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INSIGHT

The global infrastructure magazine / Issue No. 6 / 2014

Population

With a special feature on

Asia Pacific's infrastructure market

KPMG
cutting through complexity

Foreword

The link between shifting demographics and infrastructure is undeniable. In the next 50 years, three billion more people will be added to the global population,[1] a large number of whom will live in cities within the developing world. The demand for infrastructure to support these new global citizens will be incredible.

At the same time, the demographics of the population are rapidly shifting, creating deep complexities for governments and infrastructure planners. By 2065, for example, more than a quarter of all people living in the developed world will be over 65; more than one in 10 will be over 80 years of age.[2]

[1, 2] http://esa.un.org/wpp/unpp/panel_indicators.htm

The pressures this will create on social and health infrastructure, and on the tax base, will be enormous.

In the less and least developed countries, population growth will combine with rising affluence, better access to healthcare and education, massive urbanization and gains in productivity to shift the demographics dramatically and, in doing so, put enormous strain on the existing infrastructure and the funding capability of governments and their supporters.

Clearly, population and demographics matter. That is why we have focused this edition of *Insight* on the challenges surrounding population. In the articles that follow, KPMG infrastructure professionals from around the world talked to demographers, government leaders, infrastructure planners and developers to bring together a comprehensive view of how these game-changing demographic shifts are influencing the way infrastructure is planned, prioritized, funded, operated and maintained.

This edition of *Insight* also contains a Special Report on Asia Pacific, a region at the center of the demographic shift now underway. Within this section, KPMG infrastructure leaders explore some of the biggest challenges and opportunities emerging across the region. Whether it is frontier countries such as Myanmar and Mongolia, energy market reforms in Japan or investment opportunities in China, this report provides deep insight into the markets and issues that matter.

We therefore hope this edition provides governments, planners and infrastructure players with some new perspectives and practical advice for managing the difficult changes ahead. Moreover, we hope that it starts the conversation in government corridors around the world about the need to rethink our approach to infrastructure. There is no time to waste.

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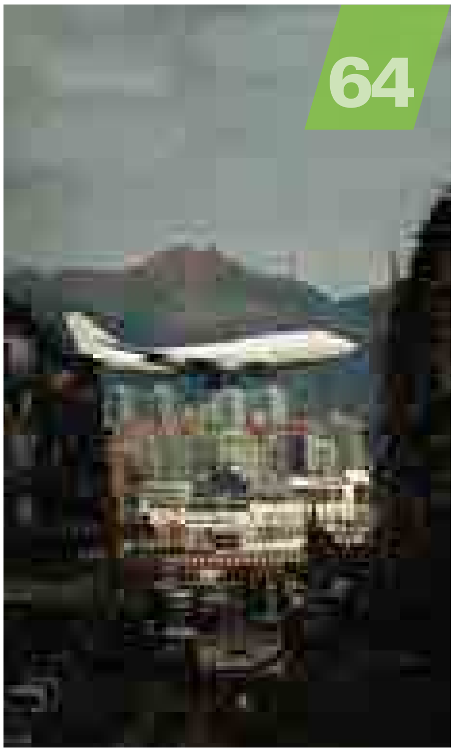

Spotlight: Asia Pacific's infrastructure market

Insights

Around the world in infrastructure

NORTH AMERICA

California HSR gets back on track

It seems that California's High-Speed Rail (HSR) project may be about to get a much-needed boost. Democrats in that State have proposed that the project be funded with proceeds from California's carbon cap-and-trade program. Should the proposal be accepted, it would give the California HSR Authority the ability to leverage the stable funding to accelerate the development of the project. Once completed in 2029, the system will run from San Francisco to Los Angeles in under three hours at speeds of up to 200 miles per hour. It is estimated that the project will carry a price tag of around US$68 billion.[1,2]

Urban light rail in Canada

Canada is seeing the value of light rail transit (LRT). Three new light rail projects have been announced recently in three of Canada's largest cities. In Toronto, a US$3 billion (plus) project will create a 19 kilometer line that will provide better East/West connectivity. Montreal's US$1.5 billion LRT project will provide a better connection between the South Shore and the downtown core, while Edmonton's US$1.8 billion project will create more than 13 kilometers of new lines, including the construction of a new bridge and a 350-meter tunnel.[3,4,5]

Thinking longer-term in NYC

The long-awaited replacement of the Tappan Zee Bridge over the Hudson River kicked off in 2013. The original bridge – built at a cost of just US$80 million in 1955 – had seen traffic rise well above the bridge's original design capacity while demand forced authorities to extend the life of the bridge past its expected 50-year lifespan. The new bridge (a dual-span, eight-lane, cable-stayed structure) was designed to have a minimum lifespan of 100 years – both in construction quality and capacity capability – and will be completed by 2018 at a cost of under US$4 billion.[6,7]

Securing medical isotopes

The Canadian government is investing CAD141 million (US$120) into restructuring AECL, the Crown corporation specializing in a range of nuclear products and services. The restructuring was part of Canada's Economic Action Plan 2013 and follows the sale of AECL's CANDU Reactor Division to SNC-Lavalin Group in 2011. It is hoped that the investment will help AECL "put in place the conditions for Canada's nuclear industry to succeed in the future, while reducing cost and risk for Canadian taxpayers over time."[8,9]

Also in British Columbia (BC)…

BC is considering options for the replacement of the George Massy Tunnel, which carries more than 80,000 vehicles into and out of Metro Vancouver every day. Public and stakeholder consultations are expected next spring with construction expected in 2017. A recent report by TransLink, the Greater Vancouver Transportation Authority, has suggested that a tolled eight-lane bridge be constructed to replace the current four-lane tunnel. The report stated that the tolled bridge option appeared to manage the growth in auto traffic demand and could potentially prolong the useful capacity of the bridge beyond 2045.[10,11,12]

LATIN AMERICA

Peru takes their investment portfolio on the road

ProInversion, Peru's public-private partnership (PPP) implementation and investment promotion agency has kicked off a roadshow to Asia and the UK. With the intention of showcasing Peru's infrastructure investment opportunities to potential private investors, the roadshow will visit China, Korea, Japan, Australia, New Zealand and the UK. Twenty-two percent of Peru's Gross Domestic Product (GDP) comes from private investment and the country has signaled a desire to expand the origin of their investors further into Asia.[13,14]

Santiago's airport expansion ready to take off

President Michelle Bachelet's new government seems keen to ensure that the proposed US$716 million expansion to Santiago International Airport goes ahead this year. The expansion, which has suffered a number of delays, will increase the airport's capacity to 29 million passengers per year by 2030 and to 50 million by 2045. The project will include the construction of a 200,000 square meter terminal as well as aprons, asphalt runways, a freight terminal and car parking. Santiago already accounts for nearly 70 percent of Chile's airport passenger traffic.[15,16]

