CEMENTING SUSTAINED GROWTH

LEADERSHIP THROUGH INNOVATION

CEMENTING INDIA

Kolkata

30th November, 2018

INDIAN CHAMBER OF COMMERCE

TTC connecting ideas for impact

Foreword

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Cement Industry in India is on a roll at the moment. Driven by a booming real estate sector, global demand and increased activity in infrastructure development such as state and national highways, the cement industry has witnessed tremendous growth. Production capacity has gone up and top cement companies of the world are vying to enter the Indian market, thereby sparking off a spate of mergers and acquisitions. The origin of Indian cement industry can be traced back to 1914 when the first unit was set-up at Porbandar with a capacity of 1,000 ton. Cement industry in India has also made tremendous strides in technological upgradation and assimilation of latest technology. Presently, 93 per cent of the total capacity in the industry is based on modern and environment-friendly dry process technology. The induction of advanced technology has helped the industry immensely to conserve energy and fuel and to save materials substantially.

The cement industry in India is on the right growth trajectory. Yet, there are relevant issues of importance which needs to be looked at. To march ahead in the '2030 Agenda' compliant way, the cement industry needs to adopt state of the art technology to improve efficiency, reduce emissions and gradually shift more towards a circular model with minimal waste. Since this sector directly influences the economy of a nation, a shift to the circular environment will boost the economy to a new level. According to a recent report by the International Energy Agency (IEA) and the Cement Sustainability Initiative (CSI), a combination of technology and policy solutions could provide a pathway to reducing direct carbon dioxide emissions from the cement industry by 24% below current levels by 2050. The Indian cement industry is the most energy efficient compared to the global cement industries. However, there are areas of improvement in the usage of alternate fuels and concrete recycling. As a fast-growing cement market with increasing vulnerability to climate impacts, India has an important role to play in establishing the baseline for effective climate-smart infrastructure, urban planning and decision making.

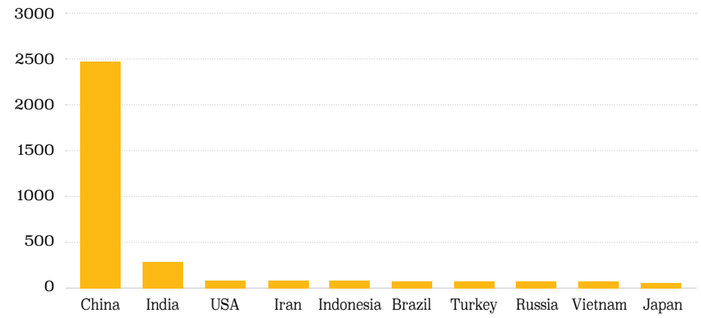
Against this background, **Indian Chamber of Commerce (ICC)** is organizing **'Cementing India'** on 30th November 2018 at Kolkata. **Thinkthrough Consulting (TTC)** has joined hands with ICC as the Knowledge Partner for the summit. We hope this platform will bring together various major players in the industry to share, discuss and evolve suitable sustainable strategies.

Contents

Context

It is impossible to envisage a modern world without cement. The sector is directly associated to economic growth, and growing economies are striving for rapid infrastructure development which would have direct impact on the sector. The Indian cement industry is the second largest cement producer in the world after China with a production capacity of nearly 420 million ton. It accounts for 6.9% of the world's cement output. This industry is vital part of the country's economy, providing employment to more than a million people, directly or indirectly. Cement has a direct co-relation of 1:1.2 with the GDP. With the development of national highways, rural and urban Roads, affordable housing, port connectivity, development of 100 smart cities, preference given to concrete roads India's cement production is expected to double by 2030.

Top Cement Producers in 2016 (million ton)



Adopted from India Brand Equity Foundation (IBEF) www.ibef.org

However, being one of the most energy intensive industries in the world, it has a significant environmental footprint which is a major concern. The Cement Sustainability Initiative (CSI) of World Business Council for Sustainable Development (WBCSD), in cognition of the same also focusses on the two key areas of 'Climate and Energy' and in 'Safety and Health', making SDG3 and SDG13 the most relevant ones for the initiative. Further, the Sustainable Development Goal (SDG) number 9 stresses on the importance of industry, innovation and infrastructure to drive economic growth and empower communities. Some of the targets under different SDGs for the sector come out as:

- Develop quality, **reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure,** to support economic development and human well-being, with a focus on **affordable and equitable access for all.**
- By 2030, **upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes,** with all countries taking action in accordance with their respective capabilities
- Promote climate resilient infrastructure
- Integrate climate change measures into national policies, strategies and planning
- Prevention of health impacts by minimizing environmental pollution

As the SDGs talk about infrastructure, the related sectors in the value chain gets automatic focus, one of the primary sectors being the cement industry.

