity of 2.0Mt/yr. Cemex switched the former 1.2Mt/yr Ponce integrated plant to grinding only in early 2018, stating that the island only needed around a third of the installed capacity. It is unclear how much cement is now made at the site, although increased demand in light of devastating Hurricanes in the second half of 2017 are in contrast to Cemex's expectations for the market. In July 2018 sales were up by 30% year-on-year, the seventh consecutive increase, exactly coinciding with Cemex's decision to downscale its operations. February 2019 sales were up on the back of Federal investments in infrastructure but they began to contract in the following three months to May 2019.

The other cement plant in the territory is located close to San Juan, the capital of Puerto Rico. It was built as a wet process line in 1970. Today the plant has a dry production line with a capacity of 0.8Mt/yr and is operated by Essroc, part of HeidelbergCement.

Trinidad & Tobago

Trinidad & Tobago are two islands that form a nation in the extreme south east of the Caribbean. The larger island, Trinidad, is just 11km





from mainland South America (Venezuela). It gained independence from the UK in 1962. Today Trinidad & Tobago is relatively prosperous due to oil revenues, although significant wealth-inequality remains.

Trinidad & Tobago is home to Trinidad Cement, 69.8% owned by Mexico's Cemex. Its 1.2Mt/yr plant has been located in Claxton Bay, Trinidad, since 1954, following a feasibility study by experts from the former Rugby Portland Cement Company in the UK. The plant was upgraded in 1958 and 1968, increasing its production capacity to 0.18Mt/yr and 0.25Mt/yr respectively. A new kiln was installed in 1996, two years after Cemex had taken its initial 20% stake.

In addition to assisting its Baijan subsidiary Arawak Cement in its unsuccessful dispute against Rock Hard Cement, Trinidad Cement has been battling imports in Trinidad & Tobago. In 2018 union members from the Trinidad Cement branch of the Oilfields Workers Trade Union protested at the Port of Chaguaramas over cement imports from Turkey. A union member claimed that a batch of imported cement had no import duties paid, according to local press. Trinidad Cement took legal action in the Caribbean Court of Justice against Turkey's Sönmez Çimento for breaking local tariff rules. The company previously made an official complaint to Caricom, the Caribbean Community organisation, about tax concerns regarding cement imports from Turkey as early as 2016.



Right: Palletised bags of cement leave the Trinidad Cement plant in Claxton Bay, Trinidad.

GLOBAL CEMENT: CARIBBEAN

Smaller nations and territories

Anguilla: Trinidad Cement incorporated TCL Trading in the British Overseas Territory of Anguilla in 1997 to engage in the trade and sale of cement and related products.

Antigua & Barbuda: A major cement importer in Antigua & Barbuda is Caricement Antigua. Barbuda, the smaller of the islands, had trouble

sourcing enough cement for rebuilding efforts after severe hurricane damage in September 2017.

Aruba: One of four constituent countries of the Kingdom of the Netherlands, Aruba's cement needs are catered for by Thiel Resources,

Barcadera Cement and ATCO Concrete Products.

The Bahamas: The Bahamas is supplied by Bahamas Cement, Cemex Bahamas, Island Cement and others.

British Virgin Islands: A British Overseas Territory, the BVI is supplied by Alternative Concrete Solutions, Teve Concrete and Tortola Concrete.

Cayman Islands: A British Overseas Territory, the Cayman Islands are supplied by National Cement and Supermix.

Curaçao: One of four constituent countries of the Netherlands, Curaçao has a single ready mix concrete supplier, Heavy Mix Concrete BV, based near Willemstad.

Dominica: Argos Dominica has been a major supplier of cement in Dominica since 1996. It opened a new packing plant in May 2019 with a capacity of more than 1000 bags/hr.

Grenada: Independent from the UK since 1974, Grenada has several suppliers associated with Trinidad Cement.

Montserrat: Montserrat is a British Overseas Territory that, since a devastating volcanic eruption in 1995, has abandonned two thirds of its

territory. Trinidad Cement lists a local business as its local importer of cement, although with a population of little over 5000, imports are very infrequent.





















Saint Barthélemy: The French Territorial Collectivity of Saint Barthélemy that was formerly part of Guadaloupe until 2007. It has looser ties with



France than the Overseas Départements in that it is not governed from Paris. However, it is represented in the French Parliament. The island imported US\$2.3m-worth of cement in 2017 according to oec.world. At an estimated price of US\$100/t this translates to 23,000t of cement.