AFRICA

World's largest metro procurement program reaches financial close

Almost three and a half years after first setting out their feasibility study, PRASA (South Africa's passenger rail agency) reached financial close on what is believed to be the world's largest-ever metro rail procurement program. Alstrom was selected as the preferred provider for the program, which is expected to procure almost US$6 billion worth of rolling stock. Six hundred new six-unit trains will be ordered, representing about 3,600 new units over a 10 year period.[17]

Transnet announces preferred suppliers

South Africa's Transnet, the state-owned freight rail operator, recently announced the successful

Source:

[1] http://www.hsr.ca.gov/
[2] http://online.wsj.com/news/articles/SB10001424052702304788404579523964267880976
[3] http://www.infra-deals.com/deals/964363/eglinton-crosstown-lrt.thtml
[4] http://www.infra-deals.com/deals/986733/edmonton-lrt-p3-valley-line.thtml
[5] http://montreal.ctvnews.ca/quebec-opts-for-lrt-on-new-champlain-bridge-1.1245706
[6] http://en.wikipedia.org/wiki/Tappan_Zee_Bridge
[7] http://en.wikipedia.org/wiki/Tappan_Zee_Bridge_Replacement
[8] http://www.aecl.ca/en/home/about/Restructuring.aspx
[9] http://actionplan.gc.ca/en/initiative/atomic-energy-canada-limited
[10] http://www.proinversion.gob.pe/modulos/LAN/landing.aspx?are=0&pfl=1&lan=10&tit=proinversi%C3%B3n-institucional
[11] http://www.eturbonews.com/45031/peru-back-seoul-attract-korean-investors
[12] http://engage.gov.bc.ca/masseytunnel/
[13] http://en.wikipedia.org/wiki/George_Massey_Tunnel
[14] http://www.vancouversun.com/Tolled+bridge+replace+George+Massey+Tunnel+best+option+managing+traffic+flow+TransLink+report/9602253/story.html
[15] http://www.bnamericas.com/news/infrastructure/chiles-new-govt-promises-to-launch-santiagos-airport-tender-soon1

bids of four global suppliers for their upcoming US$5.5 billion freight investment program. The locomotive investment plan calls for a 50/50 mix between electrical and diesel units. China South Rail, China North Rail, GM and Bombardier will deliver more than 1,000 locomotives to Transnet by 2019. The rolling stock will be manufactured in South Africa in the hopes of helping the country become an original equipment manufacturer, said Transnet CEO Mr. Molefe at the signing.[18]

ASIA PACIFIC AND MIDDLE EAST

India brings reform to civil aviation

The Ministry of Civil Aviation in India is bringing about a series of reforms aimed at aligning India's air industry with global best practices. It is expected that India's new government after the 2014 elections will put additional focus on formalizing the Open Sky Policy, establishing an Inter-Ministerial Group for Aviation (IMGA), fast tracking the delivery of new airports (particularly Navi Mumbai, Mopa and Agra airports), and developing new 'no-frill' airports (NFAs). NFAs typically offer none of the luxuries associated with metro airports such as air conditioning, baggage carousels, waiting areas and so on, and are therefore thought to be well-suited to improving access to air travel.[19,20]

Australia enjoys strong investor appetite for secondary assets

Two recent major secondary market transactions in Australia demonstrate that institutional and strategic investors are hungry for good quality assets. At the end of April, the Queensland Government announced the sale of Queensland Motorways to a private consortium for AUD7 billion.[21] A week later, the New South Wales Government signed a 98-year lease on the Port of Newcastle to Hastings Funds Management and China Merchants for AUD1.75 billion, a far higher value than the AUD700 million the government had expected.[22] With more secondary market transactions in the pipeline, it is expected that much of the proceeds will be recycled into new infrastructure development.

Interest heats up in Japan's airport concessions

Over the past few months a number of major airport operators and investment funds have indicated their interest in participating in a range of upcoming tenders for 27 government-managed airports. The sales are widely considered to be a front-runner of similar tenders for the country's remaining 67 airports. The move marks a significant departure for Japan, where airports have long remained under public sector management. The concessions are expected to raise funding for new infrastructure development and, it is hoped, will result in more efficient airport operations.[23]

EUROPE

Ireland steps up their PPP programs

With the N17/N18 motorway PPP deal having recently closed, Ireland's government now has a series of tender competitions underway across a variety of sectors including: a new schools bundle, the re-development of a former mental health hospital campus into a university, a set of primary care centers and a series of court houses. The government also announced that a review of capital spending was underway to identify a new program of capital projects which is widely expected to include a number of new PPPs.[24]

Portugal improves transport integration

Following a review of Portugal's transport priorities from 2014-2020, the government has approved a National Plan for Transport Infrastructure that includes 60 projects (19 port projects, 18 rail projects, 14 road projects, six airport projects and three passenger projects). Notably, the plan included guidelines to support the prioritization of projects across three main criteria: of inter-modality, affordability and timing of execution. The plan also envisions particular focus on cargo (versus passenger), brownfield projects and rail and ports (versus roads and airports).[25, 26]

A step forward on the UK runway debate

With the debate over airport expansions in the UK continuing to simmer, the UK Airports Commission (also known as the Davies Commission) has moved the conversation forward with an interim report in December 2013 calling for one net additional runway for the UK South-East by 2030. The report also suggests that a second new additional runway would be required by 2050. The commission said it would take forward proposals for new runways at Gatwick and Heathrow Airports, and offered recommendations on improving the use of existing capacity. The Commission is expected to hold a public consultation on options in late 2015.[27]

HS2 picks up steam

The UK's High Speed Rail 2 (HS2) program continues to move forward. Having rebuffed a number of legal challenges, it seems that the project is back on track and a final route will be chosen in late 2014. The high-speed rail network will link Birmingham, Manchester and Leeds with London and Heathrow Airport and will be Britain's second high-speed rail line following the successful completion of HS1. The first sections of the network are expected to open in 2027 and will be integrated into the existing network to allow the use of both high-speed and conventional rail lines.[28]

Mersey Gateway Bridge project moves forward

Construction has begun on the Mersey Gateway Bridge project following a GBP270 million guarantee from the government as part of the 2014 Budget. The bridge project will not only improve connectivity in the North-West by providing a new (tolled) six-lane conduit across the Mersey River and the Manchester Ship Canal, it will also stand out visually. The project includes a 1 kilometer-long cable-stay bridge with four spans supported by three towers, where the central tower will stand 20 meters shorter than the outside towers.[29]

Source:

