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## EVOLUTION OF GREEN CERTIFICATION FOR READY-MIXED CONCRETE IN INDIA

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### **Abstract**

The ready-mixed concrete (RMC) industry has been growing steadily in India. The evolution of the Indian RMC industry as well as the industry's attempts in developing and implementing a quality framework have been well documented in two papers presented in previous ERMCO Congresses<sup>1,2</sup>. Thanks to the sustained efforts made by the Ready-Mixed Concrete Manufacturers' Association (RMCMA), jointly with three other stakeholders, namely, the Green Products and Services Council (GPSC), Quality Council of India (QCI) and the International Finance Corporation (IFC), the industry has now accomplished one more progressive landmark that involves development of green certification for RMC in India.

Termed as "*Greenpro*" certification for RMC, this certification, developed by an expert group adopting the well-known 3"*R*"(Reduce, Recycle and Reuse) techniques, evaluates the green features of RMC based on eight parameter and is both plant-specific and product-specific. The certification system also addresses the national sustainability-centric priorities set by the government of India to tackle the climate change issues..

The paper briefly describes the salient features of the *Greenpro* Certification System for RMC.

**Keywords:** Sustainability, *Greenpro*, product certification, 3"*R*" techniques,



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## Introduction: RMC Industry in India

In a true sense, the ready-mixed concrete (RMC) industry in India is a newcomer amongst the league of RMC industries in many other countries. Commercial RMC production commenced in major metropolitan cities of India during the late 1990s and since then the industry has been growing steadily. The evolution of the RMC industry is well documented in a paper presented during the ERMCO Congresses held at Verona during June 2012<sup>1</sup>. Currently, commercial RMC has spread its wings throughout the length and breadth of India, covering not only the major cities but also the tier II and III cities.

The Ready Mixed Concrete Manufacturers' Association (RMCMA) which was established in the year 2002 has been working steadfastly to achieve the long-term vision of the association to make RMC the preferred building material of choice across the whole of India. Realising that the quality of concrete has been one of the major concerns of customers, RMCMA took the lead in evolving and implementing a quality framework for RMC in India. Initially, RMCMA developed a self-regulatory and voluntary framework for quality of RMC. Later, the quality scheme was upgraded and was converted in to a third-party certification scheme under the auspices of the Quality Council of India (QCI). The journey of the quality scheme from self-regulation to third-party control has been documented in a paper presented during the ERMCO Congress held in Istanbul in May 2015<sup>2</sup>.

Simultaneously, RMCMA joined hands with the National Safety Council of India (NSC) and evolved a well-defined criteria and certification for Occupational Health & Safety of RMC Operations. Incidentally, RMCMA is also quite active in training and certification of RMC personnel. Two programs, one for the quality personnel named as "Concrete Technologists India" and the other on the batch plant operators are presently being conducted in different parts of the country.

## GHG Emissions: India' Commitments

One of the goals of the mission of RMCMA is to encourage sustainable development with the use of RMC. However, before the topic of concrete sustainability is discussed, it may be pertinent to briefly highlight the crucial importance of adopting sustainability-oriented practices in India, as the total Green House Gas (GHG) emissions from India are relatively high.

According the latest report of the International Energy Institute, the total world-wide CO<sub>2</sub> emission in 2014 was 32.4 GtCO<sub>2</sub>, China leads the list of top 10 CO<sub>2</sub> emitting countries and is followed by the USA (Fig 1)<sup>3</sup>. India is the third largest CO<sub>2</sub> emitting country with the emission of 2 GtCO<sub>2</sub>. However, in terms of per capita CO<sub>2</sub> emission, India's emission is less than the world average and it is estimated to remain closer to the world average even in 2030-31. This is revealed in a report of the Department of Environment & Forest, Government of India incorporating studies by well-known five private institutes, namely, TERI, NCAER, IRADe, McKinsey & Company and Jadavpur University<sup>4</sup>. This report predicts that even in 2030-31, India's per capita GHG emission will vary from 2.77 tonnes to 5 tonnes of CO<sub>2e</sub>, which will be closer or less than the world average per capita CHG value is 4.22 tonnes CO<sub>2e</sub> (Fig 2).

Of course, this does not mean that there is a room for complacency. The urgent need to reduce CO<sub>2</sub> emissions is the responsibility of all countries including India. In this context, it is heartening to note that the Indian Government has publically announced its resolve to reduce the GHG emissions. During the Conference of Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris in 2015 the Indian government announced its pledge to cut greenhouse gas emissions intensity by 33 to 35 percent, relative to 2005 levels, by 2030.