Saint Martin / Sint Maarten: The island of Saint Martin is split into two jurisdictions, the French Territorial Collectivity of Saint Martin in the north and Sint Maarten, a constituent country of the Netherlands in the south. There are no border checks between the two sides of the island,



St Kitts & Nevis: Fully independent from the UK since 1983, St Kitts & Nevis has no cement capacity. It has a number of concrete suppliers.

St Lucia: St Lucia gained independence from the UK in 1979. Trinidad Cement is present in St Lucia through a local dealership, as is Barbadosbased Rock Hard Cement.

St Vincent & The Grenadines: Independent from the UK since 1969, this group of islands is supplied by Rock Hard Cement, as well as smaller firms.



US Virgin Islands: The US Virgin Islands are unincorporated and organised territory of the United States. US-based US Concrete, which ac-















GLOBAL CEMENT: EVENT PREVIEW - FICEM 2019

Contents

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Preview: 36th FICEM Technical Congress

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CETEC Co Ltd	15
Christian Pfeiffer	26
Claudius Peters Americas	68
CNBM Smart Industry Technology	32
Corcement Group	60
CTP TEAM	29
DALOG Diagnosesysteme	47
DCL, Inc	62
Dynamis Latinoamerica	51-52



Exhibitor

FCT Combustion, Inc	21
FICEM	14
Fives FCB	12
FLSmidth	3-4
FONS Technology International	25
Forjas Bolivar	31
Gambarotta Gschwendt srl	79
Gebr. Pfeiffer, Inc.	35
Gorco SA	57
Grupo SPR	64

Stand



FICEM Technical Congress will take place at the Barceló Bávaro Convention Centre, a short distance from the beach in Punta Cana.

Right and below: The 36th

Entrance	_		Entrance	
	C	offee		Coffee
60	52 51	36 35	20 19	
61	53 50	37 34	21 18	2
62	54 49	38 33	22 17	3
63	55 48	39 32	23 16	4
64				5
65		Coffee		6
66				7
67	56 47	40 31	24 15	8
68	57 46	41 30	25 14	9
60	58 45	42 29	26 13	10
70	59 44	43 28	27 12	10
/0				
Coffee	71 72 73 7	74 75 76 77	78 79 80	Coffee





Above: Delegates at 35th FICEM Technical Congress 2018 at the Megapolis Convention Centre in Panama City in September 2018. Source: FICEM.

Exhibitor	Stand
Harold Beck & Sons, Inc	56
Haver & Boecker USA, Inc	36
HGH Systèmes Infrarouges	49
Humboldt Wedag	5
IAC	19
IMASA: Ingenieria y Proyectos SA	59
Industrial Juval Ltda	37-39
KEMEX	43
KettenWulf	2
Lechler Inc	73
Loesche America Inc	44
Luoyang Zhili New Materals	17-18
Magneco / Metrel	23
Magotteaux	80
Malvern Panalytical	67
Master Controls SA de CV	66
MDG Handling Solutions	58
Minprotec SAS	6-7
Parker Hannifin / BHA Altair	24
Refratechnik Mexico	45-46
Reotix Materiales Refractarios	20
robecco GmbH	69
Sablières Modernes SAS	63
Sacos del Atlantico	42
Satarem Latam SA	61
Schenck Process	70
Scheuch GmbH	30
Shanghai Everspring Filtration Tech	. 1
Sinoma TCDRI	54
Smurfit Kappa Rep' Dominicana	77-78
Standard Industrie	41
Thermoteknix Systems Ltd	16
Thorwesten Vent	69
Thyssenkrupp Industrial Solutions	48+55
Unitherm Cemcon Feuerungsanlage	en 65
Vecoplan AG	27
Vortex Valves Latinoamericana	71
Wieland Lufttechnik GmbH & Co K	.G 50
WL Gore & Associates	74
YARA International	69
Zhengzhou Ruitai Refractory Mater	ials 28





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GLOBAL CEMENT: EVENT REVIEW

Thomas Hacker, Cement Technology Consulting, LLC

Review: FICEM delegation visits Austria

A delegation from FICEM, the Inter-American Cement Federation, took part in the 6th *Multi-country Mission* and 10th *Forum for Climate Change and Co-Processing* in Austria at the end of May 2019 at the invitation of the Advantage Austria and the Federal Austria Business Development Agency. Event facilitator Thomas Hacker reports...