[16] http://www.ciechile.gob.cl/en/relicitacion-del-aeropuerto-internacional-amb-santiago/
[17] http://www.globalrailnews.com/2014/04/29/financial-close-for-e4bn-south-african-train-order/
[18] http://www.noodls.com/view/865FD49C1F45875090CA53839CF892619BDFE4EF?1469xxx1395200138
[19] http://www.business-standard.com/article/economy-policy/under-new-govt-it-might-rain-reforms-for-civil-aviation-sector-114052001093_1.html
[20] http://www.ainonline.com/aviation-news/ain-air-transport-perspective/2013-04-01/iata-backs-indian-carriers-seeking-reform
[21] http://www.brisbanetimes.com.au/queensland/7-billion-queensland-motorways-makes-healthy-profit-for-qic-20140423-374ta.html
[22] http://www.platts.com/latest-news/coal/perth/australian-newcastle-coal-exports-port-sold-to-26779984
[23] http://www.ijglobal.com/articles/88183/japan-stirs-a-new-type-of-ppp-is-on-the-way
[24] http://ppp.gov.ie/news/
[25] http://www.ijglobal.com/articles/90990/portugals-privatisations-drive-ahead
[26] http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/evasltrat_tran/portugal.pdf
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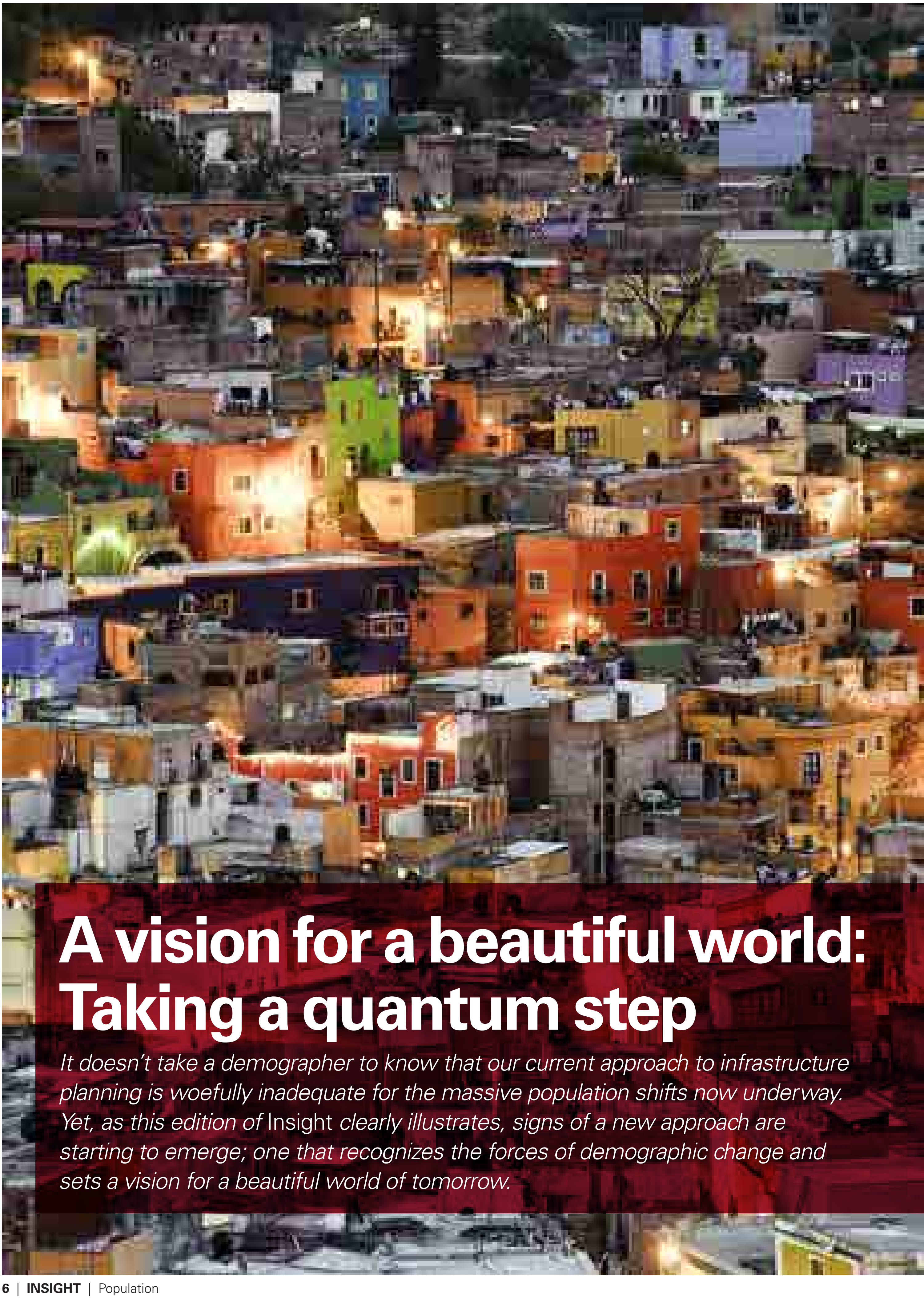


A vision for a beautiful world: Taking a quantum step

It doesn't take a demographer to know that our current approach to infrastructure planning is woefully inadequate for the massive population shifts now underway. Yet, as this edition of Insight *clearly illustrates, signs of a new approach are starting to emerge; one that recognizes the forces of demographic change and sets a vision for a beautiful world of tomorrow.*

THE FUTILITY OF 'MORE'

Let's face it: if we simply keep doing more of what we are doing today, the world that we leave our children and grandchildren will be an ugly place indeed. Laying down more roads, building more power plants, damming more rivers or growing more food will never enable us to keep pace with the massive demographic changes now underway.

That's assuming governments could pay for 'more' if they wanted to. But they can't. Most of the 'baby boom' countries are facing a drop in tax revenues over the coming years as workers retire and start using increasing levels of government services, particularly in healthcare (see Bernard Salt's article on page 12 for more). Those in high growth countries are being challenged by urbanization and demands for new services suited to an emerging middle class.

WE HAVE THE DATA

We need a better way. As Prof. Hans Rosling notes in the article on page 8, we already know everything we need to know about our populations to be able to accurately plan 50 or even 100 years into the future. Governments and planners can no longer claim ignorance or a lack of data when demographic shifts overwhelm their existing infrastructure.

We also have enough data – or at least the right tools and capabilities to capture the data – to help inform better decision making in infrastructure planning and improve the efficiency of our existing assets and services (see *An app for that* on page 24). Yet, as our *Emerging Trends* article on page 64 notes, we have yet to really see anyone bring data and analytics together and effectively utilize them to better plan, deliver, operate and maintain infrastructure. We mostly talk about it and do very little.

UNIQUE SITUATIONS, NEW APPROACHES

Even with the right data, the reality is that the complexity of making the right long-term decisions is messy by nature. All governments face different choices based on their particular imperatives – population, economic, cultural, demographic or social – and their decisions will need to be made within the context of their own situations.

Desmond Kuek, CEO of Singapore's Mass Rapid Transit (SMRT), summed it up well on page 30 when he said, "Planners and designers need to take a long-term view to really balance all of the factors and trade-offs which, in turn, requires designs to be integrated across all relevant agencies and community stakeholders up front."

NO ACCOUNTING FOR PEOPLE

The actual problem besetting governments around the world may be less about shifting population demographics and more about the infrastructure planning prioritization process itself. In our experience, most infrastructure investment planning methodologies tend to hold the 'real economy' as constant. As a result, the impacts of population growth or decline on the economy are often ignored in the prioritization decision-making process.

