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About the writer

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A study in green

By Alyn Griffiths

Countries all over the world are committing to transforming their cities into models of intelligent sustainability. Vision looks at how global urban development is taking a quantum leap into a more ecologically conscious future

The need for a more environmentally responsible approach to urban development has never been more immediate or dire, particularly in developing nations, where swelling cities are struggling to provide affordable housing, good education, medical facilities and green space and recreational areas while also aiming to reduce pollution and energy consumption. These issues prompted the organisers of the 2010 World Expo in Shanghai to choose as their theme 'Better City, Better Life' and invite participating nations to demonstrate, through the architecture and content of their pavilions, how they are confronting these problems in unique and innovative ways.



01 Shanghai recognises the need for a more environmentally responsible approach to urban development

The expanding global market for clean energy is expected to be worth US\$2.2tn in 2020, and the market share of developing nations including China, India and Brazil is predicted to increase dramatically as these countries implement policies to further their ecological credentials and commit funding to support the development of green projects and products. Green building and renewable energy technologies are the nexus of this low-carbon industrial revolution and developing nations, with rapidly expanding metropolises and access to raw materials, are well placed to lead the way.

In India, a major push to reduce carbon emissions has seen the number of construction firms implementing green building practices rise to levels similar to those of the United States, with the Indian Green Building Council setting a target for India to become the world leader in sustainable construction in the next two to three years. Investment in renewable energy by the Indian government and private investors has been increasing steadily and a recent study by the World Resources Institute estimated that the country's renewable energy market could already be worth as much as US\$2bn a year.

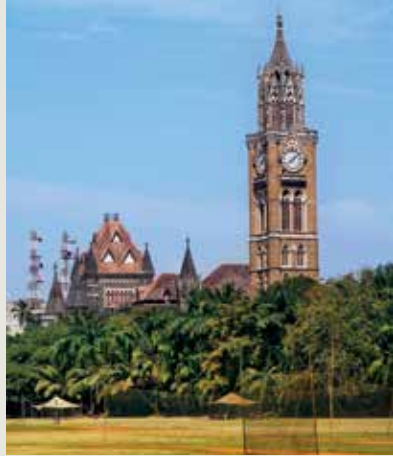
Meanwhile, a green building revolution is taking place in the favelas of Rio de Janeiro, Brazil, to help improve the

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standard of life in the slums and confirm Brazil's credentials as a global leader in renewable energy. Clean technologies such as biofuels, LED and induction lighting and new hydride batteries, which can store electricity for air conditioning and refrigeration, are being introduced alongside more low-tech solutions.

During the 2010 World Expo, new technologies in sustainable construction, energy provision, transportation and information and communication were presented in formats designed to engage, entertain and educate. Foremost were the buildings themselves, many of which were only made to last for the term of the fair, so the organisers insisted they be easy to disassemble and, where possible, reused elsewhere.

From the outset, the organisers of the Expo were focused on how the ideas and technologies showcased could be translated into something of lasting value and significance for the international



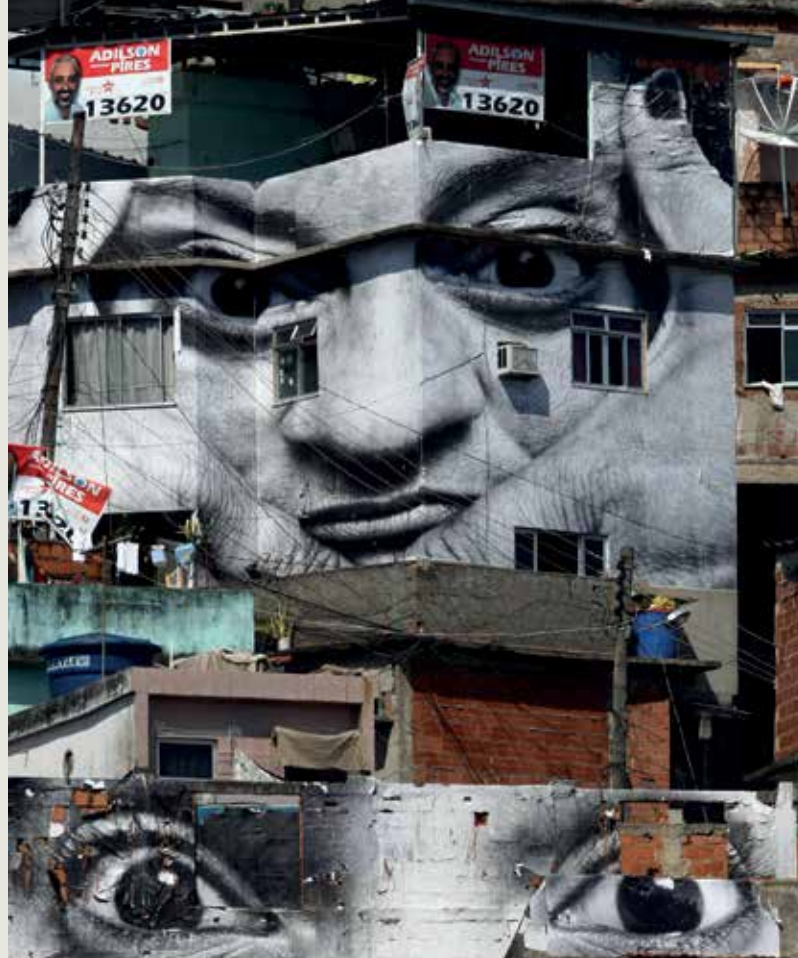
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The key to implementing these ideas on a global level lies in educating and incentivising policy makers and planners, helping them to envision these strategies working in their own cities