Right: Left-to-right: Georg Lechner (Scheuch GmbH), Christian Breitenbaumer (Kirchdorfer Zementwerk Hofmann GmbH), Maria José Garcia (FICEM), Hans-Jörg Hörtnagel (Advantage Austria), Thomas Hacker (Cement Technology Consulting) & Manuel Lascarro (ASOCRETO, Colombia). The main objective of the 6th Multi-country Mission was to learn about Austrian technology and advanced experience in the creation and implementation of regulations on co-processing and waste management within the cement sector. The visit brought together managers responsible for the environment, alternative fuels and sustainability from the cement industry in Latin America and the main environmental authorities of that region with responsibility for the development

of regulation frameworks, the granting of environmental permits and control of the execution of co-processing programs.

The objectives of the visit were to discuss support in public policies and regulations; Exchange technical, legal and practical experiences; Interact with the Austrian environmental authorities responsible for the National Policy on Solid Waste and other environmental issues, and; Develop an understanding of the relationships between the Austrian cement sector and the country's environmental authorities in the



areas of waste management, co-processing regulations, measurement and reduction of CO_2 emissions, amongst others. These activities were supported by visits to cement plants with co-processing activities.

The mission was headed by FICEM Director Maria José Garcia and Hans-Joerg Hoertnagel, the Austrian Trade Commissioner in Bogotá, Colombia. Thomas Hacker from Cement Technology Consulting was responsible for information on technical aspects and translation during the visit.



Right: The FICEM Group at Kuchl City Hall, in the state of Salzburg, Austria.



The Inter-American Cement Federation invites you to book the week from **September 2 to 4** to don't miss out the **XXXVI FICEM Technical Congress 2019,** to be held in **PUNTA CANA, DOMINICAN REPUBLIC!**



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After August 27, 2019	1.050	1.250

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Trainer: John Kline - Kline Consulting, LLC.

Members in Dominican Republic











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Data from the Ministry of Commerce & Industry shows that cement production in India rose by 6.3% year-on-year to 178Mt in the first half of 2019 from 167Mt in the same period of 2018. On a monthon-month basis production fell by 1.5% to 28.3Mt in June 2019 from 28.8Mt in June 2018. June 2019 was the first month since October 2017 that cement production had fallen in this way.

India: ACC sales rise by 8% in first half of 2019

A CC's net sales grew by 8% year-on-year to US\$1.15bn in the first half of 2019 from US\$1.06bn in the same period in 2018. Its operating earnings before interest, taxation, depreciation and amortisation (EBITDA) increased by 18% to US\$191m from US\$162m. Its cement sales volumes rose by 2% to 14.7Mt from 14.4Mt and its ready-mixed concrete (RMX) sales volumes jumped by 15% to 1.79Mm³ from 1.56Mm³.

India: Dalmia results restricted by input costs

Dalmia Bharat has blamed the general election for its slow cement sales volumes growth in its first quarter. Its sales volumes of cement increased slightly to 4.55Mt. Its revenue grew by 7% yearon-year to US\$365m in the first fiscal quarter to 30 June 2019 from US\$340m in the same period in 2018. Its earnings before interest, taxation, deprecation and amortisation (EBITDA) rose by 27% to US\$95.7m from US\$75.2m.

The cement producer also said that its power and fuel costs per tonne had been negatively affected by its Kalyanpur plant operating at low capacity utilisation levels, partly due to a lack of coal. However, it noted that its raw material costs had been 'moderated' due to falling slag prices.

India: New Wonder line

Wonder Cement has launched the third production line at its Nimbahera plant at Chittorgarh in Rajasthan. The new 2Mt/yr integrated line had an investment of US\$159m. The unit at Nimbahera now has a total production capacity of 9Mt/yr and the company also operates a 2Mt/ yr cement grinding plant at Dhule in Maharashtra.

Sanjay Joshi, the executive director of Wonder Cement, said that he expected domestic cement demand to grow by 8% year-on-year in the 2019 – 2020 financial year. He added that, although the market was crowded, he thought that a new company could stand out if it delivered quality cement products.

Australia: Southern Cross Cement to build new import terminal

Southern Cross Cement, a joint venture between Brickworks, Neilsen Group and Neumann Group, is planning to open a 0.2Mt/yr terminal by October 2019. The US\$60m unit will import cement from south east Asia, according to the CourierMail newspaper. It is anticipated to supply 10% of the Queensland market. A 12,000t/day mechanical ship unloader will be installed at the site.



