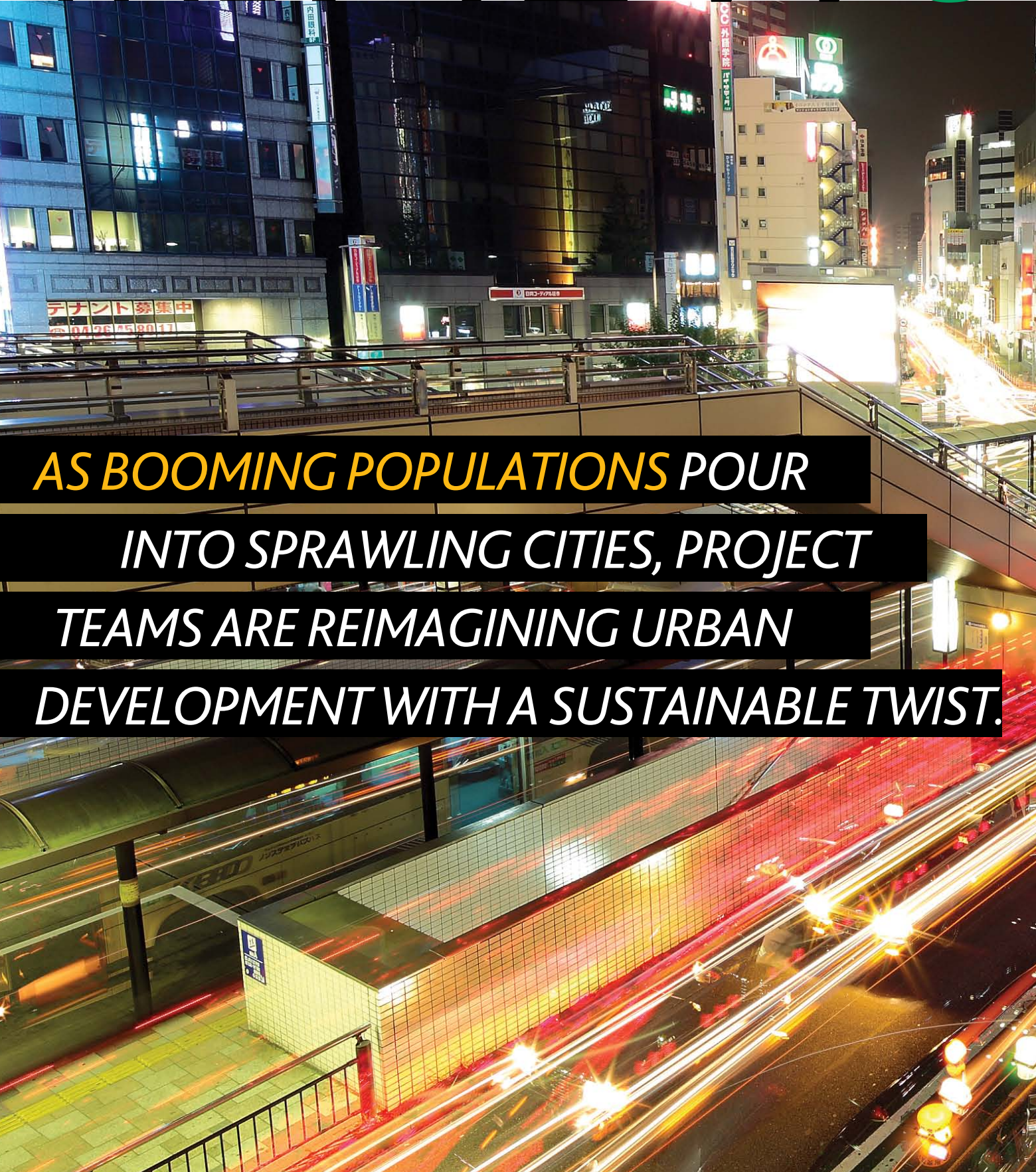


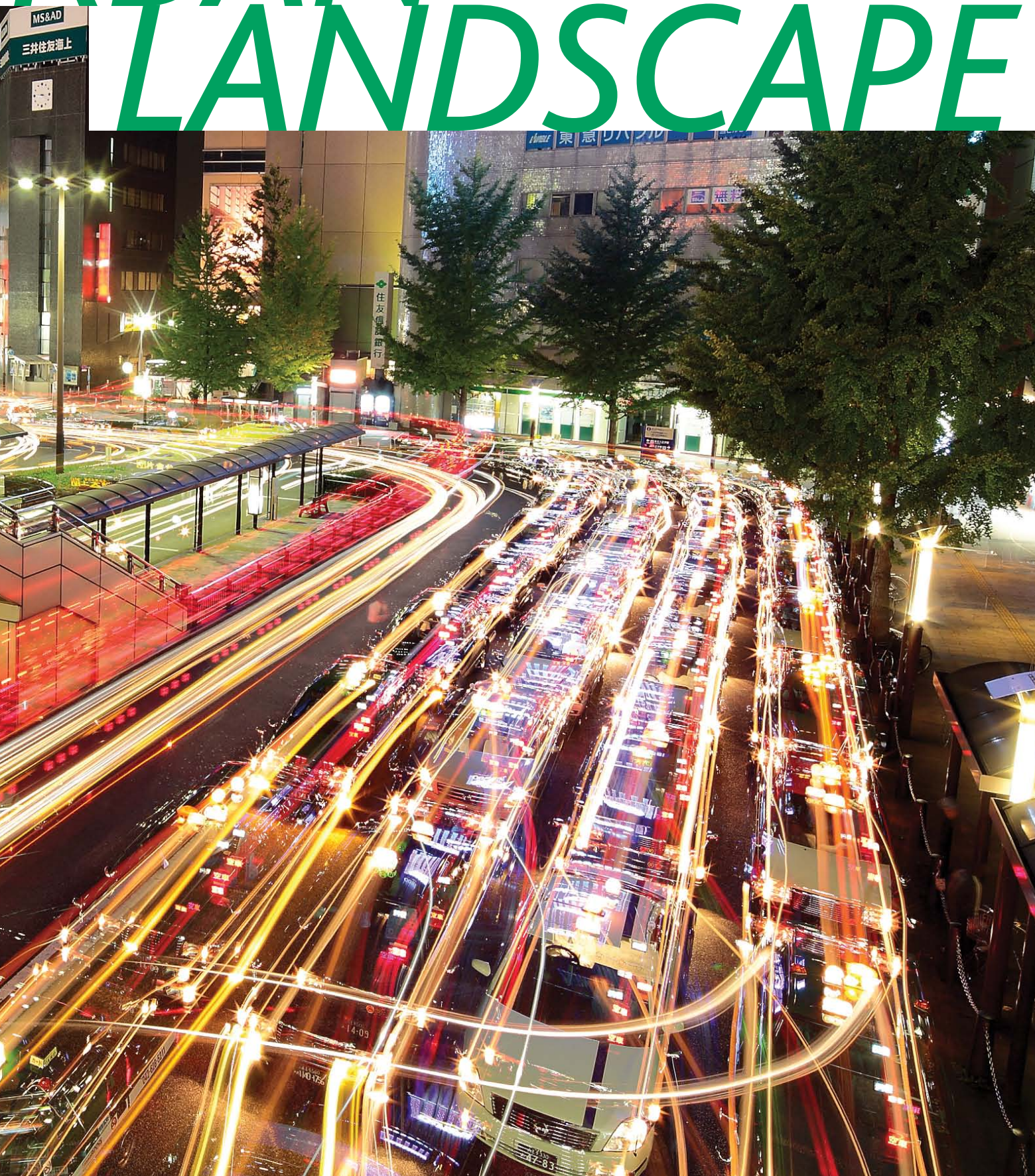
THE NEW U



AS BOOMING POPULATIONS POUR INTO SPRAWLING CITIES, PROJECT TEAMS ARE REIMAGINING URBAN DEVELOPMENT WITH A SUSTAINABLE TWIST.

URBAN LANDSCAPE

BY SARAH FISTER GALE



THE FUTURE IS GOING TO BE CROWDED.

There now are more than 7 billion people on the planet, and that number is expected to jump to 9.4 billion in less than 40 years, according to the U.S. Census Bureau. As the population grows, so too does the mass migration from the countryside to cities, particularly in developing nations. China's urban population outstripped its rural dwellers for the first time in 2011, driven by an increasingly industrial economy. The United Nations estimates that Asia's urban population will top 50 percent in 2025, with Africa reaching that tipping point by 2030.

The increasing economic clout of urban areas mirrors their population growth. Analyst group McKinsey & Company estimates in its 2011 *Global Cities of the Future* report that emerging market cities will contribute 45 percent of the global GDP growth through 2025. The report also pins 60 percent of that global growth to 600 cities.