Dipankar Ghosh
Partner & Lead – Sustainability & Climate Change, Thinkthrough Consulting (TTC)

"Cement is an essential ingredient in the real estate and infrastructure sectors, and continued growth in these two sectors is likely to drive growth in the cement sector as well in the coming years. This year (2018-19), India's cement production is expected to cross 310 million ton, this is a 6.5% growth over the last year, and global cement production is projected to reach 5.4 billion ton by 2050. Cement being a material-intensive, energy-intensive and GHG-intensive commodity, adoption of responsible production process is crucial for the entire cement manufacturing value chain, including mining, calcination, grinding and logistics. 'Circularity' is the way forward for cement industry; it is of utmost importance to imbibe this concept into cement business strategies - a transformative change that will highlight the contribution of the cement industry towards sustainable resource consumption."

Cement production and value chain

Dry, semi-dry, semi-wet and wet processes are the four main process routes that are used for the production of cement. Dry processes are considerably more energy efficient, but the choice of technology mainly depends on the state of raw materials. The availability of dry materials has resulted in many developed countries switching to dry processes. Dry processes are also the choice for new plants or for those looking for expansions or upgrades. The energy-intensive wet process is still used in some countries (and is a considerable share of production in the Former Soviet Union, Australia, and New Zealand), but is being phased out in many countries.

Most of the energy use and CO_2 emissions of the cement industry is linked to the production of clinker, which is the main component of cement and produced by sintering limestone and clay. Electricity needed for crushing and grinding raw materials, fuel, and the finished products represents another important energy demand. Proven technical options with potential to enable considerable reductions in energy use and CO_2 emissions can be categorized into: use of energy efficient technologies; use of alternative raw materials and fuels and reducing the clinker content of cement via increased use of other blends. There are also emerging options in the form of alternative cementitious materials and carbon capture and storage.

Cement Production Process

Fuel Preparation
- Alternative fuels
- Fuel management
- High efficiency mills
- High efficiency classifiers

Raw Material Preparation
- Alternative raw materials
- Process control systems
- Efficient transport systems
- Efficient meal blending
- High efficiency mills
- High efficiency classifiers

Clinker Making
- Energy management and process control
- Improved insulation
- Combustion system improvements
- Heat recovery
- Addition of mineralizers
- Low pressure drop cyclones for preheaters
- Additional pre-heater stages
- Converting to multistage pre-heater systems
- Addition of pre calciner to preheater kilns
- Dry systems with pre heaters and pre-calciner
- Fluidized bed advanced kiln systems

Clinker Cooling
- High efficiency coolers
- Optimized heat recovery
- VSD in cooler fans

Finish Grinding
- Blended cements
- Process control and management
- High efficiency mills
- High efficiency classifiers
- Grinding aids in ball mills
- Improved grinding in ball mills

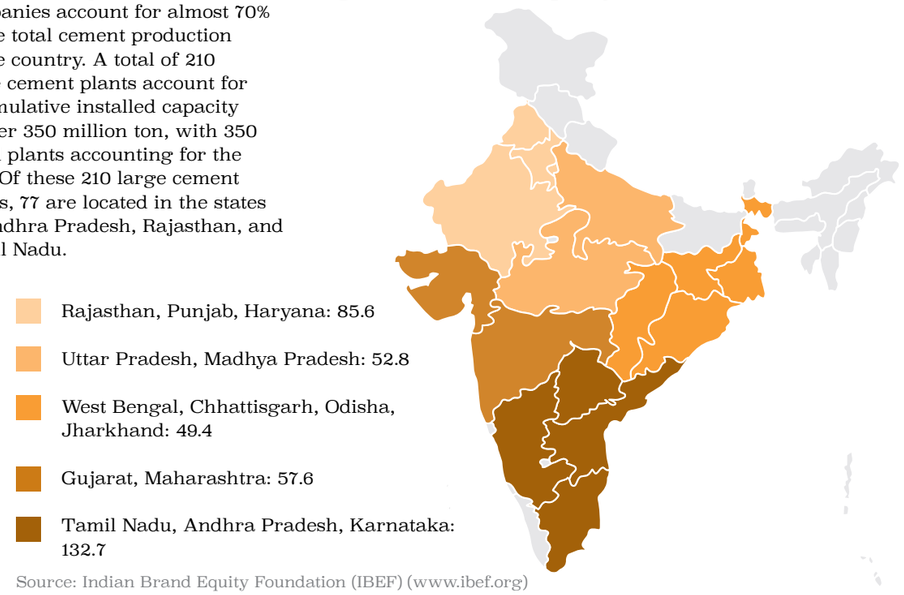
General Measures
- Preventive maintenance
- High efficiency motors and drives
- Variable Speed Drivers (VSD)
- Compressed air and fan systems
- Lighting and control optimization