Philippines: Davao upgrade complete

Holcim Philippines has completed the upgrade to its integrated cement plant at Davao. The expansion involved the installation of a finish mill and a new pneumatic conveying system for loading cement to the silos from the pier, eco-hoppers to improve dust emissions and an overhead crane. Cold commissioning started in April 2019 and full production began in late June 2019. Holcim Philippines held a ceremony in August 2019 to inaugurate the facilities with partners from the public and private sector. The improvements add 0.7Mt/yr to the cement production of the plant.

The expansion of the Davao plant is part of the company's on-going program to improve operations to better support the positive growth of Mindanao. In March 2019, the company launched a new blended cement product, Solido. It also opened its first construction laboratory outside Metro Manila at Davao in 2018.





Contents

China: Cement production rises...

Chinese cement production volumes grew by 6.8% year-on-year to 1.05Bnt in the first half of 2019. Profits from the sector rose by around 20% to US\$11.6bn, according to the China Securities Journal and the Xinhua News Agency. This growth has been attributed to buoyant real estate and infrastructure markets. The trend is expected to continue into the second half of 2019, with even greater profits anticipated. In 2018 the sector reported a record profit of US\$22.5bn.



India: UltraTech allotment cancelled

The Jharkhand Industrial Area Development Authority (JIADA) has cancelled an allotment of land to UltraTech Cement for a project to build a 1.5Mt/yr plant. The cement producer was allotted 48 acres of land by JIADA in 2016, according to the Times of India. The industrial development body for the state government also sent notices to 20 other companies warning them that their allocations would be nullified. The action is being taken to free up land for development.



...as capacity is cut by 70Mt/yr

The China Building Materials Federation has released plans to cut cement production capacity by 70Mt/yr in 2019 as part of its efforts to reduce air pollution and increase industry efficiency through consolidation. Ideally the federation's work plan wants the largest 50 national producers to close all production lines with a capacity below 2000t/day and to upgrade old technology on the remaining lines. Larger cement production lines in China manufacture 5000-7000t/day.

China produced 2.2Bnt of cement in 2018. The new work plan will order all cement companies to shut down production lines producing below 2000t/day in areas where pollution is high. The Beijing-Tianjin-Hebei region in northern China has been identified as one of these areas. The scheme also encourages industrial consolidation, with the aim of placing 60% of national production with the top 10 cement makers. It wants to reduce the amount of lower quality cement made so that it comprises less than half of all cement made. It wants to use mergers and restructuring to do this and it supports integration through cross shareholdings and asset exchanges.

Azerbaijan: Cement production falls in first half

Data from the State Statistics Committee shows that cement production in Azerbaijan dropped by 5.2% year-on-year to 1.6Mt in the first half of 2019. This has been blamed on a poor market, according to the Turan Information Agency. Despite this, concrete mix sales increased by 20.5% to 0.78Mt.

Japan: Taiheiyo to slash CO₂ emissions by 80%

Taiheiyo Cement has set an 80% CO_2 reduction target from cement production by 2050. It also plans to reduce its emissions from cement products by 20%. It aims to do this via a number of means, including energy-saving measures, promoting co-processing, lowering the clinker factor and CO_2 capture technology. The company started a chemical absorption CO_2 capture project on a kiln exhaust at its Fujiwara plant in early 2019.

Uzbekistan: New cement plant grows from 4Mt/yr to 5Mt/yr

UTD Cement has increased the size of a new integrated cement plant it plans to build in the Farish district of Jizzakh region from 4.0Mtr/yr to 5.0Mt/yr. The decision to increase the size of the upgrade has followed access to a new limestone quarry at Almaz, according to the Trend News Agency. Once completed, the plant will produce 4.0Mt/yr of Ordinary Portland Cement (OPC) and 1.0Mt/yr of white cement. UTD Holding is planning to invest over Euro400m in the project. It is working with German companies Phoenix Consulting and MN Medianet.

Kazakhstan: Steppe up

S teppe Cement turnover grew by 34% yearon-year to US\$36.7m in first half of 2019 from US\$27.5m in the same period in 2018. Its cement sales volumes rose by 6% to 0.78Mt from 0.74Mt. The cement producer said that the local market declined by 3% in the reporting period. Imports represent 8% of the market and they remained stable. Exports fell by 5% to 0.87Mt.