By 2025, the United Nations forecasts that eight megacities will exceed the 20 million population mark, adding massive strain to already underdeveloped resources. As these cities—and the burgeoning agglomerations that surround them—grow, so too will their infrastructure, construction, energy and IT demands. That, in turn, creates a potential sea of change in every aspect of project execution. Project leaders must learn to balance complex space constraints, resource limitations and demanding stakeholders to deliver massive sustainable urban-development projects—all while keeping cities fully operational.

This confluence of politics, policies, stakeholders, delivery methods and financial efficiencies needs a wider view from project leaders. "Much more attention has to be paid to the benefits-realization component of these projects," says Al Zeitoun, PhD, PMP, Middle East and North Africa director for portfolio solutions at consultant company Booz Allen Hamilton, Abu Dhabi, United Arab Emirates. "No longer will the triple constraints be sufficient in measuring success. The measurements will need to be much more benefits realization-focused. This means that they should reflect the business case for which these projects were created."

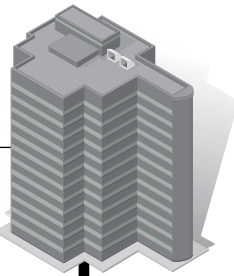
SUSTAINABLE SOLUTIONS

Before any grand urban vision can be executed, there must be an acknowledgement of the massive burden cities place on the environment. By

Megacities Circa 2015

In just three years, five of the 10 largest cities in the world will have 20 million or more citizens, according to the United Nations forecasts.

1. Tokyo, Japan: 36.4 million
2. Mumbai, India: 21.9 million
3. São Paulo, Brazil: 20.5 million
4. Mexico City, Mexico: 20.2 million
5. New York, New York, USA: 20 million
6. Delhi, India: 18.7 million
7. Shanghai, China: 17.2 million
8. Dhaka, Bangladesh: 17 million
9. Kolkata, India: 17 million
10. Karachi, Pakistan: 14.9 million



CURITIBA, BRAZIL

2030, they will account for 73 percent of the world's energy consumption, according to the 2011 United Nations *Cities and Climate Change* report. And the U.S.-based National Academy of Sciences predicts that by 2050, 1 billion urban dwellers will face perennial water shortages.

Project sponsors must focus on meeting growing demands for urban services in the face of tight budgets and shrinking natural resources, says Janice Perlman, PhD, founder and president of the Mega-Cities Project, a New York, New York, USA-based not-for-profit network focused on innovative solutions to urban problem-solving.

"There are fantastic opportunities today for cities in the developing world to leapfrog over the outmoded infrastructure left over from the end of the 19th century and go directly to the technologies of the 21st century," she adds. "There has been no real fundamental change in urban infrastructure for more than 100 years." Dr. Perlman notes that from steel-framed buildings to single-source water facilities, the solutions implemented today generally are based on ideas developed in the 1900s. "Those designs were created in a time when there was no resource scarcity, and no one expected cities to have millions of inhabitants."

Instead, she says cities must look at implementing circular rather than linear systems that regenerate resources through actions



Nearly 30 parks and urban forests dot Curitiba. This decades-long effort has grown the city's green space from less than 1 square meter (10.7 square feet) per citizen in the 1970s to 52 square meters (559.7 square feet) today.



BUS PHOTO COURTESY OF [HTTP://WWW.CURITIBA-TRAVEL.COM.BR](http://www.curitiba-travel.com.br)

The award-winning, **high-speed bus system** in Curitiba mimics subways' fare and passenger-flow systems to increase efficiency.

LONDON, ENGLAND



John Keane at the Crossrail site at Farringdon (East Central London)

PHOTO BY MARTIN BEDDALL



such as collecting rainwater, repurposing lightly used water for flushing toilets and heating buildings with methane gas. These types of regenerative urban systems not only help curtail further environmental degradation, but also contribute to ecological restoration.

“The lesson for project planners is, instead of spending money to extend what’s already been done, take the time to explore new ideas,” Dr. Perlman says. “It might cost a little more up front, but there can be big savings down the line.”

Some of the most innovative solutions come from the developing, not the developed, world. The Brazilian city of Curitiba won the Globe Sustainable City Award in 2010 for its long-term urban planning and sustainable designs. Its high-speed bus system, for example, mimics subways’ fare and passenger-flow systems to increase efficiency. The city also uses a fleet of 92-foot (28-meter) long megabuses powered by biofuel. And because 75 percent of the city’s weekday commuters use the system, Curitiba uses 30 percent less fuel and has a lower rate of ambient air pollution than Brazil’s other major cities. To encourage public transit use, the government allows project developers to build taller, higher-density buildings if they’re close to bus hubs.

