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
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Cement is one the backbones for development of emerging economies. World cement production is projected to be around 6 billion tons in 2050. 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 volumes of its production contributed about 8% to global CO_2 emissions in 2014. However there is a large potential from cement industry in contributing towards sustainable development of emerging economies by shifting to blended cements. A consortium of prominent research institutes, social enterprises and Industry from India, Switzerland and Cuba have developed a 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 utilizing waste materials. The programme is supported by Swiss Agency for Development and Cooperation.

Cement is one of the largest produced construction materials in the world. It's 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 (**Error! Reference source not found.**) 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 industry around the world recognized 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 a Cement Sustainability Initiative report, use of fly ash and slag in worldwide cement production has not increased from 2007 while limestone use is constantly increasing.

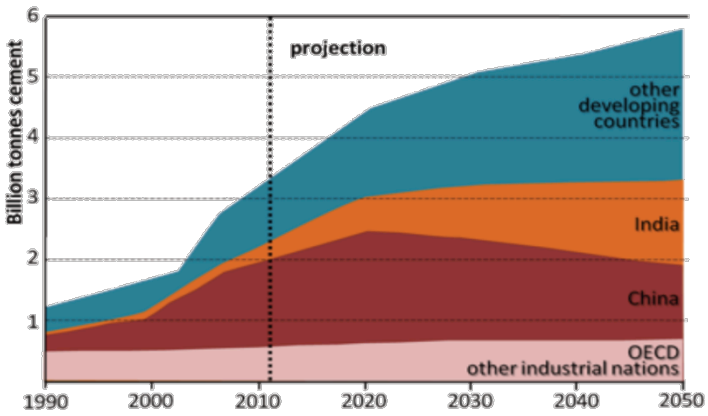

Figure 1 Rise in Cement Production until 2050 (Adapted from CEMBUREAU)

[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

To address the twin issues of CO_2 emissions and saving natural resources and new cement blend has been developed by a consortium of EPFL, IIT-Delhi, IIT-Madras, IIT-Bombay, TARA and CIDem through a project supported by Swiss Agency for Development and Corporation (SDC). The cement blend has a nominal mix design of 50% clinker, 15% non-cement grade (waste) limestone, 30% waste china clay (overburden) from mines and 5% gypsum.

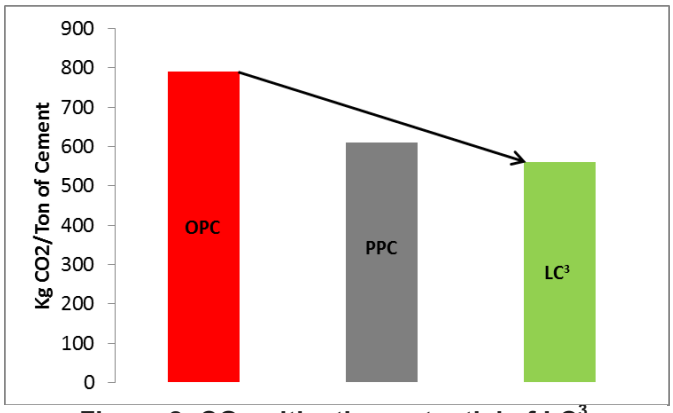

Figure 2: CO_2 mitigation potential of LC^3

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^{0}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.

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 in the same platform and discuss on the contribution of LC^3 towards sustainable growth of emerging economies around the world.

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Speaker profiles

Prof. Karen Scrivener
Directrice
Ecole Polytechnique
Federale De Lausanne, Switzerland

Prof. Karen Scrivener obtained her PhD at Imperial College in 1984. She worked for Lafarge in France for 6 years, before being appointed Professor and Head of the Laboratory of Construction Materials, at EPFL, Switzerland in 2001. Her research focusses on the understanding the chemistry and microstructure of cement based materials and improving their sustainability. She is editor in Chief of the leading academic journal "Cement and Concrete Research" and was made a fellow of the Royal Academy of Engineering in 2014. She is leading the LC^3 project.