North Korea: Black outs stop plant

Production has reportedly been stopped for three months at the Seongho Lee cement plant near Pyongyang due to a lack of electricity. Sources quoted by South Korea-based Daily NK online newspaper suggest that government power rationing has lowered the importance of the plant in comparison to other so-called 'core' industries.

Sri Lanka: New integrated plant on the cards for CG Cement

Binod Chaudhary, the owner of CG Cement, says bis company plans to invest US\$150m towards building a new integrated cement plant. He said that government approval had been granted and that there were several potential limestone deposits to support the project. The company intends to export cement and clinker. The company currently operates a grinding plant at Dumbikas, Nawalparasi district. It says it has a 10% share of the Sri Lankan market.

Vietnam: Mining project approved

Kien Giang province has granted an investment licence to Siam City Cement Vietnam for a limestone and clay mining project and a clinker kiln project in Kien Luong district. Both projects have a combined investment of around US\$470m, according to the Viet Nam News newspaper. The subsidiary of Thailand's Siam City Cement Group operates five plants in the country following its acquisition of Holcim Vietnam in 2017.

Azerbaijan: Dal to upgrade Gazakh plant

Turkey's Dal Teknik Makina is set to start work on an upgrade project at Akkord Cement's integrated plant at Gazakh. It will increase the clinker production capacity to 3300t/day from 2500t/day. The supply of equipment is expected to be completed in six months and the installation period will be around five weeks. No value for the order has been disclosed.

Indonesia: Semen Indonesia results

Semen Indonesia's revenue grew by 23% year-on-year to US\$1.17bn in the first half of 2019 from US\$0.95bn in the same period in 2018. However, its net profit halved to US\$34.3m from US\$68.8m. Its domestic sales volumes of cement fell by 7.2% to 7.8Mt in the first five months of 2019 from 10.5Mt in the same period in 2018. Exports rose by 7.4% to 1.4Mt from 1.3Mt. Both local sales and exports fell at its Thang Long Cement subsidiary in Vietnam. Semen Indonesia bought an 80.6% stake in Holcim Indonesia in February 2019.

Pakistan: Cement exports up by 40%...

Data from the Pakistan Bureau of Statistics shows that cement exports grew by 40% year-on-year to 6.41Mt in the financial year to the end of June 2019 from 4.56Mt a year earlier. The value of the exports rose by 22% to US\$272m from US\$223m.



Above: Sunrise at Karachi Port.

...and Lucky cashes in on trend

Lucky Cement has counteracted mounting costs with increased export sales. Its gross sales rose slightly to US\$420m in its financial year to 30 June 2019. Its profit after tax fell by 14% year-on-year to US\$65.2m from US\$75.8m from the same period in 2018. Its cost of sales grew by 11% to US\$190m from US\$211m. Its cement sales volumes fell by 1.8% to 7.67Mt. However, its export sales increased by 60.9% to 1.82Mt.

The cement producer said that the first shipment of machinery from China's Sinoma to its new 1.2Mt/yr integrated plant project at Samawah, Iraq, has been made. A power plant has been ordered from Finland's Wärtsilä. Commercial production at the site will start in mid-2020.

Nigeria: Domestic doldrums drag Dangote down

Dangote Cement's sale revenue fell by 3% year-on-year to US\$1.30bn in the first half of 2019 from US\$1.34bn in the same period in 2018. Its earnings before interest, taxation, depreciation and amortisation (EBITDA) dropped by 11.4% to US\$605m from US\$683m. Cement sales volumes decreased slightly to 12.3Mt. Revenue, earnings and sales volumes all fell in Nigeria but only earnings fell for its operations outside of the country.

"Group sales volumes were only slightly down on last year and this

was a solid performance against the impact of delayed elections and increased competition from new capacity in Nigeria, as well as operational and economic challenges in key territories such as Ethiopia and South Africa," said Joe Makoju, the group chief executive officer of Dangote Cement. "However, we saw a stronger performance from Tanzania, which is now running on gas turbines, and also from Senegal, where our sales volumes are more than 100% of our rated capacity,"

Algeria: GIFA plant starts selling... into busy market

Société des Ciments de Sigus, part of Groupe Industriel des Ciments d'Algérie (GICA), has started marketing cement from its 2Mt/yr integrated plant at Sigus, Oum El Bouaghi. The US\$427m unit started producing cement in the first quarter of 2019.