The flip side of this is that planners also assume – in the absence of new infrastructure – things would go on much the same as they have in the past. But in reality, the pressures of the current demographic shifts will mean that demands from the population will change, density will likely increase and, as a result, cities will become clogged and economies will suffer.

WE NEED A PLAN

Progress towards more thoughtful and integrated planning is being made. Five years ago there were only a handful of governments with nationally integrated infrastructure plans, but today we know of more than 50. However, most are still in an early stage of development; even the UK's plan – now in its fourth generation – barely scratches the surface on progressing the country's two biggest infrastructure debates around HS2 and airport capacity.

We believe that more must be done. Those countries without a structured and integrated national infrastructure plan should start considering how they will prioritize their investments to help guide their country's future growth at a more holistic level. Those with early stage plans will need to do more to bring greater integration and vision to their efforts.

THE QUANTUM STEP FORWARD

We recognize, however, that moving infrastructure planning prioritization into maturity will demand governments take a quantum step forward. It starts not by focusing on solving the short-term pain points or debating the merits of one solution over another, but rather on creating a consensus within society around the vision of where a country or city wants to be in 30 to 50 years time.

From this vision, planners can start setting objectives and criteria that can be used – in concert with current economic appraisal methods – to create a prioritization approach that achieves the long-term goals of society.

That is not to say that prioritization should not continue to be conducted on a project-by-project basis – it should – but planners should also be able to apply a set of programmatic criteria that help achieve the overall vision. So, for example, planners could set an objective of reducing CO_2 by 20 percent across the program. If the first cut of projects does not meet this program criteria then other projects will need to be substituted in.

OUT OF AFRICA

South Africa's national infrastructure plan is a brilliant demonstration of this at work. The country's vision of what they want to be was clearly articulated in the 1990's through the Truth and Reconciliation process that followed the end of Apartheid. Today, the government has used this vision to create a national plan that prioritizes social and economic infrastructure with an emphasis on catalytic projects that can fast-track development and growth, particularly in less developed parts of the country.

To achieve these criteria, the national plan prioritizes 18 Strategic Integrated Projects (SIPs) that provide the greatest potential for achieving the vision set by South Africa's society. The SIPs, which span across the nine provinces and cut across all government departments, comprise of five geographically-focused projects, three spatial projects, three energy projects, three social infrastructure projects, two knowledge projects, one regional integration project and one water and sanitation project.

Anyone that has visited South Africa knows that the government must make some tough short-term choices to steer the country along its pathway to development. In setting such an integrated and structural infrastructure plan, the government has made the choices easier and the path fairly clear.

TIME FOR REAL VISION

We believe the signs that point towards this new approach to infrastructure prioritization are everywhere – in this publication, in demographic projections and in the world around us. Now is the time for governments and planners to start thinking about what kind of society they want their children and grandchildren to live in.

It will be complex. But if we are to make the right choices for our future, then we need to start articulating our vision for a beautiful world and set hard-nosed objectives and criteria to achieve it. Those that ignore this fact do so at their own peril.

Don't panic

When it comes to population growth, world-renown statistician and global health expert **Hans Rosling** has one piece of advice for infrastructure planners and developers: don't panic.

Anyone who has had the pleasure of watching Hans Rosling – a dynamic and charismatic Professor of International Health at Sweden's Karolinska Institute and co-founder of Gapminder – will know why *Time Magazine* named him one of the 100 most influential people of 2012. Armed with amazing visualizations and graphics created through the Trendalyzer software developed by his son and daughter-in-law (which Google acquired in 2007), Prof. Rosling brings statistics alive to paint a different – and likely much more accurate – vision of our current and future population challenges. **Stephen Beatty**, America's and India Head of Global Infrastructure, had the opportunity to sit down with Prof. Rosling to discuss `all things population'.

PUTTING POPULATION MYTHS TO BED

According to Prof. Rosling, the first thing the world's urban planners and governments must do is realign their preconceived ideas about population growth. In particular, there are three big myths that need to be debunked. The first is that population forecasts and predictions are wild guesses or based on incomplete – or even manipulated – data.

"In 1958, the UN population division made their first estimate on the size of the world population, which went out to the year 2000, and they hit the mark to within about 4 percentage points; remarkable accuracy for a 42-year forecast," noted Prof. Rosling. "The reality is – with the addition of modern technology – we can now tell quite well what will happen with population growth in the future."

The second myth is that high death rates in the poorest countries provide a form of population control. In every part of the world, notes Prof. Rosling, health and survival has improved with the introduction of modern medicine and sanitation, and as a result mortality has greatly decreased. In fact today it is the

> “It’s when the corporate sector starts using their power of innovation and development to catalyze government and civil society to proactively seek out a decent life for the increasing population that we will get good and peaceful societies.
>
> **Prof. Hans Rosling,** Professor of International Health at Sweden’s Karolinska Institute and co-founder of Gapminder

countries with the highest rates of child mortality – the Democratic Republic of Congo for example – that also have the fastest population growth rates. And since births outnumber deaths right around the world, countries like the Congo and Afghanistan are seeing population size double in a generation as parents bring an average of five to six children into the world and lose only one to two.

Somewhat interrelated, the third great myth is that there is this ‘developing world’ where women have five to six babies each. “Nonsense,” says Prof. Rosling. “There are nine states in India with a combined population of 500 million where, on average, women have two babies or less each. Today Iran and Brazil both have lower birth rates than the US and Sweden, yet many seem to assume it’s only a vaguely defined group of ‘Western’ countries that have sustainable birth rates.”

THE FILLING UP EFFECT

So while the world population will likely grow by another four billion before it stabilizes, Prof. Rosling notes that this is not due to more children being born. In fact, the number of children born globally is expected to hit a peak this year at around 130 million. The additional billions will all therefore be adults, he suggests.

“It takes one lifetime, 70 years, for population size to stabilize once the two-child family has become a norm and there are so many countries where this has only just started to happen,” explained Prof. Rosling. “As a result, much of the population growth that we will see over the next century will essentially be the result of the population filling up while the number of children in the world will no longer increase.” So while there will still be more children in Africa, this will be balanced in Asia and Europe where the number of children will decrease at around the same rate.

THE BLESSING OF URBANIZATION

What is certainly true is the common belief that much of the future population growth will occur within cities. All of the growth illustrated by Gapminder will occur in urban areas while the rural population in the world will remain largely stable on average.