Emerging Carbon products and measures
- Carbon capture and storage
- Low and negative-carbon cement alternatives

Adopted from Industrial Efficiency Technology Database, Institute of Industrial Productivity

In India, the top 20 cement companies account for almost 70% of the total cement production of the country. A total of 210 large cement plants account for a cumulative installed capacity of over 350 million ton, with 350 small plants accounting for the rest. Of these 210 large cement plants, 77 are located in the states of Andhra Pradesh, Rajasthan, and Tamil Nadu.

Region-wise Cement Capacity in MTPA



Source: Indian Brand Equity Foundation (IBEF) (www.ibef.org)

Innovation

On a 'business as usual' trajectory, global cement production is set to increase to over 5 billion ton a year over the next 30 years[1]. The infrastructure demands and urbanization are not limited to housing. Providing clean water, sanitation and energy services typically relies on concrete, whether for transport infrastructure, wind farms or hydroelectric dams. In this milieu, continuing efforts to meet the UN Sustainable Development Goals (SDGs) are expected to result in $60 trillion being invested in such infrastructure in developing countries by 2030[2]. Shifting to a climate resilient pathway, will require going further and moving faster on all available solutions, as well as making sure that the next generation of innovative technology options is ready as soon as possible. In order to drive innovation in this sector there is a need to focus on a cradle to cradle approach. Some of the strategies are shown below:

Innovation in Cement Industry

Resource Efficiency
- Alternate Fuels
- Raw Material Substitution
- Clinker substitution
- Novel Cements
- Transport efficiency

Energy Efficiency
- Electrical energy efficiency
- Thermal energy efficiency

Carbon Sequestration and Reuse
- Carbon Sequestration and Reuse
- Biological carbon capture

Product Efficiency
- Low carbon concrete

Downstream
- Smarter building and infrastructure development
- Recycling concrete
- Re-carbonation
- Sustainable construction

Source: Innovation in cement industry (http://lowcarboneconomy.cembureau.eu/)

[1]International Energy Agency (2017), Energy Technology Perspectives 2017; Müller, N. and Harnisch, J. (2008), A blueprint for a climate friendly cement industry, WWF International, http://awsassets.panda.org/downloads/englishsummary__lr_ pdf.pdf

[2]The New Climate Economy (2016), The Sustainable Infrastructure Imperative: Financing for Better Growth and Development, Washington: World Resources Institute, http://newclimateeconomy.report/2016/wp-content/uploads/sites/4/2014/08/NCE_2016Report.pdf

Governments and major concrete-consuming companies need to grow the market for low-carbon building materials by restructuring procurement processes. This will involve incentivizing investment in distribution networks for clinker substitutes, additional processing equipment and storage infrastructure and scaling up best-practice dissemination and support to make the use of new products feasible. International commitments need to be agreed upon on a net-zero-emissions, resilient built environment; science-based target setting and working together to achieve them. There is a requirement to mobilize a coalition to explore what it would mean to have 'circular' built environment and scale up finance for sustainable infrastructure.

New opportunities can be created by the disruptive trends surrounding the sector which in turn can accelerate the use of low-carbon cement or concrete technology. The disruptive effects of digitalization, introduction of new business models, and the sustainability expectations of investors and consumers – are catering to a wide range of industries. An amalgamation of improved connectivity, remote monitoring, predictive analytics, 3D printing and innovation in design is already transforming traditional supply chains within the construction sector. McKinsey recently published research on potential use cases for artificial intelligence (AI) in the engineering and construction sector, predicting that AI will play an increasingly significant role in the sector in the coming years[3]. Such changes can result in consumption of cleaner cement and concrete, as well as lower overall cement demand.

Sustainability challenges

Cement belongs to the most often used building materials and its production is increasing over the world. Building industry is one of the leaders in deterioration of environment by depleting resources and consuming energy or creation of waste. The key sustainability challenges the cement industry is facing today is shown below.

Key Sustainability Challenges in Cement Industry; (Source: CSI)

Employee Health and Safety
- Work accidents and occupational diseases have an enormous impact on the health of workers and considerable economic and social impacts
- Risks assessment becomes a crucial and strategic answer to preserve workers health and safety on the one hand and to maintaining a qualified labour on the other hand.

Climate Change impacts
- Cement production causes approximately 5% of global man-made CO_2 emissions.
- 50% of emissions are process emissions that happen during clinker production, 40% come from the burning of the fuels to heat the cement kiln, 10% come from electricity use and transportation.