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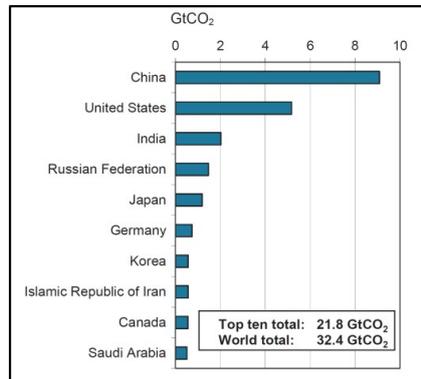


Fig 1 Top 10 CO<sub>2</sub> emitting countries<sup>3</sup>

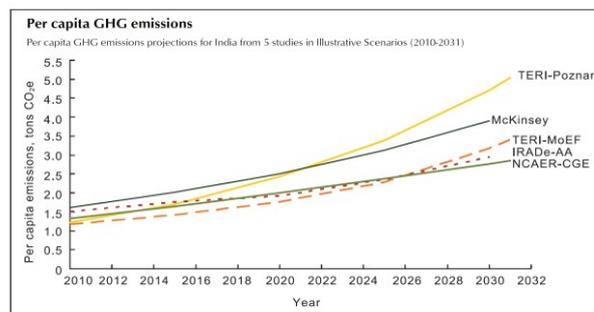


Fig 2 The 2030 GHG Emissions by India – Compilation of data from 5 Indian studies<sup>4</sup>

## Why Concrete Sustainability?

The construction sector and the built environment are the main consumers of resources — energy, materials, water, land. They need to play a crucial role in achieving sustainable development and reducing the GHG emissions. Since concrete is the foremost material of construction, it will be highly essential to ensure sustainability of concrete to achieve sustainability of construction and built environment.

It is well known that amongst different materials of constructions such as steel, aluminium, glass, wood, etc., concrete happens to be the most sustainable. This is because of a variety of factors - it is made up of ingredients that are locally available, it does not produce any harmful by-product during production, it has a capacity to absorb a large proportion of agro-industrial waste, it does not corrode, it is fire-resistant and it can be recycled. Yet, it contains ordinary Portland cement, the production of which releases around 0.8 tonne of CO<sub>2</sub> for every tonne of ordinary Portland cement produced.

In India, exact estimates of neither the total cement used by the ready-mixed concrete industry nor of the amount of GHG emissions contributed by the same are presently available. The Green product Services Council of the Confederation of Indian Industries however provide a rough GHG emissions of the concrete sector - it reportedly varies from 0.08 to 0.12 m<sup>3</sup> concrete production. Assuming that the total cement consumed by the RMC sector in India is roughly around 7 percent of the total cement produced in the country, it is estimated that a total of approximately 12 million tonnes of GHG emissions per annum may be attributed to RMC production. Since the RMC industry is poised to grow further in the near future, the GHG emissions emanating from RMC production is also bound to increase. Considering this, there is an urgent need to evolve criteria for reducing GHG emissions, thereby improving the sustainability of RMC.



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## Why *Greenpro* Certification for RMC?

Leading Indian ready-mixed concrete producers are already making significant efforts to reduce GHG emissions by adopting a variety of technologies including the increased use of supplementary cementitious materials like fly ash and slag. Yet, ample opportunities exist to improve the “green” performance of a variety of products from the ready-mixed concrete industry. Considering this the Ready Mixed Concrete Manufacturers’ Association and the Green Products and Services Council (GPSC) of India under the Confederation of Indian Industries (CII) decided to develop Green Product Certification RMC. This initiative is supported by the Quality Council of India (QCI) and the International Finance Corporation (IFC).

The Indian Green Building movement is spearheaded by the Indian Green Building Council (IGBC). Till date, the IGBC has been instrumental in enabling 4,792 million m<sup>2</sup> of green buildings in India. The green building market growth in India has created demand for green products and services. Considering this need, the CII jointly with Sohrabji Godrej Green Business centre (CII-Godrej GBC) has launched the Green Products and Services Council (GPSC), which has been offering green certification termed as “*Greenpro*” with the support of all stakeholders including product manufacturers, standard developers, architects, green building developers, etc. The *Greenpro* certification for RMC is one such initiative by the GPSC. Incidentally, *Greenpro* certification has received accreditation from Global Ecolabelling Network (GEN) through GEN’s Internationally Coordinated Ecolabelling System (GENICES). *Greenpro* for RMC was launched during Indian Green Building Congress held at Jaipur in October 2017.

## Objectives of *Greenpro* for RMC

The main objective of *Greenpro* for RMC is to facilitate the Indian ready-mixed concrete producers to adopt green measures and to enhance the green performance of their products with the ultimate objective of reducing the GHG emissions of the RMC industry.

The GPSC has estimated that GHG emission reduction to the tune of 150,000 tonnes / annum can be expected on account of reduction in resource consumption during the manufacturing process and increase in addition of additives in ready-mixed concrete.

## Salient Features of *Greenpro* for RMC

For evolving the certification system, GPSC set up an expert group. The expert group followed the prescriptive as well as the performance-based approach.

**Performance Parameters:** The certification system evaluates the green features of RMC based on eight well-known parameters, namely, product design, product performance, raw materials, manufacturing process, waste management, life-cycle approach, product stewardship and innovations. The certification aims to improve resource conservation through increased use of recycled content (e.g. manufactured/recycled aggregates, fly ash, slag, etc.) enhanced energy efficiency, water efficiency, minimization of waste, etc. by adopting the well-known 3”R”(Reduce, Recycle and Reuse) techniques.

