

IN THE GREEN

Sustainability is becoming a key feature of concrete, which is now being enhanced for waterproofing and structural durability, **Andrew Don** finds

Sustainability has become a highly fashionable subject in the Middle East, with every construction company claiming its products are 'greener' than its competitors. However, being environmentally friendly will require that the region invests more thought and resources into its projects, as well as its building materials.

A paper for the International Journal of Sustainable Built Environment, titled *Trends and Developments in Green Cement and Concrete Technology* (2013), noted that the global construction industry faces unprecedented challenges relating to energy resources, carbon dioxide (CO₂) emissions, and the use of alternative materials.

Perhaps it is to eliminate these environmentally hazardous factors that the Middle East's regulatory framework is adapting to incorporate sustainability. An example of this is the UAE's Federal Law No 24 of 1999, for the Protection and Development of the Environment, which was also established in 1999.

David Bowerman, regional business segment manager for admixtures at BASF Construction Chemicals, says Dubai Municipality announced this year that all new buildings in the Emirate would be made with green concrete. The move comes in a bid to help extend structures' lifecycles and reduce greenhouse gas emissions.

Buildings under construction will have to use green alternatives for original Portland cement, the major component of concrete mix that is found to emit CO₂ during its production process.

Similarly, upgrades implemented to Qatar Construction Specifications (QCS 2014) mean the concrete currently produced in the country has a lower carbon footprint than it did earlier, Bowerman explains.

Laith Haboubi, regional business director at Grace Construction Products Middle East, says the demand for LEED- and Estidama-certified buildings is also growing in the region.

The latter, he adds, is a crucial part of the Abu Dhabi Vision 2030 initiative to develop





CHEMICALS AND ADMIXTURES



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the UAE’s capital city in accordance with advanced green standards.

“As regional environmental requirements move from guidelines to [legislation], driven primarily by governmental and municipal authorities, demands on both cement and concrete will essentially require the use of additives and admixtures to perform and comply,” Haboubi adds.

Legislation based on environmental considerations, such as Dubai Green Building Code, have also furthered the need for construction materials to be more sustainable than before.

Understandably then, technological advancements are regaining significance as product differentiators, with manufacturers

adding various features to their offerings in a bid to outpace the competition.

LafargeHolcim’s Sustainability Strategy, for instance, commits to sustainable concrete features, such as permeability, insulated concrete systems, low CO₂ concrete, and products with a high recyclability content. The company’s Ecoterm brand comprises a variety of readymix concrete types with insulating properties. According to its creators, the product reduces energy needs for heating or cooling by 25%, compared to conventional concrete.

The firm claims that its Thermedia insulating concrete can also reduce a building’s heating and air-conditioning costs and energy consumption.

Hydromedia pervious concrete, on the other hand, absorbs rainwater and facilitates its natural runoff into the ground due to its permeability and drainage capacities.

Demand for such features will only increase as infrastructure grows in the GCC – and perhaps more so in the wake of recent flooding-related damage across the region.

Qatar’s Hamad International Airport was flooded after rains lashed the country on 25 November, 2015. According to Twitter users, rainwater steadily seeped through the \$15.5bn (QAR56.4bn) airport’s roof.

Fortunately, the GCC appears to be conscious of such challenges, and has ramped up efforts to prevent seasonal damage to its infrastructure networks.

Sultan Al-Dossari, a spokesman for the Makkahgovernorate, said the construction of 11 dams in Jeddah facilitated the absorption of 49-million cubic metres of rainwater in the city. Jeddah witnessed heavy rain on 17 November, 2015.

It is perhaps in anticipation of these incidents that concrete manufacturers are improving the implementation time of their products too. Chronolia and SpeedCrete are LafargeHolcim’s fast-hardening concrete applications for roadways, and the manufacturer says roads constructed by deploying these concrete variants are typically ready for use within seven hours, thereby reducing traffic congestion and associated emissions.

Elsewhere, BASF says its Green Sense Concrete mix meets the requirements of Dubai Municipality, which require the increased use of cement-replacement materials. Bowerman says it is “an environmentally friendly and cost-effective optimisation product, which incorporates supplementary cementitious materials to act as a water-reducing admixture”.

In 2015, BASF launched what it says is the first water-reducing polymer since the introduction of polycarboxylates 24 years ago. Bowerman says polymers based on Poly Aryl Ether are more robust and give the concrete enhanced rheology.

Concrete developments are also focused on improving structural durability. Grace’s Strux brand, Haboubi says, can improve the flexural and tensile properties of concrete and control cracking, bolstering long-term durability. From an environmental point of view, Strux can reduce both sectional thicknesses and the use of reinforcing steel, thereby reducing weight and transportation emissions too.



DOKA PRESENTS CONCRETE SENSOR TO DUBAI MUNICIPALITY

Doka debuted ‘Concremote’ at a technical presentation for Dubai Municipality in June 2015. The Austria-headquartered firm said that the ‘green concrete’ sensor is ideally placed to support the Emirate’s environmentally-minded construction legislation.

Concremote, according to Doka, measures the compressive strength and durability parameters of green concrete, leading to

improvements in quality and safety, and reductions in cost and time.

The presentation was delivered by Wilko van der Meer, the company’s managing director for Concremote, who outlined the functionality and benefits of the product, and how it can be implemented in practical terms.

“Concremote sensors are placed directly in a concrete structure after pouring to measure non-

stop compressive strength evolution,” Doka explained in a press release.

“All sensors have a real-time connection to the internet, and notify stakeholders such as job-site staff and consultants via text or e-mail when concrete is hardened enough to proceed with subsequent construction works.”

The manufacturer claims that the device offers time savings of 47% and cost savings of 32%.

Mohamed El Hazek, Mapei Construction Chemicals’ commercial director, says sustainability is crucial for new chemicals and mixtures for concrete

“With the introduction of green building codes in the UAE and greater awareness to build sustainably, we are [working hard] to convey our knowledge and latest standards to the market. [We are] active with associations such as Emirates Green Building Council,” he adds.

Saudi Arabia is also gravitating towards concrete of higher durability, which has led to a growing demand for admixtures based on polycarboxylic ethers (PCEs).

“The Kingdom Tower currently under construction near Jeddah is using our MasterGlenium SKY mixture in its construction,” BASF’s Bowerman tells *Construction Week*, adding that the same admixture was used successfully in the building of Dubai’s Burj Khalifa.

“This super-plasticiser’s properties enabled the concrete to be pumped to a record height without segregation. Ensuring low pressure during the pumping process, it also avoided the need of vibration and reduced heat curing, thereby saving energy and lowering carbon emissions,” he concludes. **enr**