Use of fuels and raw materials
- By-products from domestic, industrial, or agricultural sources can be used as fuels, partially replacing traditional fossil fuels.
- Reduction in burning of fossil fuels, groundwater pollution, methane generation and hazardous ash residues.

Emissions
- Major source of emissions such as CO_2, NO_x, SO_x, VOCs, Particulate matter etc.
- The major environment health and safety issues are emissions to air and energy use

Community Impact
- Job creation
- Necessity for a business model that respects, appreciates and cares for both local landscapes and the people who live in them.

Water
- Major sustainability challenge. Cement production requires water for cooling heavy equipment and exhaust gases, in emission control systems such as wet scrubbers, as well as for preparing slurry in wet process kilns

Concrete Sustainability
- Concrete Recycling
- Responsible Sourcing

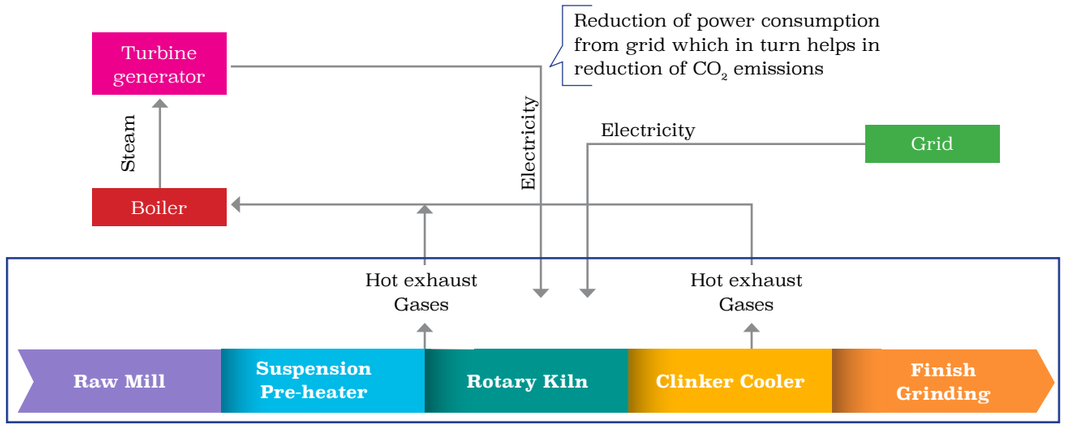
[3]Blanco, J. L., Fuchs, S., Parsons, M. and Ribeirinho, M. J. (2018), 'Artificial intelligence: Construction technology's next frontier', McKinsey & Company, https://www.mckinsey.com/industries/capital projects-and-infrastructure/our-insights/artificial-intelligence-construction-technologys-next-frontier?cid=other-eml-alt-mip-mck-oth-1804&hlkid=9cffea706869405a958e0695fbaa6785&hctky=3020283&hdpid=af68edb8-20a1-45a9-a41e-015991519e06

Leading practices

Waste Heat Recovery Process
Cement production process is highly energy intensive with approximately 3-4 GJ energy consumption per ton of cement produced. The production process is characterized by a significant amount of heat loss mainly by the flue gases and the air stream used for cooling down the clinker. Waste heat can be reused for some useful and economic purposes. A heat recovery system could increase the efficiency of the cement plant as well as reduce the amount of CO_2 emissions to the environment by lowering the temperature of the exhaust gases.

The figure below depicts how the waste heat from different sources can be reused in the production process. The hot exhaust gases from the suspension preheater and clinker cooler can be used to heat the boiler.

Typical Waste Heat Recovery Process



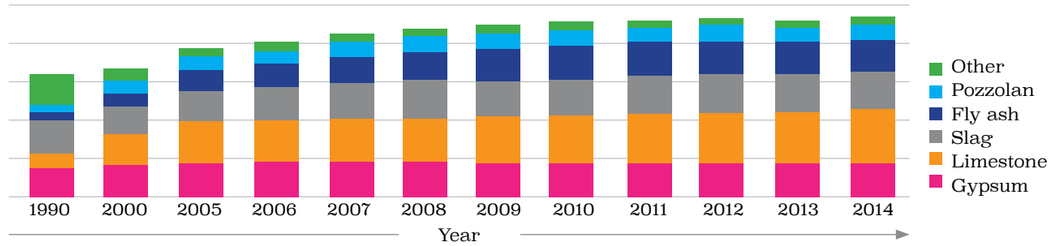
Benefits
- Reduces purchased power consumption (or reduces reliance on captive power plants), which in turn reduces operating costs
- Mitigates the impact of future electricity price increases
- Enhances plant power reliability
- Improves plant competitive position in the market
- Reduces greenhouse gas emissions

