LOW CARBON CEMENT

- Supporting Sustainable Development of Emerging Economies

Agenda

16th November, 2016, Green Zone

TIME	TOPIC	SPEAKER	AFFILIATION
15.00 hrs	Introduction to Side Event on Low Carbon Cement	Moderator's space	Development Alternatives
15.05 - 15.20 hrs	***Key note address:*** Low Carbon Cement and its potential in mitigating climate change	Prof. Karen Scrivener Directrice	Ecole Polytechnique Federale De Lausanne, Switzerland
15.20 - 15.30 hrs	Application and benefits of LC^3 - The India Perspective	Dr. Soumen Maity Team Leader - Technology	Technology & Action For Rural Advancement, India
15.30 - 15.45 hrs	Life Cycle Assessment of LC^3 - Global Implications	Prof. Ravindra Gettu Associate Dean - Industrial Consultancy and Sponsored Research	Indian Institute of Technology Madras, India
15.45 - 15.55 hrs	Contribution of cement industries in reducing global emissions	Tbc	Tbc
15.55 - 16.05 hrs	North – South technology transfer models - Supporting sustainable development through technological interventions	Dr. André Wehrli Program Manager Global Program on Climate Change (GPCC)	Swiss Agency for Development and Cooperation, Switzerland
16.05 - 16.25 hrs	Panel discussion *Contribution of a Low Carbon Cement to the sustainable development of emerging economies - Way Forward*	Designated Speakers	
16.25 - 16.30 hrs	Summing up and Key Message	Moderator	Indian Institute of Technology Delhi, India

Tbc: To be confirmed

Low Carbon Cement

Supporting Sustainable Development of Emerging Economies

World cement production is projected to be about 6 billion tons in 2050. Cement is one of the backbones for development of emerging economies. Currently emerging economies are the leading producers and emitters of CO_2 in the world from cement production. Production of cement also consumes natural resources in bulk quantities. The sheer volume of its production contributed about 8% to global CO_2 emissions in 2014. However there is a huge potential in cement industry in contributing towards sustainable development of emerging economies by shifting to blended cements. A consortium of prominent research institutes and social enterprises and industries from India, Switzerland and Cuba have developed new ternary blend of cement which substitutes up to 50% of clinker from conventional cement and reduces 30% of CO_2. The cement also saves natural resources by utilising waste materials. The research is supported by Swiss Agency for Development and Co-operation (SDC).

Cement is one of the largest produced construction materials in the world. Its production accounts for 3-7% of total man-made emissions. Though cement production is one of the most sustainable materials known to man, the sheer quantity of its production puts it amongst the top contributors of human CO_2 emissions. As per WBCSD[1] total volume of world cement production in 2014 was 848 million tons. The major contributor of CO_2 emissions in cement production is process emissions i.e. production of clinker, one of the main constituents of cement. In 2014 cement production contributed about 8% to global CO_2 emissions 4.1% of which came from clinker production[2]. Cement production also consumes natural resources such as limestone. Though earth crust is rich in limestone, the huge volumes of cement production and projected demand world-wide (Figure 1) puts huge pressure on this resource. Thus to save resources and reduce CO_2 emissions use of clinker in the cement mix should be as minimum as possible. Cement industries around the world recognised this and have shifted to blended cement by replacing clinker with fly ash and slag. Both are industrial wastes. However availability of industrial waste varies with the region. As per 'Getting Numbers Right' data based on Cement Sustainability Initiative, use of fly ash and slag in cement have fluctuated since 2007; however limestone use have increased constantly.

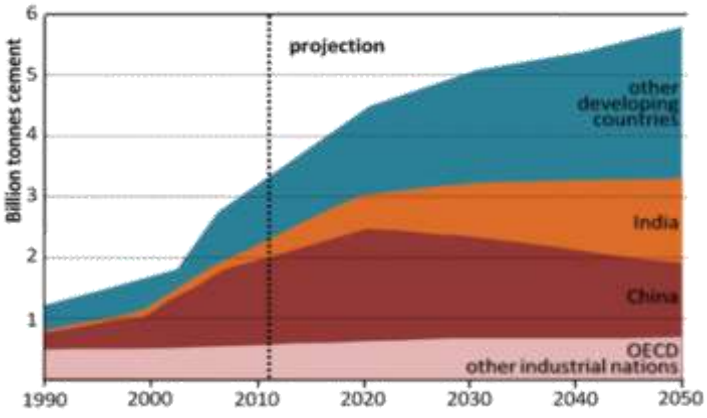

Figure 1 Rise in Cement Production until 2050 (Adapted from CEMBUREAU)

To address the twin issues of CO_2 emissions and saving natural resources, a new cement blend has been developed by a consortium of EPFL, IIT-Delhi, IIT-Madras, IIT-Bombay, TARA and CIDem through a project funded by Swiss Agency for Development and Corporation (SDC). The cement blend uses 50% clinker, 15% Non-cement grade (waste) limestone, 30% Waste China Clay (Overburden) from mines and 5% gypsum.

[1] World Business Council for Sustainable Development

[2] Source: Olivier JGJ et al. (2015), Trends in global CO2 emissions; 2015 Report, The Hague: PBL Netherlands Environmental Assessment Agency; Ispra: European Commission, Joint Research Centre

The blend has two major advantages for sustainable production, one, about 45% of raw material in the blend is waste, two, clinker content is reduced to 50%. Waste china clay is calcined at 800-900˚C and ground with clinker, gypsum and waste limestone. The produced cement is named as Limestone Calcined Clay Cement (LC^3). Life Cycle Analysis reveals that LC^3 production can reduce CO_2 emissions up to 30% and save up to 50% limestone as compared to conventional cement. The cement is found have comparable durability and strength with conventional cement. Suitability of the cement for construction has been tested through various demonstration buildings constructed in India. There are enormous volumes of china clay available throughout the world. Interestingly most suitable clays for production of LC^3 are overburdens (Waste clay) from china clay mines.

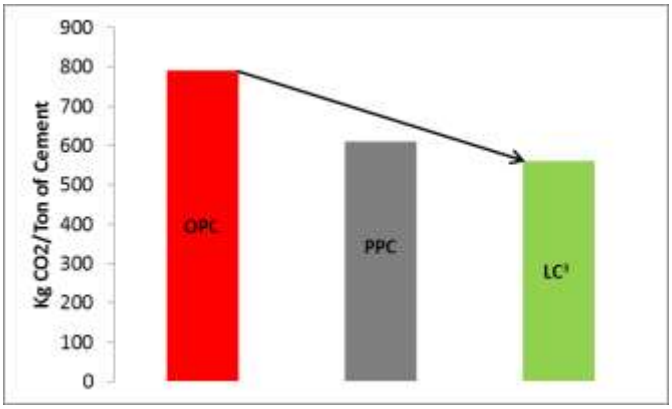

Figure 2 CO_2 Mitigation Potential of LC^3

Picture 1: The SDC building at the Swiss Embassy in Delhi having AAC blocks made of LC^3

Picture 2: Building in TARAgram Orchha, India made with LC^3 cement

The event focuses to showcase the potential of Limestone Calcined Clay Cement (LC^3) contributing towards achieving **Sustainable Development Goals 9,11, 12 and additional support to 13**, **reducing CO_2 emissions and saving natural limestone resources** while achieving durability properties similar to that of general purpose cements. The event will present the global research and application results of LC^3 technology and its contribution to lower the carbon emissions. The event will also bring together various stakeholders i.e. research, industry and government on the same platform to discuss on the contribution of LC^3 towards sustainable growth of emerging economies around the world.