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DECARBONISING

Resource conservation, process optimisation and above all awareness, will create the green carbon footprint that the industry needs.

EXPERT SPEAK

- Col Rajnish Kapur, JK Cement
- Rajesh Kakkar, Birla Corporation
- Prashant Bangur, Shree Cement
- Dr. Hitesh Sukhwai, JK Lakshmi Cement
- Ashok K Dembla, Humboldt Wedag
- S K Rathore, JK Cement
- Jamshed Cooper, HeidelbergCement
- Sanjay Joshi, Nuvoco Vistas
- Jim O'Brien, CSR Consulting, Ireland
- Dr. B N Mohapatra, NCCBM
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Decoding Decarbonisation

Efforts are on at every quarter of the Indian cement industry to have a more sustainable and carbon neutral way of producing cement. With companies like leading by example, there is much to learn. **Jamshed N Cooper, Managing Director, HeidelbergCement India Limited (HCIL)**, takes into account various aspects of cement production that affect sustainability efforts and suggests the way forward toward carbon neutrality.



Every debate or conference in today's world runs the risk of being termed incomplete if it was not to touch upon 'sustainability'. To name a few, 'carbon neutral', 'decarbonisation', 'alternative fuel resources', 'net-zero' are increasingly becoming integral to every business on our planet for mitigating the impact of climate change. The philosophy 'Polluter Pays' is gradually getting implemented in many countries whereby Carbon Tax is imposed on industries and products for their share of emissions. In India, we still enjoy a free hand when it comes to carbon emissions. But for how long?

The Indian cement industry emits 210 MT of CO₂ annually ie. 10 per cent of global cement industry emission. Every tonne of cement produced in India, ~580 kg CO₂ is emitted as against the average of ~620 kg/to that of the world cement industry. Undoubtedly, Indian industry has demonstrated its leadership on this count and should continue to lead the global cement industry by continuing to reduce its emissions year after year. HeidelbergCement India Limited (HCIL) takes pride in having contained our

carbon emissions to 512 Kg/t of cement and strive to reduce it further.

Reducing emissions by the cement industry calls for a multi-faceted approach. The share of CO₂ is maximum at the production stage of clinker (~820 kg CO₂ /t of clinker) and therefore reducing the clinker factor in cement would yield maximum reduction of CO₂. Replacing clinker with fly-ash or slag or other cementitious materials is widely practiced by the cement industry but the current levels are not enough. There lies immense potential to reduce the clinker factor further by increasing absorption of cementitious materials and this calls for amendments in the BIS standards for blended cements which in my view is a low hanging fruit. HCIL is a 100 per cent blended cement producer with fly-ash absorption touching close to 35 per cent, which is the maximum permissible limit under current BIS Standards.

Accelerating decarbonisation by the Indian cement industry needs the support of the Government by way of promoting use of blended cement in infrastructure projects. Currently, Ordinary Portland Cement (OPC) by default gets mentioned in all tenders

and specifications. The need of the hour demands that blended cements find their mention in the tenders alongside allowing the contractors discretion on selection of type of cement.

RETHINKING ENERGY SOURCES

Power and fuel are major inputs in cement production. Limiting dependency on fossil fuels / grid power and replacing them with green power / waste heat recovery / alternative fuels will go a long way in decarbonising the cement industry. HCIL has been able to replace 25 per cent of its grid power with green power and are now targeting to achieve 40 per cent replacement in the year ahead. Accelerating the use of alternate fuels viz. biomass, municipal solid wastes (MSW), rice husks etc are also being considered as replacement of fossil fuels.

When it comes to sustainability, every drop counts and therefore the company's initiatives are in areas of water conservation, tree plantations, bio-diversity management, etc. Water harvesting initiatives at HCIL have made our operations 4.4 times water positive certified by BVQI. With focus on mining responsibly, the company's mines are home to 117 bird species-certified by a survey spearheaded by Birdlife Natural history society. Its 'Friends of Earth' initiative is dedicated to making the world a wonderful place to live for generations to come, and has been motivating people to volunteer in planting trees. Reclaiming the mined areas and replantation activities carried out in a systematic manner has resulted in the growth of dense forests in and around our cement plants thus resulting in a drop in ambient temperature of ~1.2 degree celsius when compared to that prevailing a kilometer away.

ANALYSING THE RISK FACTORS

Decarbonising the cement industry is a long journey, which needs to be shortened given the imminent risks of global warming. Today, when it comes to comparing emission standards relating to ambient air particulate matter, SOX and NOX emissions, India is no less than its counterparts in other countries. However, when we talk about CO₂ emissions, we have a long way to go. Technologies being adopted by developed nations with respect to Carbon Capture and Storage (CCS), Carbon Capture and Reuse/Recycle (CCR) are costly and not accessible to us at economical costs. Given the inevitable, CCS / CCR seem to be the way forward for achieving carbon neutrality.