Use of Alternate Fuels and Biomass
Fossil fuels and raw materials used by Indian cement plants can be replaced to a large extent with AFR. Typical wastes streams that can be used as AFR in the Indian cement industry include the following:

- Industrial wastes
- Pre-processed industrial wastes
- Sorted municipal solid waste (MSW)
- Refuse-derived fuel (RDF) from MSW
- Discarded tires and tire chips; expired consumer goods e.g. medicines and fast moving consumer goods (FMCG)
- Waste oils and solvents
- Non-recyclable plastics paper residues
- Biomass (such as rice husk, coconut shells and groundnut shells)
- Effluent treatment sludges from water and wastewater treatments plants
- Lime sludges from paper and allied industries.

Clinker Substitution
Replacing the clinker with additive materials such as fly ash / blast furnace slag not only reduces the power consumption, but also protects the environment, conserve the limestone and coal as well as reduce the amount of GHG emissions. The most common clinker substitutes (figure below) are reactive by-products from other industries: granulated blast furnace slag (GBFS), a by-product of pig-iron production in blast furnaces, whose use in cement dates from before 1900; and fly ash (FA), generated by burning coal to produce electricity. However, the most commonly used clinker substitute is limestone filler.

Clinker substitution evolution in last 25 years



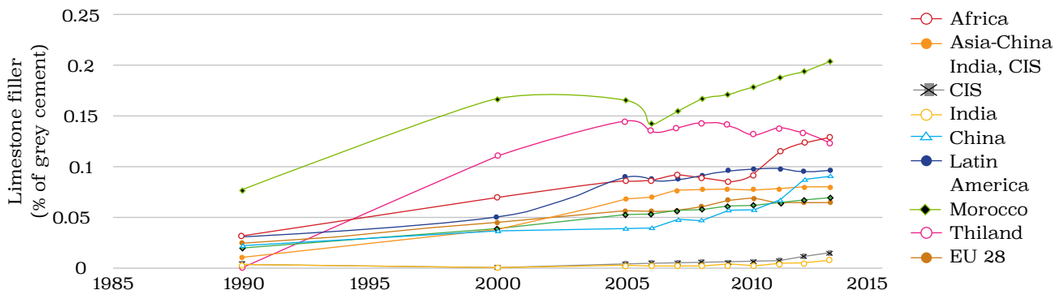
Source: Eco-Efficient Cements: Potential Economically Viable Solutions for a Low-CO_2 Cement-Based Materials Industry, United Nations Environment Programme (2017)

The figure above shows the evolution of clinker substitutes over the past 25 years for companies in the CSI's Getting the Numbers Right (GNR) database. It shows that the of clinker substitution is levelling off as the supply of the most desirable clinker substitutes — particularly blast furnace slags and coal fly ash of adequate quality — is rather modest compared to total cement production.

Producing Composite Cement
One of the latest trend and recent development in the cement industry is to produce composite cement where in clinker is replaced with both blast furnace slag and pozzolonic material like fly ash. Composite cement will have the best properties of cement like low heat of hydration, resistance against chemical attack with the equivalent strength portion. Producing composite cement ensures reduction in specific energy consumption, complete utilization of waste and conservation of limestone and hence greenhouse gas emission reduction.

Fillers as Supplementary Cementitious Materials (SCMs)
Fillers are fine particulate materials, inert or weakly reactive, produced by grinding, that can partially replace clinker or other reactive SCMs. The use of fillers to dilute or extend more valuable raw materials is widespread in other industries, including plastics. Fillers are also a convenient clinker substitute for the cement industry. Since they do not require calcining, filler use could be very interesting from an economic and environmental perspective. Their production needs only energy for grinding. Since many minerals can be used as fillers, they are available everywhere in effectively unlimited quantities.

Limestone filler content in grey cement for selected regions[4]



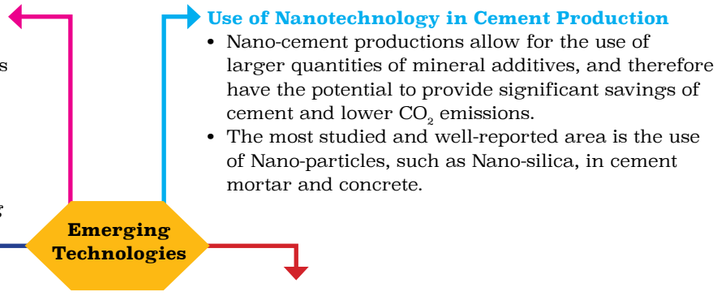
Source: Eco-Efficient Cements: Potential Economically Viable Solutions for a Low-CO_2 Cement-Based Materials Industry, United Nations Environment Programme (2017)

Limestone filler has become the most widely used clinker substitute with an average content (among GNR companies) of around 7% that has remained constant since 2010. Because a fraction of the limestone does react with available alumina to form carbo aluminate phases which contribute to strength and durability. The average of limestone filler used in cement varies from 1–20% from country to country (see figure above). Several factors influence the acceptance of filler: a history of poor quality, forged high-filler cement, or other cultural circumstances may keep standard limits low; the existence of local over-capacity of clinker productions may make filler less attractive to cement producers, etc.