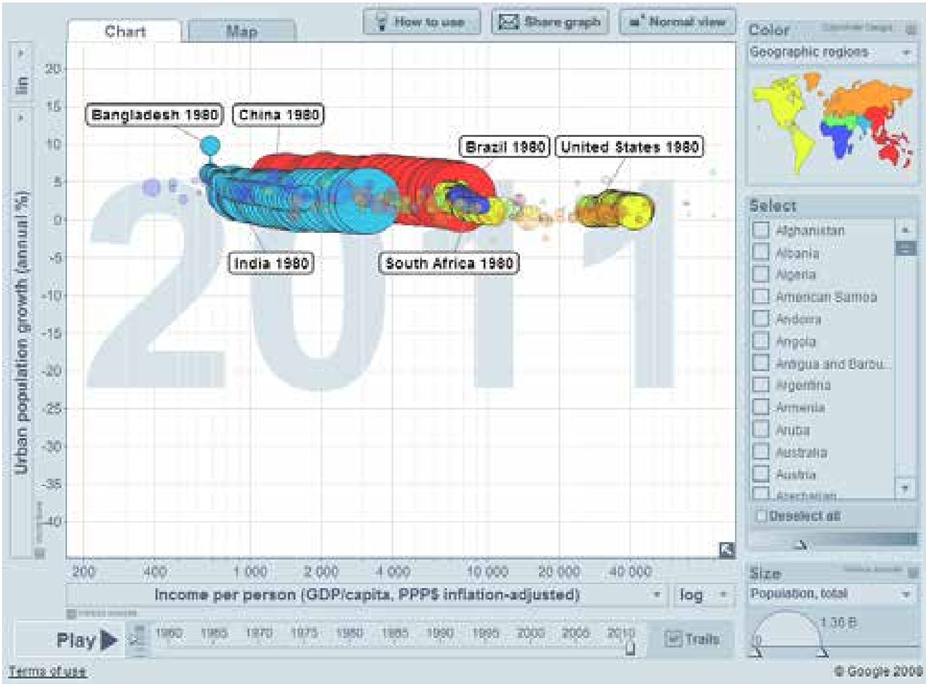
But, according to Prof. Rosling, urbanization is an undeniable blessing for most people. “We should be trying harder to bring people into cities where they can be exposed to modern thinking, have opportunities for jobs, access to contraception and better education and healthcare; that’s when we see young families quickly choose to have only two children,” added Prof. Rosling.

Make no mistake; the way out of extreme poverty will be anything but beautiful over the next two generations or so. “The women who get away from the rural villages in Bangladesh to work in urban textile mills don’t have a beautiful life *per se*, but for the vast majority it is a better life than the stark ugliness of extreme poverty and personal limitations that they endure in rural areas.”

However, Prof. Rosling shows that family sizes drop not because of a country’s economic growth but rather because of smart policy decisions and investments in public service. “In part, it’s about taking away extreme poverty where children are needed just to collect firewood and water,” he noted. “But it’s also about vaccinating children against disease, improving literacy, encouraging urbanization and educating people about contraception and making it accessible, those are policy matters.”

He points to Ethiopia where such policy measures have helped reduce fertility rates in the capital, Addis Ababa, to just 1.6 babies born per woman, or Bangladesh where access to contraception and better education has slowed the fertility rate down to 2.2 children born per woman. Similar measures in Iran and Turkey have worked so well that leaders in both countries are now starting to worry that they will not be able to replace their population over the coming century.

Urban population growth (annual percentage) 1980–2011



PREPARING FOR 10 BILLION

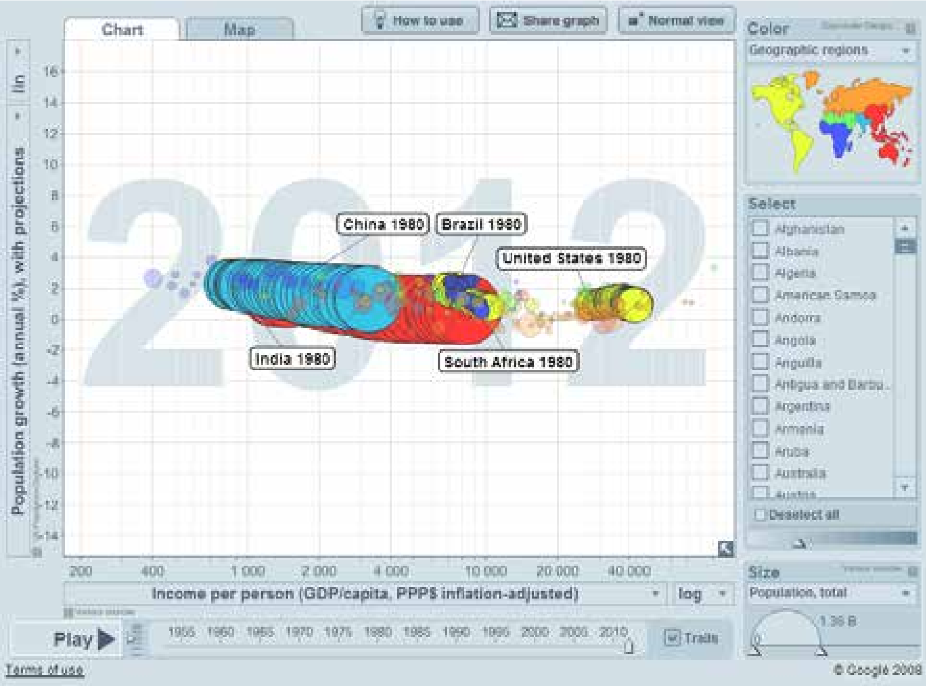
Based on the UN Population Division´s data, Prof. Rosling explains that the only thing that governments, planners and the public at large can do is prepare for a world population of 10 billion. "We've studied the data and we know with precision where the population will experience shifts over the next century – these are facts," adds Prof. Rosling. "It is much better to be proactive and prepare for these shifts than it is to ignore them; we can't ignore, for example, that the number of city dwellers around the world will double this century, from 3.5 billion to around 7 billion."

To achieve a decent (if not 'good') life for all of these people, Prof. Rosling suggests that government, civil society and the private sector will need to contribute with innovative solutions that help integrate the expanding population into well-functioning urban societies. Technology, regulation and policy will play a part, but so too will initiatives such as the 2012 London Summit on Family Planning, which brought together a range of private and public stakeholders to tackle the challenge of access to contraception in the developing world.

"It's when the corporate sector starts using their power of innovation and development to catalyze government and civil society to proactively seek out a decent life for the increasing population that we will get good and peaceful societies," he added.

For the size of the global population to stabilize, it will take a huge push against extreme poverty and access to healthcare, education and contraceptives in large parts of Sub-Saharan Africa and in the poorest parts of South Asia. "Everything is possible but nothing will happen automatically," Prof. Rosling noted. "If you see how far we have already come, it makes the reality much easier to endure."