Decarbonising the Indian cement industry would call upon the industry to invest in technologies that

are immensely capital intensive and if done would threaten not only to erode the competitiveness of the industry but also make cement unaffordable. A visionary approach of the Government has become increasingly prudent to strike a balance between societal pressures for decarbonising and at the same time meet the burgeoning need for housing and augmenting the country's infrastructure.

The current European standards call for containing CO₂ emissions by the cement industry at ~500 kg/t of cement. Given our current levels of ~580 Kg emissions, we need a road map to reduce our emissions by 2030. Regulatory interventions followed by subsidies for technology adoption would be essential going forward. In Europe, carbon credits is trading at ~70 Euros per tonne CO₂, which has more than doubled from 30 Euros over last year. The governments in developed countries are subsidising CCS technologies as they remain unaffordable to the industry.

The HeidelbergCement Group has emerged as a pioneer in the cement industry to set up the first carbon capture and storage project at Brevik, Norway.

CARBON CAPTURE AND STORAGE TECHNOLOGY

The Brevik (Norway) plant has a total production of 1.3 MT of cement per annum, which releases around 820 KT CO₂ every year. With the deployment of Carbon Capture and Storage (CCS) technology, the project would be able to capture 400 KT of CO₂ annually ie. ~50 per cent of its emission starting from 2025. The project was initiated around four years ago and the FEED study was completed towards the end of 2019. During the fag end of 2020, our Group received the parliamentary approvals for the project, which is now under implementation.

Capturing CO₂ definitely is a challenge but storing it securely is a bigger challenge. There are two ways of storing CO₂ underground:

- (i) Depleted saline aquifers
- (ii) Depleted oil and gas fields ie. under the sea.

There have been numerous studies for storage of CO₂ under the sea, which have proved that the storage of CO₂ under seabed is basically returning it to the place from where it originated thus making it more of a natural phenomenon. A research carried out by Shale on CO₂ storage underground has concluded that it would be 100 per cent safe. Studies indicate that the amount of CO₂ that can be stored worldwide is enormous. Europe alone can store 60 years of CO₂ emitted by its power plants.

HeidelbergCement in Norway has signed an MoU with Equinor – holder of oil fields with shells to



Captured CO₂ can be liquified and transported in special ships to be transferred to the sea bed.

transport and store CO₂ under the sea. The captured CO₂ would be liquified and transported in special ships where it will be transferred into the seabed permanently. The CO₂ liquefaction, transportation and burial under seabed would be carried out by Equinor at an operational expense of ~15-30 euros per ton of CO₂. Majority of this cost would be funded by the state of Norway.

THE INDIAN STANDPOINT


In India, the cost of setting up a cement plant averages around \$ 110-120 / tonne of cement. However, back of the envelope calculation for building a CCS project would be close to \$830-880 / tonne of CO₂ captured i.e. roughly 7-8 times the cost of setting up a cement plant.

Decarbonising the Indian cement industry using advanced CCS technologies in the current context seems to be a distant dream. Nevertheless, we need to make a beginning and go for the low hanging fruits such as:

- Government projects should adopt the use of blended cement and not insist on the use of OPC alone.
- Flyash addition for Portland Pozzolana Cement (PPC) is currently restricted to 35 per cent as under BIS Specifications. The same should be enhanced to 40 per cent.
- Performance enhancing materials to the extent of max 10 per cent should be permitted under the BIS Specifications.
- Waste Heat Recovery Power Generation projects should be recognised as a source of green power.
- Incentivise cement manufacturers who achieve >20 per cent TSR (Thermal Substitution Rate) using alternative fuels.

The above stated quick wins are an opportunity to the Indian industry to reduce ~25–30 million tonnes of CO₂ emissions out of 210 million tonnes it emits annually.

While the industry is making its effort to achieve carbon neutrality, it also calls upon cement consumers to demonstrate responsible behaviour by showing their preference for green products. To create consumer awareness and enable them to choose wisely, product labelling would be essential. HeidelbergCement has recently launched a cement brand ‘Primo Greencem’ in Southern India (by Zuari Cement) that carries a label on the bag showing our carbon footprint. This endeavour is one of its kind making us the first in the world to have labelled the cement bag with a CO₂ scale.

Decarbonising is a journey that could be made pleasant by taking a collaborative approach among manufacturers, government bodies and cement consumers. “After all, we are obliged to handover the world we inherited from our ancestors to our future generations so that they, too, could survive and thrive the way we did. It’s all about demonstrating responsible behaviour and making the world a wonderful place to live for our generations to come.” 

ABOUT THE AUTHOR:



Jamshed N Cooper, Managing Director, HeidelbergCement India, has over 36 years in the cement industry. He joined the company as Head of Sales & Marketing in December 2006. He is credited for revamping the sales and marketing setup of the company and launching the ‘mycem’ brand, which is now positioned as a premium category cement in central India. He is also the Managing Director of Zuari Cement Limited and Chairman of Gulbarga Cement Limited (which are part of HeidelbergCement Group).