[4]CIS: Commonwealth Independent States; EU: European Union

Emerging Technologies

Emerging technologies can significantly improve CO_2 emissions reduction of the cement industry at various stages of development.



Source: Good Practices Manual for Cement Sector produced by National Productivity Council and supported by Department of Industry and Policy Making

Indian cement sector and sustainability[5]

Sustainability awareness has picked up momentum in recent years in the Indian cement industry, and several efforts are on by both cement manufacturers and major plant and machinery and auxiliary equipment manufacturers to integrate sustainability issues, essentially in energy conservation, resource optimization and environmental planning and management. For the cement industry, the major focus areas for sustainability are improving thermal energy efficiency and process technology, optimizing fuel composition, including the use of waste as fuel, waste heat recovery, reduction in clinker factor, especially through increased rates of blending, and renewable energy. It is heartening to note that most of the cement companies have developed specific initiatives and road maps to reduce their organizational carbon footprint.

The Indian cement industry takes pride in being a key contributor to the country's circular economy. It is probably one of the most energy- efficient in the world today. The domestic industry uses around 40-50 million ton fly ash and 15 million ton blast furnace slag annually to produce blended cements Most of the major players have been adopting the best manufacturing practices right from mining to production to sales and distribution, across all units and disciplines by optimizing energy, natural resources and technology. Some of the plants have thermal and electrical specific energy consumption (SECs) comparable to the best cement plants in the world, resulting in low emission intensities. Some of the measures taken up by the Indian cement plants to improve energy efficiency are reduction of pressure drop of pre-heater tower, waste heat recovery units, improvement of burner and operation, improvement of raw mix design and its burning ability, improvement in plant productivity, reduction in leakages across the system, improvement of plant layout, etc. If we look at the global average electricity consumption per ton of cement (kWh/ton of cement), Indian cement industry's average is 23% less and our best performing plants are operating near 64 kWh/ton of cement, which is about 38% less than the global average. Also, the specific thermal energy consumption (kCal/kg of clinker) is about 12-15% less compared to the global average.

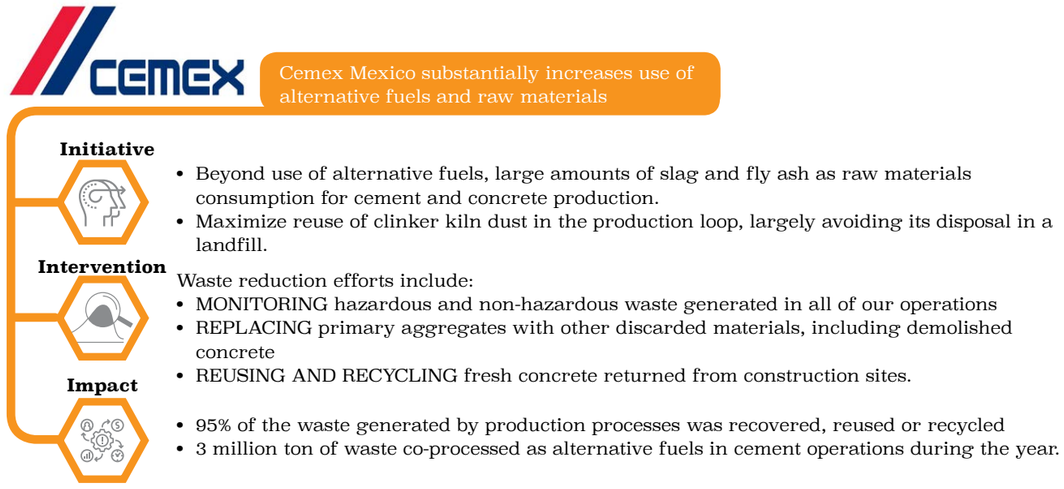
Indian cement industry has been quite upbeat in use of fly ash in blended cement production. The environment friendly disposal of fly ash has helped in creating value for both thermal power plants (waste generator) and the cement industry (waste disposer). Portland Pozzolana Cement (PPC) production in India has helped avoidance of about 212 million ton CO_2 in the last five years (FY 2011-12 to FY 2015-16),. This is equivalent to generating about ₹1,564 billion natural capital value within a five year period on Greenhouse gas (GHG) emission avoidance alone. Although, cement industry is the largest utilizer of fly ash, the annual fly ash utilization ranges only 58 to 61%.