A TIGHT SQUEEZE

Projects in densely populated areas often come under particularly careful scrutiny because they affect millions of stakeholders—the city’s residents.

“The challenges of megacity projects are massive, and you’ve got to plan, plan, plan and make sure you know exactly what everyone is going to do, before they do it,” says John Keane, chief construction engineer of the civil infrastructure global business unit at construction firm Bechtel, London, England.



PHOTO COURTESY OF SISK GROUP

The 10-year, £14.8 billion

London Crossrail project is one of Europe's biggest construction efforts—and it's in the middle of one of the world's biggest cities.

Major construction projects in crowded neighborhoods may require the use of cranes or large-scale material delivery elements that could present a challenge when dealt with on the spot in real time, says Jeff Smallidge, consultant at Walker Parking Consultants, Indianapolis, Indiana, USA.

"You have to look at all of the costs, risks, feasibility and space constraints of each solution," he says, noting that ideas that work well in small or rural environments don't always make sense in an urban setting. "If you need to deliver a 60-foot (18-meter) piece of pre-cast to a job site in a crowded environment, it's a significant logistical challenge that may result in incurring a lot of added costs."

Mr. Keane knows something about that. He was one of the construction managers for the central tunneled element of the ongoing London Crossrail project, which aims to build a high-frequency railway link under the city. Expected to be operational in 2018, the 10-year, £14.8 billion effort is one of Europe's biggest construction projects—and it's happening smack-dab in the middle of one of the world's biggest cities.

To avoid interfering with the travel routes of Londoners, the project team and contractors developed schedules that dictated exactly when excavated materials were removed and construction materials were delivered, how they arrived at the site, where they were stored and how quickly they were used. The project team also took advantage of the nearby Thames River to ship material by boat, and truck deliveries were scheduled to ensure materials arrived just in time.

"We couldn't have a line of trucks waiting on the road to enter the project site," Mr. Keane says.

"The only way to do that is know exactly what needs to happen when," he says. "That kind of logistics coordination doesn't occur by accident." It happens only when project teams work in tandem with government stakeholders, utilities, retailers, citizen groups and anyone else impacted by the project.

GREEN FIELDS INTO GREEN CITIES

Building a new public-transit infrastructure—or clean energy generators or wastewater-collection



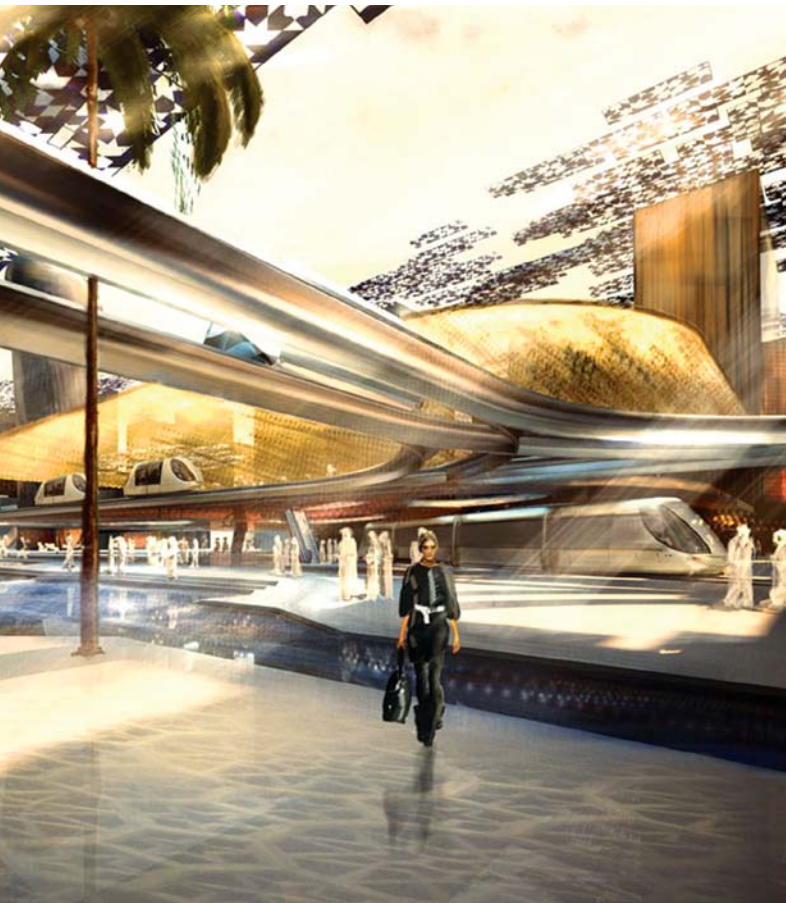
MUCH MORE ATTENTION HAS TO BE PAID TO THE BENEFITS-REALIZATION COMPONENT OF THESE PROJECTS.