community. To this end, they put together the *Shanghai Manual: A Guide for Sustainable Urban Development in the 21st Century*, to be used as a blueprint for tackling poverty and inadequate housing in major urban centres.

Warren Karlenzig, the founder and president of the sustainable development consultancy Common Current, helped to write the *Shanghai Manual* and subsequently worked with the UN on a series of training and capacity-building exercises that showed mayors and Asian leaders how to implement the report's criteria. He says that similar events continuing across other parts of the world are a key part of the legacy of Expo 2010 and are having "untold impacts on urban sustainability policy, economic and technology development, education and societal behavioural evolution".

Karlenzig feels that Expos play a vital role in educating all the stakeholders involved in sustainable development about the potential to improve standards



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of living alongside creating opportunities for generating revenue. "Sustainable development has created the largest venture-backed industry in the world besides information and communications technology," he explains. "The green economy has been growing faster than all other major economic segments and it will continue to do so in coming decades."

One of the most celebrated and ecologically innovative pavilions at the Expo was that of the UAE, designed by British architects Foster + Partners. Gerard Evenden, a senior partner at the firm, explains that the pavilion's design was informed by a "focus on sustainability and heritage", with a ridged form covered in shimmering gold tiles evoking the sand dunes prevalent throughout the

Emirates, while the solid south-facing surfaces helped to reduce solar gain – high internal temperatures caused by radiation from the sun – and north-facing vertical strips of glazing allowed light to enter the interior. "Most importantly," says Evenden, "the pavilion was designed to be recycled, so it's

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- 01 Green space in Mumbai. India is involved in a major push to reduce carbon emissions
- 02 A green building revolution is taking place in the favelas of Rio de Janeiro, Brazil, to help improve the standard of life
- 03-04 The design of the UAE pavilion was a ridged form covered in shimmering gold tiles evoking the desert dunes



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inherently sustainable – the structure has since been taken apart and rebuilt in Abu Dhabi.”

The UAE has shown its commitment to ecological innovation with the completion of the Masdar Institute, a leading centre for research and education in the areas of sustainable energy and business development. Designed by Foster + Partners, the campus itself addresses issues of sustainable urbanisation specific to the Emirates. “The main challenges are the heat and the dust, as well as conserving water,” explains Gerard Evenden. “We work to create comfortable environments in the intense heat, which don’t rely on mechanical ventilation or consume vast amounts of energy.”

The buildings are part of a larger urban masterplan for a prototypical sustainable city and contain accommodation, laboratories and public facilities. They are intelligently arranged to provide shade and reduce the need for artificial cooling. Sunshine harvested by photovoltaic panels produces more energy than is consumed by the institute. The architects also chose to revive a traditional technique to help control the climate: wind towers that channel breezes down through the buildings. “The wind towers are proving to be effective,” says Evenden. “It shows that heritage solutions still have a great deal of relevance today.”

Shanghai’s World Expo offered China the opportunity to present the city as a model example of its endeavours to develop world-leading urban policies and practices. So began a US\$45bn process

Having studied traditional settlements that predate the introduction of electricity in the region, Foster + Partners was able to implement building techniques that have been used for centuries and to design the masterplan around a way of life that has proven sustainable benefits. “The next challenge for the Masdar Institute will be to use the lessons learned from this new city and look at how they can be applied to retrofit existing cities and lower their energy consumption,” adds Evenden. “This potential for a much wider global application is one of the most vital and exciting aspects of the project.”

As part of its commitment to creating a lasting legacy for the city following the Expo, Shanghai’s municipal government scaled up its environmental initiatives ahead of the event, upgrading urban



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infrastructure, employing cleaner and more energy-efficient technologies, promoting renewable energies and strengthening pollution control measures to establish Shanghai as an example of good urban practice.

Kenneth Jarrett, chairman of the US pavilion at the Expo and Greater China chairman at global communications and public relations consultancy APCO Worldwide, says that the environmental legacy of the Expo might not be immediately obvious on the streets of Shanghai, but insists that the event triggered a change in the mindset of those who visited. “The theme, ‘Better City, Better Life’, has entered the popular consciousness in a positive way,” he says. “The Expo helped educate Shanghaiese about the role cities play and the possibilities available to make such large cities more liveable, more green and more healthy.”