The plant joins Algeria's increasingly large dometic cement sector, which has turned significantly towards exports in the past 12-18 months. Indeed, the value of clinker exports from Algeria grew to US\$30m in the first five months of 2019 from just US\$3.2m in the same period in 2018. The country is hoping to increase its exports of cement and clinker to around US\$500m/yr by the mid-2020s, according to Télévision Algérienne, but will face major production overcapacity as its cement manufacturing base hits 40.6Mt/yr in 2020. Consumption was around 26Mt in 2016.

Morocco: Ciments du Maroc buys rivals

Ciments du Maroc has signed a deal to buy Atlantic Cement and Cimsud from Anouar Invest Group. Atlantic Cement is building an integrated plant in Settat province and Cimsud has recently commissioned a 0.5Mt/yr grinding plant at Laâyoune. Ciments du Maroc said that the agreement would strengthen its market presence in Morocco's central region. It is expected that the acquisition will be completed in the second half of 2019 subject to regulatory approval. No value has been disclosed.

Ciments du Maroc, a subsidiary of HeidelbergCement, currently operates three integrated cement plants and two grinding plants. It also runs 30 ready-mixed concrete plants and four quarries.



Contents

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Ad Index

Nigeria: CCNN results

Cement Company of Northern Nigeria's (CCNN) sales revenue more than doubled to US\$89.1m in the first half of 2019 from US\$33.6m in the same period of 2018. Its profit after tax nearly tripled to US\$20.3m from US\$7.22m.

Zimbabwe: New plant mooted by Livetouch

Vile Wang, the general manager of Livetouch Investments, says that his company is considering plans to build a clinker plant. He said that the Chinese company was holding negotiations with South Africa's PPC to invest up to US\$50m into a joint venture, according to the Chronicle newspaper. Livetouch Investments owns the Diamond Cement grinding plant at Redcliff, which opened in 2017. It sources its clinker from PPC at present.



Senegal: Tax plans don't worry Dangote

Dangote Cement Senegal (DCS) has stated that it is not worried about potential plans by Senegal's government to cut tax exemptions to cement plants as part of its Plan for an Emerging Senegal (PES) and that it is 'ready to discuss the proposals' with the authorities. DCS's Administrative and Financial Director Ousmane Mbaye also blamed distributors and a breakdown at a competitor's plant for recent swings in the price of cement.

Egypt: Market only needs 40% of domestic production

Medhat Istafanos, the head of the Cement Division at the Federation of Egyptian Industries (FEI), has stated that the domestic Egyptian market only supports 40% of local production. He blamed this on a slowdown in building activity and a lack of government-backed infrastructure projects to make up the shortfall, according to the Al-Ahram newspaper. Noha Bakr, an executive director at the cement division of the FEI, also blamed a construction ban on agricultural land.

The country's 24 cement plants have a production capacity of 85Mt/yr but only 48Mt of cement was sold in 2018. Cement sales have fallen since 2017 but are expected to improve marginally to 49Mt in 2019.

Producers are exploring options to increase cement exports. Walid Gamaleddin, the president of the Export Council for Building Materials and the Metallurgical Industries, has called for the government to support industry exports. The minister of trade and industry discussed a programme for cement-export subsidies with officials from the sector in late July 2019. The deal would include encouraging agreements to export cement to other African countries. The Central Bank of Egypt has also instructed the banking sector to support cement companies that need to restructure their debts. The merger of smaller companies to form larger conglomerates has also been encouraged.

However, Egypt will face an uphill struggle to export more cement. Istafanos said that Egyptian cement costs around US\$12/t more than that of regional competitors.





Saudi Arabia: Government to tax exports

Total exports of cement from Saudi Arabia have now reached 25Mt since export rules were relaxed in mid-2017. Abdul Rahman Hussein, from the Ministry of Trade and Investment, said that the government will now apply fees to exporters following a two-year tax holiday, according to the Aliqtisadia newspaper. He noted that the ministry has approved 53 cement export licences, 22 of which have been issued in 2019 so far.

Saudi Arabia: Selected cement sector results

Substitution of the first half of 2019 from US\$154m in the same period of 2018. Its net profit after Zakat and tax grew by 12% to US\$59.9m from US\$53.4m.

Meanwhile, Southern Province Cement's sales revenue rose by 37% year-on-year to US\$165m from US\$121m over the same time periods. Its net profit after Zakat and tax grew by 53% to US\$56.3m from US\$36.8m.

