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# Editorial

When we look back at the last few decades of the 20th Century that we have just left behind, we cannot but marvel at the awe-inspiring and overpowering changes and innovations that have taken place during that time in the fields of science, engineering and technology. These advances have almost imperceptibility transformed our way of life in terms of health and medicine, travel and transportation, communications, computing and information technology, and in the development and use of a wide range of materials. The construction industry has been no exception to these dramatic changes when we look at the exciting developments in the design and construction of buildings, bridges and structures such as the channel tunnel and the millennium wheel, to name just a few. There is no doubt that this process of evolving unprecedented changes has also had a tremendous impact on the social face of the world – and have brought enhanced wealth, better living and enjoyable recreation for at least a small proportion of the world's population.

But these exciting, unexpected and unpredictable changes have also plunged the world into the greatest infrastructure crisis that humanity has ever seen. And because the construction industry is so closely interlinked with the status of infrastructure, these changes have brought about many equally demanding and arduous challenges to engineers and material scientists, all over the world. The construction industry, whatever be its limitations, is still rightly perceived and identified as the provider of a nation's infrastructure, and indirectly, to its economic progress and stability, and indeed to the quality of life of its people. So the construction industry, and the education and training of those who shape, manage and advance the industry are of paramount importance to the economic and environmental survival of our world.

The challenges to the construction industry, and the infrastructure crisis facing the world have come about from a number of sources. Population growth, and the inevitable advances in industrialization have resulted in an endless stream of world-wide urbanization. For the first time in human history, nearly half the world will now live in and around our cities than in rural areas. There are now over 20 megacities with 10 million or more inhabitants whilst there are over a 100 big cities with more than 1 million people with a great majority of population growth and urbanization taking place in the poorer parts of the world. These global changes have put insatiable demands on the construction industry in terms of materials, energy and resources. On top of this is the disproportionate consumption of the world's energy and resources. Some 25% of the world's population account for nearly 75% of the global energy consumption – and it is only natural that the developing nations of the world would want to create and provide a better standard of the basic amenities of life for their people. To develop a nation's infrastructure without wasting, polluting or destroying our resources and environment will then pose the greatest challenge to all those responsible to improve a nation's quality of life.

But the greatest damage to our infrastructure is being brought about by global warming and human conflict. The massive and wasteful consumption of the earth's material and energy resources has resulted in an equally massive, and almost unstoppable emission of greenhouse gases. The colossus of carbon dioxide emission that stares at us, and threatens the entire universe can best be understood if we realize that between the 1960s and 1990s, the amount of emission has increased by a factor of 2.5–3.0, ignoring those that arise from deforestation and fires. And then, some 5% of us is responsibly producing around 25% of the world's carbon dioxide emission – and some 60% reduction in carbon dioxide emission is needed to stabilize the earth's ecosystem. The Kyoto agreement amongst the world's leaders in 1997 was to reduce the emissions from the developed world by a meagre 5% by 2012!

The question then arises – should we be worried at all about global carbon dioxide emissions? We can easily ignore it; we can argue that we do not believe in it; we can be smug in the knowledge that we have the wealth and technology to rectify and rehabilitate any of the after-effects of such emissions. But the fact remains, that whatever be our beliefs and pretensions, the incontrovertible reality is that global warning is the direct result of the emission of greenhouse gases, and that global warming puts more energy into the climate system, and is primarily responsible for increasing global storminess resulting in increasing number and intensity of storms, rapid climatic changes and larger, more frequent, more damaging, extreme and erratic weather events. Many climate change models now predict that El Ninos will now occur once in every 2.8 yr instead of once in every 5 yr.

Whatever be the cause of this environmental turbulence, and whether we believe or want to believe on the

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fragility and pollution of our environment, the fact remains that the world has recently seen a string of natural disasters whose most direct impact, apart from the death and destruction they inflict, is on the damage to our engineering infrastructure – the housing, the roads, the bridges, the water and sanitation utilities, the power and communication installations, the schools, etc. The devastation to infrastructure caused in Mozambique by the cyclones Eline and Gloria must still be vivid before our eyes. Hurricane Andrew in the States in 1992 caused $20 billion worth of infrastructure damage, while that dealt by Hurricane Mitch in the Honduras, Nicaragua, and El Salvador in October 1998, the supercyclone in Orissa, India, in October 1999, and the Venezuelan floods in December 1999, e.g., is estimated to cost each $5 billion. Weather experts consider 1998 relatively calm, yet wind-related storms caused $5.5 billion in damage in the USA. How are we going to find the money, materials, and an eco-friendly technology to rebuild these shattered lives and infrastructure around the world? And what about infrastructure destroyed by human conflict – Kosovo, Serbia, Iraq, East Timor? We need hardly look at any theoretical models when the damage, devastation and destruction are in front of our very eyes! Infrastructure crisis? Our environment is in pretty good shape – should and need we worry about the rest of the world?