Under the GPSC certification, points (credits) would be awarded on the basis of concrete properties which reduce the environmental impact during its use. Some of the concrete products which can qualify such requirements include:

- a) Concretes containing higher levels of supplementary cementitious materials such as fly ash, slag, etc., which helps in reducing the requirement of Portland Cement.

- b) Concretes having low densities (e.g. concretes containing EPS, foam, etc.) - the use of which improves thermal insulation of the building envelop.
- c) Self-compacting concrete, which eliminates the need of vibration during placing of concrete, thereby helping in noise reduction.
- d) High-strength concrete, which has the potential to minimize concrete section sizes thereby reducing the requirement of concrete itself.
- e) Pervious concrete having high percolation rate to water, contributing to rain water harvesting and filtration of percolating water.

Incidentally, it may be pointed out that the requirements mentioned at (a) and (b) above are in line with the sustainability tools suggested by the well-known concrete technologist, Prof P K Mehta<sup>6</sup>. For improving concrete's sustainability Prof Mehta advocates that it is essential to use three tools, namely, (i) minimize the amount of Portland cement in concrete (ii) consume less concrete through innovative architecture and structural design, and (iii) consume less clinker in cement.

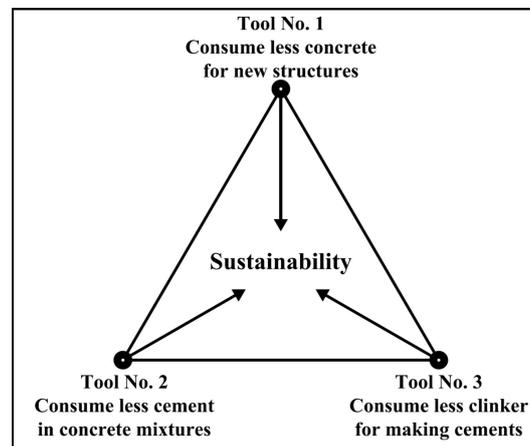


Fig 3 Concrete sustainability tools suggested by Prof Mehta<sup>6</sup>

Considering the fact that the sources of good quality aggregates are depleting fast in different parts of India, the GPSC certification encourages the use of alternative sources of aggregates such as aggregates from steel, iron and copper slag, bottom ash from thermal power plant and recycled concrete aggregates. Such use is of course subject to the condition that the requirements specified in IS 383 dealing with aggregates for use in concrete are followed.

**Manufacturing Processes:** Under the RMC manufacturing processes, following aspects have been carefully considered:

- *Energy efficiency:* Reduction in specific energy consumption
- *Water efficiency:* Reduction in specific water requirement
- *Particulate emission reduction:* PM 10 and PM 2.5
- *Concrete Sludge Management:* Reduction in the quantity of waste generation
- *Renewable Power:* Use of on-site and off-site renewable sources for meeting energy needs
- *Product Stewardship:* Includes education of stakeholders, QMS for measuring rejection rates and extended product responsibility
- *Innovations:* Recognize initiatives that are not addressed in this certification but which have profound impact on protecting environment.



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**Mandatory Requirements:** For the product to be taken up for *Greenpro* certification, the RMC producer needs to comply with the following requirements:

- Factory license under the Factories Act for permission to operate the plant
- Valid consent to operate under the Water (Prevention & Control of Pollution) Act & Air (Prevention and Control of Pollution) Act
- Valid authorization under the Hazardous Waste (management, handling & trans boundary movement) Rules
- Occupational Health & Safety compliance as per the norms of Developed jointly by the National Safety Council of India (NSC) and RMCMA.

**Minimum Equipment and Systems Requirements:** For getting the *Greenpro* certification, the RMC plant needs to have a valid RMC Capability Certification from the RMCPCS scheme spearheaded by the Quality Council of India (QCI). If such certification is not available, the CII team will carry out audit of the plant to ensure compliance with the major features of the QCI certification scheme.

## **Greenpro Evaluation**

The *Greenpro* evaluation will be done by a third-party conformity agency appointed by GPSC. The products will be certified based on the credit points achieved during evaluation. While the maximum achievable credit points are 100, the product and the plant supplying the product will be certified as green product, based on certain minimum points earned during evaluation. Incidentally, the RMC Plant supplying the *Greenpro*-certified product needs to satisfy all mandatory requirements mentioned above.

## **Conclusion**

The ready-mixed concrete in India which has been growing steadily during the past, is slated to grow further in near future. While the leading RMC producers from India have already taken many green initiatives, ample opportunities exist to further improve the “green” performance of the RMC industry’s products. The *Greenpro* certification is a good tool for this purpose. The use of this tool will go a long way in enhancing the green performance of the products from RMC industry and will also help in achieving the ultimate objective of reducing the GHG emissions from the industry

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