While creative initiatives such as the



- 01 The Masdar Institute is a leading centre for research and education in sustainable energy
- 02 A circulating water system on display at the 2010 World Expo Park
- 03 The United Nations pavilion, seen here in Seville, Spain, at the 1992 Expo, works with host cities to create lasting legacies

The UAE has shown its commitment to ecological innovation with the completion of the Masdar Institute, a leading centre for research in the areas of sustainable energy and business development

Masdar masterplan demonstrate that sustainable principles can be successfully applied on a metropolitan scale, the key to implementing these ideas on a global level lies in educating and incentivising the people who make the decisions – policy makers and planners – helping them to envision these strategies working in their own cities. This is where Expos play a crucial role, providing an opportunity to present ideas, share skills and knowledge and begin the conversations that can inspire change.

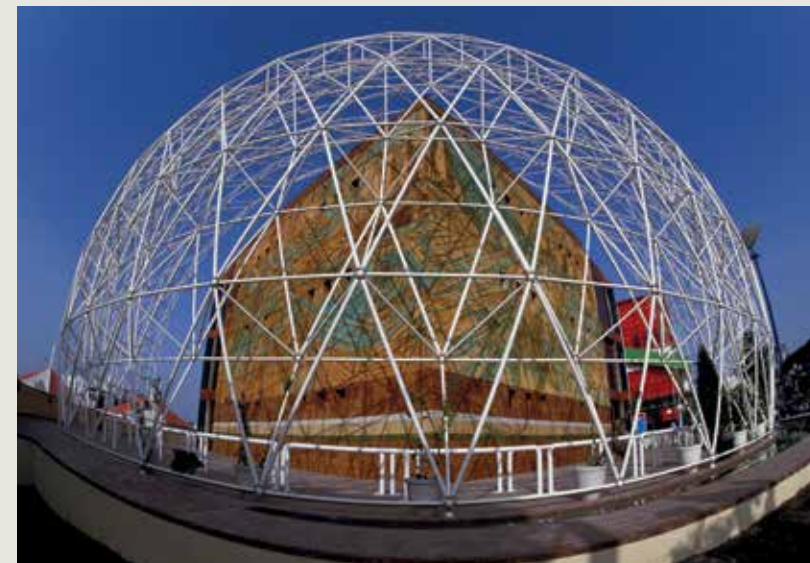
With sustainable urban development likely to remain one of the top challenges of the 21st century, it seems certain that future World Expos will continue to focus on finding appropriate and actionable solutions to a problem of international significance. **V**

Shanghai’s legacy

Looking back, it seems that the most expensive and best-attended Expo of all time delivered on its mission. But it is likely to be many more years before its legacy can be truly appreciated.

Shanghai won the right to host the first World Expo to be held in a developing nation in 2002. It offered China the chance to demonstrate a commitment to reversing its reputation as a country with problematic pollution levels by presenting Shanghai as a model example of its endeavours to develop world-leading sustainable urban policies and practices. So began a US\$45bn process of preparation and renovation in Shanghai, involving a major expansion of the city’s transportation and infrastructure alongside the redevelopment of the Expo site on a waterfront area known as the Bund.

The regeneration of the former industrial site on the banks of the Huangpu River necessitated the relocation of a shipyard and hundreds of factories to make way for permanent world-class events facilities, temporary pavilions and the 73 million people who visited the event.



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Pride of place: Expo pavilions

The world’s first Expo, London’s Great Exhibition of 1851, was housed in a huge glass-and-steel pavilion, the Crystal Palace in Hyde Park, that embodied the progressive attitude of the time and set the standard for future Expo architecture. Since then, the design of pavilions has undergone an evolutionary process, largely mirroring wider social, economic and political conditions, with triumphalist statements of industrial prowess, such as the Eiffel Tower in Paris, gradually giving way to more refined architectural statements.

National pavilions have taken on greater prominence, and the influence of the most innovative pavilions can have a lasting impact on developments in architecture, such as Ludwig Mies van der Rohe’s serene German pavilion at the 1929 Barcelona International Exposition, or the popular and emblematic Dutch pavilion from Expo 2000 in Hanover, designed by the Rotterdam-based firm MVRDV, which presented the diversity of Dutch culture in a space-saving vertical layout.

Ideas are at the heart of the most memorable designs, including the lightweight dome housing the American pavilion at Expo 67 in Montreal and the UAE pavilion at Expo 2010 in Shanghai, which combined an iconic form with intelligently implemented sustainable principles.

Successful Expos leave a legacy for the host city and country that can be enjoyed by subsequent generations, such as Expo 92, which put Seville on the map as a city of cultural and architectural significance, or Expo 2010 in Shanghai, which presented China as a developing nation with a key role to play in advancing sustainable urbanisation and technologies.

Successful Expo architecture presents a succinct vision of a nation’s character, communicating its best bits through clever combinations of form, materials and technology.