Compared to the global average, the progressive cement companies in India are quite successful in producing cement with low carbon and energy footprints. However, India is yet to reach its maximum potential in utilizing alternative fuels in domestic cement industries. In Europe, on an average 30-40% of kiln heat comes from burning of waste materials (alternative fuels). In India this value has only reached 4% despite enormous potential. Concrete recycling is yet another area which needs attention. It is quite well established in developed countries. In India, however, it is a major challenge due to multi-stakeholder involvement in solid waste management. There is quite slow progress in this as dumping of construction and demolition waste remains a cheaper option.

[5]Trying to cement a sustainable future (https://www.thehindubusinessline.com/specials/clean-tech/trying-to-cement-a-sustainable-future/article9947520.ece

Initiatives taken around the world

Initiatives by Cemex Mexico to increase use of alternative fuels and raw materials (Source: Cemex Sustainability Report, 2017)



Water management initiatives by Lafarge Holcim (Source: Sustainability Report 2017, Lafarge Holcim)

LafargeHolcim

Improving water management throughout the value chain in Colombia

Initiative

- Working on the SuizAgua Colombia project, a public–private alliance led by the Swiss Embassy in Colombia and the Swiss Agency for Development and Cooperation.

Intervention

- Recycling of the industrial wastewater of their ready-mix concrete plants instead of discharging it
- Measurement and reduction of water footprint, implementation of social and environmental responsibility actions around water management and raising awareness of the issues.

Impact

- Implementation of cutting edge technologies has already reduced their water consumption by up to 11 percent

Initiatives by Votorantim to reduce emission of nitrogen oxides (Source: Integrated Report 2017, Votorantim)

Votorantim

Processes optimization reduces the emission of nitrogen oxides in the atmosphere

Initiative

- Process optimization through SNCR (Selective Non Catalytic Reduction) and alternative fuels to reduce emission of NO_x in atmosphere

Intervention

- Use of industrial waste and disused tires as alternative fuels was a major step
- Deploying the SNCR system which makes use of the urea solution as a reducing agent. The process, which has large equipment to the capitation of NO_x

Impact

- Reduction of NO_x emitted in the atmosphere and use of urea in the production process.

Sustainable land use initiatives implemented by Heidelberg Cements (Source: Sustainability Report 2017, Heidelberg Cement)

HEIDELBERGCEMENT

Promotion of sustainable land use in Tanzania

Initiative

A public private partnership (PPP) project between Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) and Tanzania Portland Cement Company (TPCC), was launched. The main focus of the PPP was to promote sustainable land use around the TPCC quarrying sites by setting up a tree nursery.

Intervention

In the schools surrounding the cement plant, the company has started so-called Roots & Shoots conservation groups, which receive guidance and support from JGI(Jane Goodall Institute). Each month, one of the groups is invited to take part in a one-day training workshop at the nursery. Afterwards, saplings are delivered to the schools, which the students plant in and around the schoolyard. Every tree is adopted by a caregiver, who is responsible for watering and protecting the sapling

Impact

- Appreciation by the local community
- Sustainable land use near the quarry sites

Road ahead

The cement sector is responsible for 7% of global energy use and contributes to 7% of global CO_2 emissions. According to a new report by the International Energy Agency (IEA) and the Cement Sustainability Initiative (CSI), a combination of technology and policy solutions could provide a pathway to reducing direct carbon dioxide emissions from the cement industry by 24% below current levels by 2050.

Focus on low carbon transition of cement sector will automatically demand innovation in the value chain to be put into place and result in aligning to the corresponding SDGs. Innovation can drive an increase energy efficiency in industrial plants, manufacturing facilities, and distribution. Many Indian companies have shown great efforts in adopting circular economy. There is more to be done to gradually complete the transition from a linear model to circular model. The crux of this model lies in treating one industry's waste as a resource for another industry. Companies are showing interest to set up their units near power stations to use the fly ash generated from these power plants as a substitution to clinkers.

As a fast-growing cement market with increasing vulnerability to climate impacts, India has an important role to play in establishing the baseline for effective climate-smart infrastructure, urban planning and decision making. Figure 12 lists out some of the priorities which can be adopted in India.