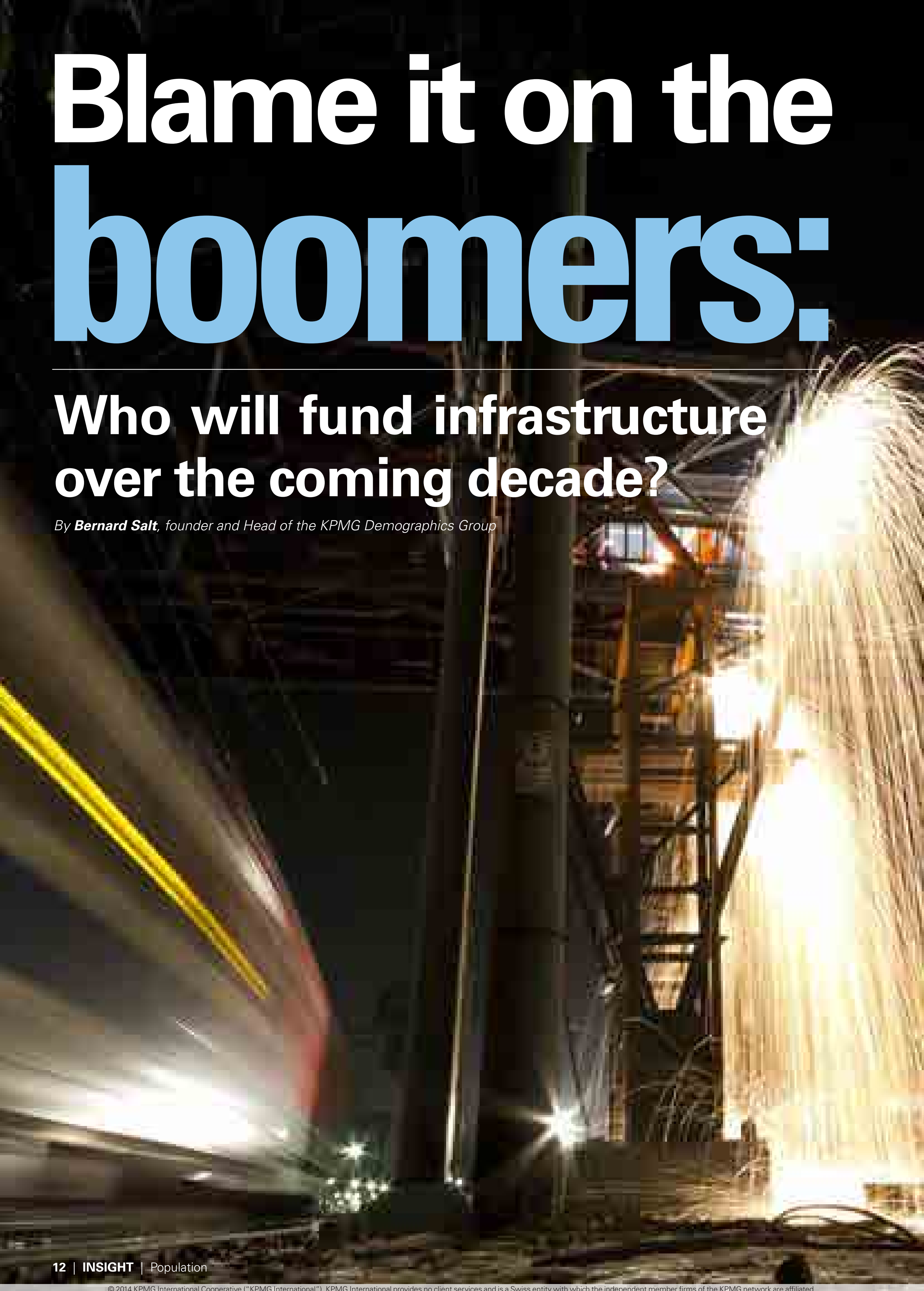
Population growth (annual percentage) 1980–2012



Blame it on the boomers:

Who will fund infrastructure over the coming decade?

*By **Bernard Salt**, founder and Head of the KPMG Demographics Group*



> Boomers are spilling from work into retirement at a faster rate than the next generation – let's call them the Millennials – are spilling into the workforce; this situation represents a breaking point between the era of the demographic dividend and the era of demographic liability.

I have a simple proposition. That the next decade will be more difficult than the last decade for governments to assemble the general tax funds required to develop nation-building infrastructure. Or indeed for nations to fund health, education and/or military imperatives. And the reason why the next decade will be harder than the last is because of the aging of the population base.

The transitioning of the baby boomer generation out of the workforce and into retirement will slow the rate of growth in consumption and in the tax base. The baby boom of course prevailed from 1946 to around 1966, after which time the contraceptive pill and the rise of the women's rights movement resulted in women remaining in the workforce and in a diminution in average family size. There were fewer kids but more breadwinners and taxpayers per household.

The baby boom impacted many Western and other developed nations. And so by the end of the first decade of the 21st century, as boomers retire, the skills base is diminished as indeed is the tax base. Boomers are spilling from work into retirement at a faster rate than the next generation – let's call them the Millennials – are spilling into the workforce; this situation represents a breaking point between the era of the demographic dividend and the era of demographic liability.

This demographic transitioning was not an issue during the 1970s, the 1980s and the 1990s when boomers turned 20, then 30, then 40 because they were at all times still in the workforce and still paying tax. Governments of the day had a rising tax base from which to fund new projects, new programs, new promises. Do this for long enough and governments and politicians and the broader population get used to the idea of the consumption base and the tax base rising at a predictable rate. But by 2014 it has all started to change.

In the US, for example, the number of people in the working-age stage of the lifecycle (15-64) increased by 21 million over 10 years to reach 210 million in 2010, whereas the number aged 65-and-over increased by just six million to reach 41 million (see Table 1). In this single decade the extra 21 million people in the working-age segment was more than enough to accommodate the needs, the tax-funded services and the infrastructure required by an extra six million in retirement.

However, over the decade to 2020 the US working-age population is expected to jump just eight million to 218 million whereas the 65-and-over population is set to increase by 15 million to 56 million.

You can see the problem straight away. Lots more workers in one decade easily accounts for the needs of a few more retirees. But when there are only a few more workers as compared with a lot more retirees in the following decade, then there is a problem.

Either retirees have longer working lives, or they go with less in retirement, or workers pay more tax per capita. The other option is to dramatically increase immigration by targeting skilled workers (and therefore taxpayers) in their 20s. Or it is all of the above, but even then this will probably not be sufficient to meet the expectations of the baby boomers in retirement.

Regardless of taxation and migration policies, the volume of funds available for nation-building and for necessary city-building infrastructure is most likely to be pushed down the priority list in favor of social welfare and health programs. New and innovative funding solutions will need to be found to support the development of cities in those nations most affected by the post-war baby boom.

Other nations are following the US lead in the great demographic transition. Over the decade to 2010, for example, the working-age population of Japan contracted by five million whereas the retiree population jumped by eight million. Over the decade to 2020 the shift is even more dramatic: eight million fewer in the working-age segment; seven million more in the retiree segment (see Table 1).

Germany, the UK, France, Canada and Australia are all set to experience a big shift in funding away from infrastructure, nation-building and perhaps defence to the delivery of social welfare programs in support of an aging population base.

Even China will struggle as a consequence of the aging process. Over the decade to 2010 China's working-age population jumped 135 million to 1,000 million while the retired segment increased by 26 million to 114 million. But over the decade to 2020 China's working-age population will hold steady, rising to just 1,004 million, while the retired population is set to jump 54 million to 167 million. Although it must also be understood that even with a steady worker-base China will still generate tax growth as workers skill-up and become more productive.