— Al Zeitoun, PhD, PMP,
Booz Allen Hamilton, Abu Dhabi,
United Arab Emirates

MASDAR CITY, UNITED ARAB EMIRATES



RENDERINGS COURTESY OF FOSTER + PARTNERS



Planners on the **US\$22 billion** Masdar City project will ban cars within city limits to force 50,000 residents to use public transportation.

plants—from scratch isn't always practical in centuries-old city centers.

"It's difficult to justify a complete overhaul of existing urban infrastructure to meet fast-changing urbanization needs," says Konkana Khaund, Toronto, Ontario, Canada-based industry manager for environment and building technologies at Frost & Sullivan.

One promising alternative is to redistribute the population away from the most crowded areas and into more eco-friendly developments on the edges of urban areas.

Outside Abu Dhabi, United Arab Emirates, the US\$22 billion Masdar City project aims to use solar and wind power, water desalination and zero-waste strategies to create a truly sustainable home for up to 50,000 people. Project planners are taking a less-than-subtle approach to get residents to use public transportation: Cars will be banned within the city limits.

Shiny, new eco-cities alone may not be enough, however. And Dr. Zeitoun worries they could divert resources that would otherwise be dedicated to megacity upgrades. "This trend could work if it is done in an integrated fashion with the other, more impending issues facing the megacities development initiative," he says. "It could provide both the relief needed on exhausted infrastructure and the environmental leadership that is, in many cases, at the center of national visions and strategies."

In the meantime, project planners are doing what they can to drive incremental efficiencies within the existing urban center. Projects to build or retrofit green buildings, implement smart grid infrastructure and deliver improved energy-savings with innovating technology integration are being rolled out in cities around the world. But Ms. Khaund warns the transition will require powerful champions who understand that the ROI could take decades in some cases.

"We need project leaders who can communicate the value, based on total cost of ownership, and demonstrate the benefits of long-term performance improvements," she says. "We need the conversation to shift from today's infrastructure needs to the physical and environmental opportunities we create with that same infrastructure in the long term."

This especially is true when budgets are limited and funding sources are scarce. "We need to think ahead, look at the long-term trends and consider where we want to be 20 or 30 years from now," she says. "That's how we will develop the blueprints for the future."



GROWING UP GREEN

Rising in the shadow of two megacities, a couple of urban development projects showcase next-generation urban sustainability.

Shobuj Pata Eco Community



RENDERING COURTESY OF JET ARCHITECTURE

Green Leaf, Bangladesh

Dhaka, Bangladesh is one of the fastest-growing—and most polluted—megacities in the world. So instead of adding to the overcrowded metro center, project planners targeted an unused piece of land just outside the city's existing boundaries to create an urban oasis.

Dubbed Green Leaf (or *Shobuj Pata* in Bengali), the project calls for rooftop gardens and vegetation-covered walls that reduce heat absorption and energy consumption. "Instead of obliterating the natural landscape of Bangladesh, it embraces it," says Jaegap Chung, principal and founding partner of JCI Architects, Toronto, Ontario, Canada.

The project also includes a centralized cogeneration power plant, low-energy cooling systems and rainwater collection tubs to offset the high cost and scarcity of clean water.

Construction of Green Leaf is slated to begin in 2012, with the first of four phases taking two to three years. When complete, Green Leaf will offer 2,400 high-density housing units for up to 12,000 residents,

along with a convention center, a mosque, a school and retail space.

JUSTIFYING THE GARDENS

The project has been in the planning stage for months, and from the start, developers placed extra focus on making choices that were both innovative and cost-effective.

"It doesn't matter how cool an idea is—if it's not financially feasible, you'll never get it done," Mr. Chung says.

In some cases, project plans were both environmentally and financially attractive. The green walls and roof, for example, offer citizens 2 million square feet (185,806 square meters) of garden space in an otherwise dense urban environment.