Priorities of Indian cement industry

- Develop an industrial policy to expand indigenous innovation capacities around low-carbon construction processes and products
- Support firms in promoting more industrial use of cements, in concert with growth and consolidation in the sector
- Scale up the use of fly ash and blast furnace slag, currently underutilized in many Indian states
- Develop climate-resilient infrastructure and city plans
- Establish a national framework for sustainable or green public procurement for construction

Source: Making Concrete Changes, Innovation in Low-carbon Cement and Concrete, Chatham House Report Johanna Lehne and Felix Preston

There are many options that the industry could adopt to conserve natural resources. Adopting feasible solutions from a thorough analysis of the sustainable measures adopted in these benchmarks, and rolling out efficient and innovative customized solutions for the Indian scenario is an urgent need of the hour. There is a huge potential for alternative fuels adoption in the Indian cement industry. Alternate Resources and Materials (ARM) such as coating residue, industrial lime and lime sludge, gypsum from gas desulphurization are promising options. There is a need to increase usage of alternative fuels needs to be in the blending process.

As technology continues to progress and institutional pressures to reduce GHG emissions and energy intensities start to mount, the cement industry is resorting to cleaner and more sustainable methods of producing cement. The cement industries need to increase the proportion of energy from renewable sources. There is also a necessity to identify and adopt new technologies and process improvements to reduce fossil fuel combustion from industrial plants and manufacturing facilities. Adoption of the global best practices can help in curtailing the emissions with minimum environmental impact. Responsible sourcing of materials and a shift from linear to circular economy approaches to reduce, reuse and recycle materials is also required to swiftly shift to a low carbon era.

"For a developing country like India, infrastructure is indispensable to achieve the main development targets such as urbanization, industrialization, power generation, irrigation structures, and sustainable economic development. The population of India is growing and in order to meet the infrastructural requirements of 1.3 billion people, construction needs to be paced up. At the same time, it is important to bring to notice the negative impact of such 'business as usual' development on the climate and environment. As cement industries have a direct correlation with employment, economy and environment, they can set a remarkable example by incorporating leading practices and sustainability concepts into their day to day business."

Parul Soni
Global Managing Partner,
Thinkthrough Consulting (TTC)

About ICC

Founded in 1925, Indian Chamber of Commerce (ICC) is the leading and only National Chamber of Commerce operating from Kolkata, and one of the most pro-active and forward-looking Chambers in the country today. Its membership spans some of the most prominent and major industrial groups in India. ICC's forte is its ability to anticipate the needs of the future, respond to challenges, and prepare the stakeholders in the economy to benefit from these changes and opportunities.

Set up by a group of pioneering industrialists led by Mr G D Birla, the Indian Chamber of Commerce was closely associated with the Indian Freedom Movement, as the first organised voice of indigenous Indian Industry. Several of the distinguished industry leaders in India, such as Mr. B M Birla, Sir Ardeshir Dalal, Sir Badridas Goenka, Mr. S P Jain, Lala Karam Chand Thapar, Mr. Russi Mody, Mr. Ashok Jain, Mr. Sanjiv Goenka, have led the ICC as its President. Currently, Mr. Rudra Chatterjee is leading the Chamber as its President.

ICC is the only Chamber from India to win the first prize in World Chambers Competition in Quebec, Canada.

ICC's North-East Initiative has gained a new momentum and dynamism over the last few years. ICC has a special focus upon India's trade & commerce relations with South & South-East Asian nations, in sync with India's 'Look East' Policy, and has played a key role in building synergies between India and her Asian neighbors through Trade & Business Delegation Exchanges, and large Investment Summits.

ICC also has a very strong focus upon Economic Research & Policy issues - it regularly undertakes Macro-economic Surveys/Studies, prepares State Investment Climate Reports and Sector Reports, provides necessary Policy Inputs & Budget Recommendations to Governments at State & Central levels.

The Indian Chamber of Commerce headquartered in Kolkata, over the last few years has truly emerged as a national Chamber of repute, with full-fledged offices in New Delhi, Mumbai, Guwahati, Ranchi and Bhubaneshwar & Hyderabad functioning efficiently, and building meaningful synergies among Industry and Government by addressing strategic issues of national significance.

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About TTC

TTC is a multidisciplinary professional services organization that specializes in providing advisory support to sustainable development initiatives, and strives to engage with clients to address critical challenges by providing access to the best possible expertise and solutions for achieving efficiency and creating the desired impact. TTC provides complete range of solutions on sustainable development, ranging from sustainability strategy, reporting, assurance, climate change (mitigation, adaptation, finance), energy issues, healthcare, CSR to ethical business, and supporting corporates, foundations, government, civil societies, multilateral/bilateral agencies and impact funds, assisting across diverse thematic areas, often focusing on the 'multi-sector approach', facilitating the synergy between the sectors for holistic sustainable development.

We derive our strength through our unique structure which is based on our strong multidisciplinary team, our Global Advisory Council and our Strategic Partners.
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