Countries where structural aging is likely to have less impact on the tax base are those that, like China, are in transition and where worker wages and productivity is on the rise. Other countries well positioned in this regard are places where the birth rate remained high for decades, including places like Mexico (see Table 1) and the Philippines.

Over the next decade there will be a burgeoning market for new and innovative ways of funding nation-building infrastructure in Western and developed countries like those of North America, Western Europe and Japan. But there will also be a rising market in such countries for management and financial governance advice in the administration of pension plans and health programs.

In the meantime, if you are in the infrastructure business perhaps the best strategy in the short-term is to build relationships in countries that were overlooked by the baby boom of the 1950s and 1960s. This strategy will take you to countries in Asia, the Middle East and possibly South America.

The benefit is that in these markets there is a rising pool of general tax funding to build the infrastructure of the immediate future. The downside will be dealing with communities and governance structures that perhaps do not have the robustness that is already in place in the developed nations that have been so nurturing of the baby boom generation.

KPMG Partner Bernard Salt founded and heads the KPMG Demographics group based in Melbourne, Australia. He is also a best-selling author, a columnist with *The Australian* newspaper and is one of the leading corporate speakers in Australia and New Zealand. See www.bernardsalt.com.au; bsalt@kpmg.com.au

A DEEPER LOOK: HOW THE TAX CHALLENGE WILL BE SOLVED

By Stephen Beatty, America's and India Head of Global Infrastructure

Bernard's article raises a number of important – and often misunderstood – considerations for governments and infrastructure providers alike. As he clearly illustrates, many of the world's countries are facing a major tax 'double whammy' when they cross the demographic divide: not only will general tax funding slump as baby boomers retire, so too will consumption and sales taxes.

The problem, simply stated, is that governments are being asked to invest more into infrastructure (largely to support the needs of their aging populations) while at the same time seeing their funding pool for major 'nation-building' infrastructure rapidly falling.

Bernard's suggestion that infrastructure providers looking for more secure long-term projects should look to the 'new baby boom' countries in Asia, the Middle East and South America is well-founded. Not only are these countries better suited demographically to maintain growth through the expansion of their working population, they are also undergoing transformational changes within their own economies that will further drive productivity and improve the tax base.

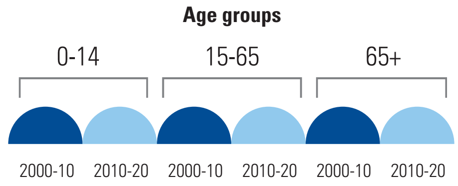
The choices for those nations already crossing that demographic divide may be somewhat controversial. Many will need to start making a significant shift over the next decade towards the application of user-pay approaches to infrastructure, a move likely to be unpopular with the existing working-age population who will feel they are being asked to foot too much of the bill.

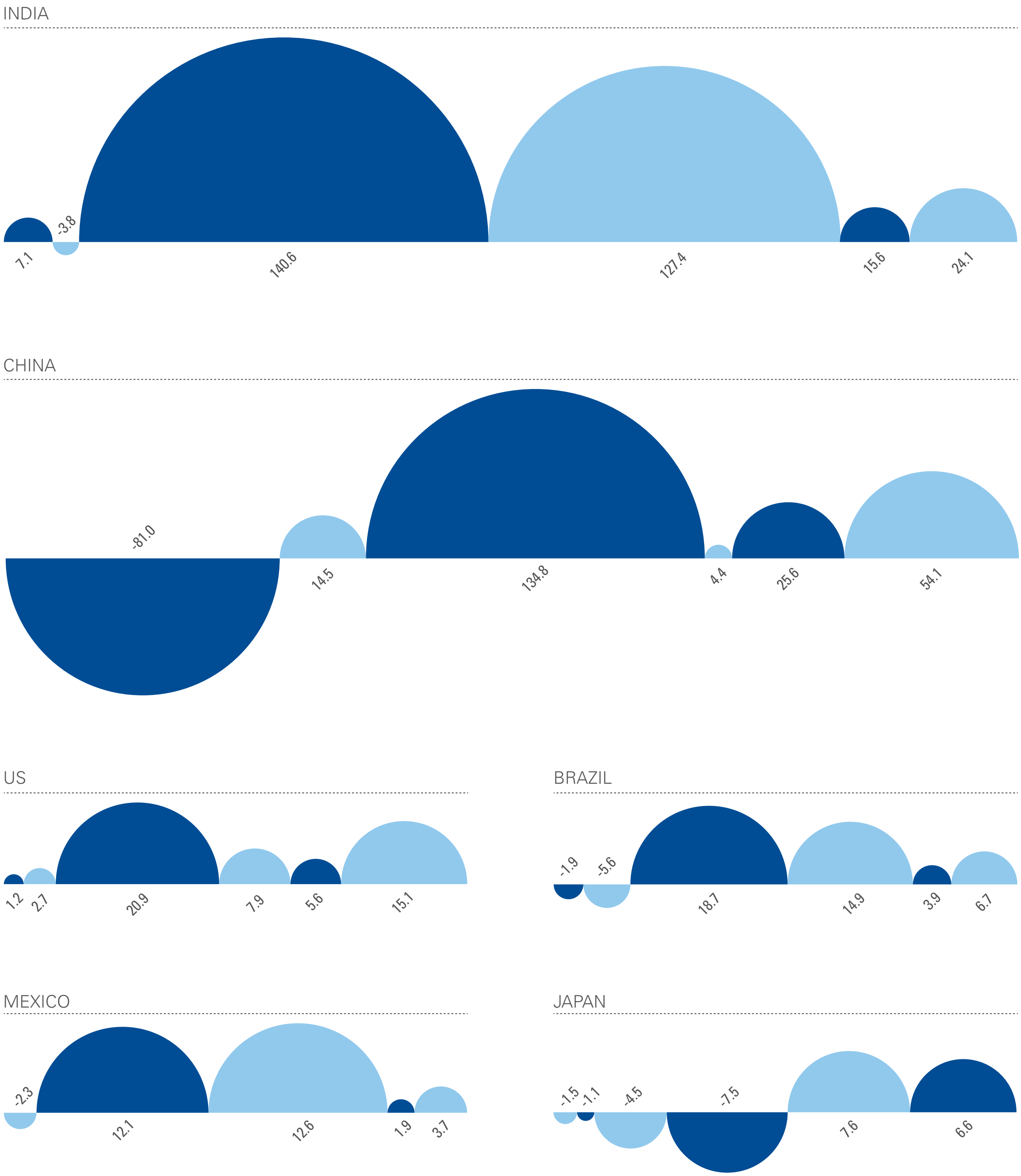
Another approach (or a complimentary approach for those strapped for tax revenues) would be to implement or increase 'death taxes'. However, this ultimately reduces the inheritance that would otherwise be put back into the economy through consumer spending and investment, and is often viewed cynically by the population as a tax-grab.

But, in my opinion, the only tried and true way for these countries to bridge the tax gap is by significantly relaxing their approach to immigration. So while – somewhat counterintuitively – governments often seem more prone to tightening their immigration when tax revenues are slumping, the reality is that they should be encouraging new workers – particularly those with families – to immigrate, find employment and become valuable tax payers. As noted by Gordon Nixon, CEO of Royal Bank of Canada, during an era of economic interdependence, shifting demographics and wars for talent – immigration is the competitive edge.