"The rooftop gardens were a big part of why we got local support, but we had to convince the developer and the client that it was a financially feasible design choice," Mr. Chung says.

To ensure ROI, planners redesigned some of the buildings to increase the number of units and provide covered parking spaces. By creating more living space, owners can earn more money from each building, thus offsetting the added cost of the gardens, Mr. Chung explains.

And because the green roof and walls will reduce the temperature of the living space by up to 3 degrees Celsius, energy costs will be lower—an important consideration in a tropical climate. "Bangladesh suffers from acute power shortages, and power is very expensive," he says.

The project team also found a local manufacturer of plastic water reclamation tubs for one-tenth the cost of more traditional concrete cisterns. Developers can then apply those savings to install massive tanks around the city to capture the huge amount of fresh water that falls during the monsoon season. The tubs will not only mean a valuable source of water, they will help alleviate annual flooding, too.

The future of sustainable city projects like Green Leaf depends on planners who can integrate revolutionary sustainability into the realities of their local markets.

"We see this project as an opportunity to integrate and embrace the natural landscape of Bangladesh in an urban-development scheme," Mr. Chung says. "And at the end of the day, we hope to change how development happens around the world."



Songdo International Business District, South Korea

Outside megacity Seoul, South Korea lies one of the biggest and most expensive urban-development projects ever undertaken: Songdo International Business District.

The ultimate goal of the development isn't to set records, however; it's to drive economic growth and vitality in an economy that has long relied heavily on exports.

"Well-educated Koreans were leaving South Korea because there were limited employment options on the peninsula," says Tom Murcott, executive vice president and global foreign investment officer at Gale International, the New York, New York, USA real estate conglomerate spearheading the Songdo project.

The South Korean government is looking to buck that trend by using Songdo to draw in international corporations that will hire local workers. Scheduled for completion in 2016, the US\$35 billion project is transforming a barren 607-hectare (1,500-acre) piece of reclaimed land on the shores of the Yellow Sea into the largest private real estate development in history. The new eco-friendly



RENDERING COURTESY OF KOHN PEDERSEN FOX



60 million square meters

(72 million square yards)
of new office, retail and public space

people who will commute in daily as office workers or students," Mr. Murcott says.

STEALING FROM THE BEST

By building on empty land, Songdo IBD's project planners were able to envision a brand-new kind of development. "You can only do so much in a built environment," Mr. Murcott explains. "We started Songdo with a blank slate, and that gave us a tremendous advantage."

But that didn't mean they didn't look to their urban neighbors. Mimicking New York and London, project planners dedicated 100 acres (40.5 hectares) of the city center to parkland, with a navigable salt-water canal running through the middle in a nod to Venice. They also made sure no part of the park is more than a two-minute walk from a mass transit node.

"It initially surprised investors that we would dedicate the most valuable piece of real estate to a park," Mr. Murcott says. But team members argued that putting the park in the center of the city created highly valuable real estate all around its edges. They also made the case that the move aligns with South Korean President Lee Myung-bak's goals to encourage green and low-carbon urban developments. "It all makes the city very livable," Mr. Murcott adds.

Other eco-friendly project features include bike lanes, charging stations for electric vehicles and a centralized waste-collection system that eliminates the need for garbage trucks. Lights, heating and electricity in all of Songdo's commercial buildings are constantly monitored, enabling more efficient energy use, and 80 percent of the built environment is expected to be LEED (Leadership in Energy and Environmental Design) certified. In addition, a central, city-wide cogeneration facility fueled by natural gas will provide clean power and hot water to the project.

City planners can look to the knowledge gathered in Songdo's development to streamline future eco-city projects, Mr. Murcott says. "It took four years to design Songdo's master plan, but by looking at lessons learned, we hope to compress that time and do the next plan in six months."

city will include 22,000 apartments and more than 60 million square meters (72 million square yards) of office, retail and public space.

The idea for the project may have started with government leaders, but several global private construction and IT firms, as well as the dozens of local utilities and contractors, have a stake in the project's outcome.

"A project like this takes a fully engaged public and private sector working together to integrate the infrastructure, subways, highways, buildings, energy grid and public spaces," Mr. Murcott says. "We are bringing hundreds of firms together to help guide them through the process."

Of course, that requires paying close attention to ensure the support of all those stakeholders doesn't waver, even when local government administrations change.

"We make sure every stakeholder is aware of the challenges and opportunities the project faces, and they understand that in the end we are building a city that will be home to more than 65,000 residents and an additional 300,000