Elsewhere, Najran Cement's sales rose by 20% year-on-year to US\$48.7m in the first half of 2019 from US\$40.6m in the same period of 2018. Its net profit after Zakat and tax was US\$0.92m, after a loss a year earlier. It attributed its increased sales and profit to higher sales volumes, better pricing and reduced costs.

Finally, Tabuk Cement's sales revenue grew by 29% year-onyear to US\$30.4m in the first half of 2019 from US\$23.5m in the same period of 2018. It attributed the sales growth to improved prices despite poor sales volumes. It reported a net profit after Zakat and tax of US\$3.4m for the half, following on from a loss of US\$0.27m in the first half of 2018.

Syria: Aleppo being refurbished

Parts of the Arab Cement Company's integrated plant in Aleppo are being renovated. Ayman Nabhan, the Director General of the General Establishment for Cement and Building Materials, said that the unit had suffered 'heavy' damage from 'terrorists'. Industrial plants in the region are being repaired and returned to production.



Above: The city of Aleppo was extensively damaged in 2012-2016.





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Contents

GLOBAL CEMENT MAGAZINE: PRICES

Egypt: Ordinary Portland Cement prices as of 12 August 2019: Arabian Cement (Al Mosalah) = US\$49.74/t; Arabian Cement (Al Nasr) = US\$48.72/t; Elnahda Cement (Al Sakhrah) = US\$48.23/t;Wadi El Nile Cement (Wadi El Nile) = US\$48.84/t; Lafarge (Al Makhsous) = US\$47.17/t; Medcom Aswan Cement (Aswan) = US\$48.23/t; Arish Cement (Alaskary) = US\$48.72/t; Sinai Cement = US\$48.24/t; Suez Cement = US\$48.72/t; Helwan Cement = US\$49.45t; El Sewedy Cement = US\$49.754/t; South Valley Cement (Ganoub Elwady) = US\$47.64t; Misr Cement Qena = US\$48.24/t; Al Wata-

nia Company for Cement = US\$48.72/t.

White cement prices as of 12 August 2019: Sinai White Cement (Alabid Elada) = US\$147.72t; Sinai White Cement (Super Sinai) = US\$148.63/t; El Menya Cement (Super Royal) = US\$153.75/t; El Menya Cement (Royal Elada) = US\$150.74/t; Menya Helwan Cement = US\$147.44/t.

Blended cement prices as of 12 August 2019: Sinai Cement (Al Nakheel) = US\$43.42/t; Helwan Cement (Al Waha) = US\$43.60/t.

Sulphate-resistant cement prices as of 12 August 2019: Lafarge (Kahger Albehar) = US\$52.04/t; Suez Cement (Al Suez Sea Water) = US\$50.65/t; El Sewedy Cement = US\$51.44/t.

Nigeria: Oyebamiji Dauda, Chairman of the Lagos State Bricklayers' Association, has urged the Federal Government to address the rise in the price of cement in order to enhance access to affordable housing. He said that encouraging further cement manufacturers would cause lower prices, currently US\$7.70- 8.25/bag (50kg) depending on the brand.

Dauda said that he recalled a discussion with Dangote Cement CEO Aliko Dangote on 22 August 2013 in which Dangote said that the price would fall to US\$3.30/bag. "It is unfortunate that until today, nothing has been done in that direction. Rather, the price of cement has been increasing

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Prices are for metric tonnes (Mt), unless stated otherwise. US\$ conversions from local currencies are correct at the time of original publication.

on daily basis," said Dauda, who even suggested that that government subsidise cement at a rate of US\$2.75/bag, regardless of manufacturer or type. It is unclear whether this refers to a US\$2.75/bag subsidy on the current price or a final price of US\$2.75/bag to the end user. *Global Cement* opines that either is highly unrealistic.

Pakistan: Muhammad Hassan Bakshi, the chairman of the Association of Builders and Developers of Pakistan (ABAD), has urged the government to take stern action against alleged cement cartels, which, according to him, have severely affected the construction industry across Pakistan.

In a statement, he said that in May 2019 a 50kg bag of cement cost around US\$3.48, but the same cement now costs US\$4.42/bag, a rise of 21%.

Bakshi said in this situation, Prime Minister Imran Khan's aim of building five million affordable houses would never come true as the cost of construction had reached an all-time high in Pakistan.

He said that ABAD had time and again requested the government to take stern action against the cement and steel cartels as they had been 'inflicting huge losses' on the national economy by 'destroying' the construction sector. He claimed that the construction sector was the

second largest job provider in the country after agriculture.