Dr. Soumen Maity
Team Leader - Technology
Technology & Action for Rural Advancement, India

Dr. Soumen Maity is a Material Scientist by profession and currently leads the Technology Management business at TARA. He is with TARA over a decade anchoring the interface between innovation and business .At one hand he guides and mentors the Clean Technology systems at the Development Alternatives Group, on the other, he also leads the incubation of developed technologies at TARA. His expertise lies in the building material sector wherein he has been instrumental in exploring commercial approaches to utilization of industrial waste, improving energy efficiency and reducing environmental emissions. Currently, whilst establishing the Vertical Shaft Brick Kiln (VSBK) technology (world's most energy efficient technology for fired clay brick production) in India, he is also engaging in disseminating the same to Asian and African countries through partner networks. He is leading the Incubation of LC^3 in Industry.

Prof. Ravindra Gettu
Associate Dean - Industrial Consultancy and Sponsored Research
Indian Institute of Technology Madras, India

Prof. Ravindra Gettu is the Associate Dean for Consultancy and Sponsored Research, and Professor of Civil Engineering at IIT Madras. After completing his PhD degree from Northwestern University (USA) in 1990, he was the Director of the Structural Technology Laboratory of the Technical University of Catalonia in Barcelona, Spain, until 2004. He has co-authored more than 400 scientific and technical publications in the areas of concrete technology, effective use of admixtures, self compacting concrete, and fibre reinforced concrete. He is the Vice President of RILEM, the International Union of Laboratories and Experts in Construction Materials, Structures and Systems, based in France, and the past Chairman of the Indian Concrete Institute Chennai Centre. He has consulted for many leading construction materials manufacturers and projects. He is leading the LC^3 research in IIT-Madras.

Mr. Mahendra Singhi
Group CEO and Whole Time Director - Dalmia Cement (Bharat) Ltd.
Whole Time Director & CEO – OCL India Ltd.

Mr. Mahendra Singhi is a science and law graduate and also a chartered accountant. Over the last 36 years, Mr. Singhi is synonymous to the growth and development of country's leading cement companies. Beginning in 1977-78, Mr. Singhi held leadership positions with major cement companies.

Mr. Singhi is actively associated with several initiatives in the area of sustainable development and environment protection. He is Co-Chair of the Cement Sustainability Initiative (CSI) in India. He was one of the two business representatives who attended Paris Agreement Signing Ceremony in New York during April 2016 on a special invitation of H.E. Mr. Ban Ki-moon, Secretary General of United Nations. Mr. Singhi also represented Indian business and cement sector during COP-21 and during High-Level Government-Business Dialogues invited by French Presidency among the ministerial representatives, the global business leaders and civil society. The leading Indian cement companies are setting global benchmarks today in climate protection and energy efficiency. This is more than a decade long sustainable performance strategy started by Mr. Singhi under his leadership.

Dr. André Wehrli
Program Manager Global Program on Climate Change (GPCC)
Swiss Agency for Development and Cooperation, Switzerland

Dr. André Wehrli is working with the Swiss Agency for Development and Cooperation SDC in its Global Programme on Climate Change GPCC. He is currently part of the Swiss delegation to UNFCCC and Switzerland's lead negotiator on adaptation incl. loss and damage. Apart from that, he manages several global and regional activities on climate mitigation and adaptation, with a particular focus on climate services, mountains and Southern Africa. Prior to joining SDC, he worked for several years as scientific expert for the Swiss Federal Office for the Environment FOEN, where he was responsible for the management of protection forests/natural hazards in Switzerland. From 2009-2011, he was seconded as a national expert to the European Environment Agency EEA to help EEA scoping their activities in climate change adaptation. He holds a PhD in Natural Sciences from the Swiss Federal Institute for Technology in Zurich (ETHZ) and a Diploma (MSc) from Zurich University, and is fluent in English, German, French and Dutch.