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

Ad Index



There were interesting discussions at two of the cement industry conferences that I've recently attended, the *Global FutureCem Conference* on CO₂ reduction strategies for the cement and concrete industries, and the *Intercem* event in Istanbul, its 100th edition. Industry experts were asked at both events if there was any prospect of there being a global emissions trading scheme (a 'GETS'). One expert said "It's a fairy tale - it will never happen." Another said, "Yes, it's inevitable. It will happen within five years." The likely outcome probably lies somewhere between the two. But why might it come into being and what would such a scheme look like?

At the moment, around 20% of global emissions are covered by schemes that put a price on carbon.¹ 46 national jurisdictions and 25 sub-national (city, state, collection of states or regional) jurisdictions have a carbon pricing scheme. Notable schemes include the EU ETS, which covers 2Bnt of CO₂ emissions, a scheme in South Korea that covers 500Mt of greenhouse gases and a Chinese city-based pilot scheme that includes up to 1Bnt of CO2 emissions. North American carbon trading systems have emerged at the regional level: nine US States have joined forces in a joint trading system called the Regional Greenhouse Gas Initiative (RGGI), and the Canadian province of Quebec linked with California's emissions trading programme in January 2014.² Countries that are covered by some form of carbon pricing include those in the EU, Switzerland, New Zealand, Japan, Kazakhstan, Mexico, South Africa and Chile. Countries considering a carbon-pricing mechanism include Vietnam, Brazil and Turkey. China expects the first trades in its own national ETS in 2020.³

It's clear then that from the first carbon tax, in Finland in 1990, that the concept has spread world-wide, although not relentlessly: Australian voters threw out a government that had successfully inaugurated a carbon-pricing scheme, in favour of a government that immediately closed it down, 'axing the tax.' However, whether you believe in global warming or not, this is a wave that is picking up momentum.

Carbon pricing comes in a variety of flavours; The widespread 'Cap and trade' model specifies the amount of carbon that can be emitted and scheme participants are obliged to buy permits: The carbon tax model essentially taxes all carbon emissions at the same rate, while a combined 'cap and trade and floor price' model sets a minimum cost for carbon emitters, irrespective of

market demands (such as is the case in the UK, where the government-mandated floor price is now below the price of emissions permits in the EU ETS). Trevor Sikorski describes (from page 58) how the EU ETS has evolved over the years, to - finally - become an effective scheme to deliver carbon emission reductions.

The various schemes around the world differ in their details from each other, but they approach the situation from the same standpoint - to charge the polluter a cost to pollute, on the 'polluter pays' principle. Philippe Fonta suggests on page 24 of this issue that there should be a 'New International Carbon Economy' - and I would like to suggest that this will have to be based on global carbon pricing, which would look like this:

• All major static sources of CO_2 would be included in the scheme - for example, any source contributing more than 10t/yr of CO_2 (or equivalent) - so including schools, hospitals, cement factories, iron and steel works, fossil-fuel power stations and the like;

• The cost will be incurred at the point that the pollutant enters the atmosphere (or earlier if the emission is inevitable, such as with fuel taxes, thus including minor mobile sources, such as cars and trucks);

• All sources of CO₂ will be included - including farming, transport, manufacture and energy - so that the real environmental costs of our choices would be reflected in the actual up-front prices that we pay;

• The price should be uniform worldwide, so that to emit a tonne of CO₂ in Ulaanbaatar would cost the same as in Timbuktu - ensuring a level playing field.

A global level playing field suggests that there would be a single body that would be in charge of the scheme (the United Nations, perhaps), but this begs plenty of other questions: Who would decide on the level of the 'cap'? Where would the money go? Would a developed country have a higher cap than a less developed one?

I don't have all the answers to these questions, but the brightest minds in the human race, who can put (a) man on the Moon, and who can use artificial intelligence to make me look 30 years older (see my new profile picture, above), can certainly figure this out if required. Then it's down to the politicians to agree.

1 Greening construction: The role of carbon pricing,' Aditi Maheshwari, IFC Climate Business Department: Global FutureCem Conference, May 2019, Brussels

2 https://climatepolicyinfohub.eu/global-rise-emissions-trading

3 https://www.reuters.com/article/climate-change-china/update-1-chinaexpects-first-trade-in-national-emissions-scheme-in-2020-idUSL3N21H02B

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