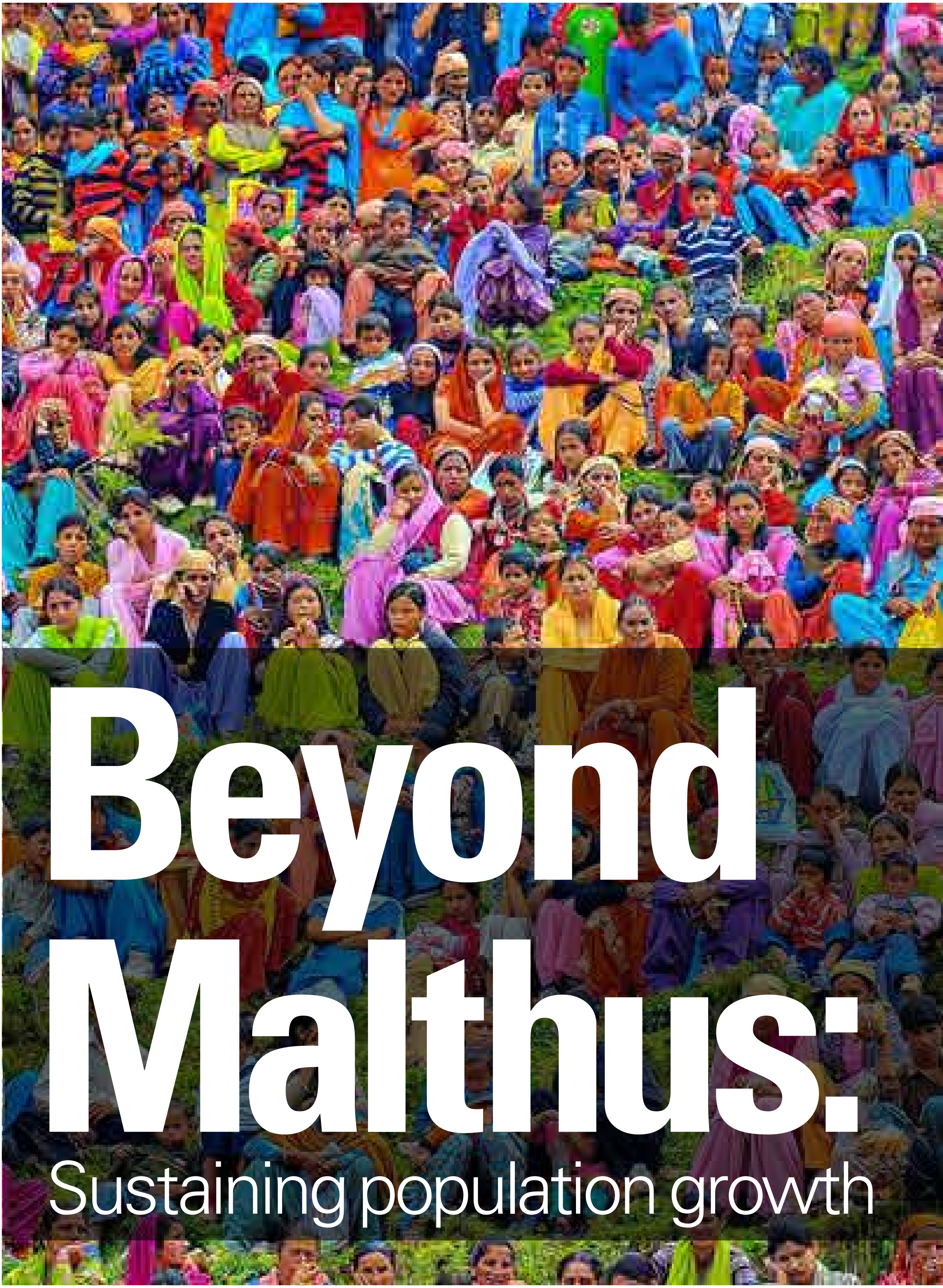
The bottom line is that, without a rise in the worker-base, taxes can only ever achieve so much. Tinkering with tax reform is important, but not nearly as important as solving the underlying demographic challenge.

Table 1: The global demographic shift: Net population change (millions) over two successive 10-year periods to 2020





Source: *United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision: "Total population (both sexes combined) by five-year age group, major area, region and country, 1950-2100 (thousands) – Estimates 1950-2010," DVD Edition*



Beyond Malthus:

Sustaining population growth

Infrastructure providers can have a huge influence in creating sustainable societies, through their capacity to conceptualize, build and implement greener infrastructure solutions for the long haul.

Gary Gardner, Senior Fellow at the Worldwatch Institute

*More than two centuries have passed since **Thomas Robert Malthus** first published his infamous Essay on the Principle of Population suggesting that the world population would quickly outgrow its ability to feed itself. Yet, while many of his dire predictions have not come true, his work continues to generate debate regarding the efficient use of resources to support the world's growing population.*

*In 1998, on the 200th anniversary of the book's publishing, **Gary Gardner** and a group of colleagues at the Worldwatch Institute released a new vision of the Malthusian theory in a book entitled **Beyond Malthus: Nineteen dimensions of the population challenge. James Stewart**, KPMG's Global Infrastructure Chairman, recently caught up with Gary in the Sierra Nevada Mountains to find out what has changed over the past 200 years and what we can learn from Malthus going forward.*

James Stewart (JS)**:** *While we all learned about Malthus in school, many would suggest that he was wrong or that his theory on population is no longer relevant. Why was it important for Worldwatch to revisit the theory on its 200th anniversary?*

Gary Gardner (GG): It's certainly true that many of Malthus' projections never came to pass and, as a result, there is significant skepticism about his view. But from our perspective, there are plenty of reasons to take a fresh look at his argument through the lens of not just agricultural output and resources, but also a wide range of other natural resources from a per capita perspective. So, for example, we wanted to see if there was enough oil, water, energy or minerals to sustain a growing population; to apply the Malthusian premise to a wide range of resources that we consider vital in the modern era.

JS: *Before we look ahead, let's look back. Why exactly did Malthus' projections never materialize? Was his theory faulty?*

GG: I don't think his theory was faulty: population and resource scarcity are certainly intertwined. But there were a few factors that Malthus either underestimated or didn't know about. He could never have foreseen, for example, how the application of technology – everything from irrigation and mechanization through to genetically enhanced seeds – would exponentially improve the bounty of agriculture.

Malthus also assumed that human nature would drive people to have as many children as possible – a flawed premise that was quickly proven wrong; as economic and educational status increase, and as women gain better access to healthcare and jobs, family sizes actually contract.

But the relationship between population and resources does matter and we can't simply assume that technology will always provide that silver bullet. So in that sense, Malthus may have just been ahead of his time.

JS: *Is there something that governments can be doing to ensure that population growth does not outstrip our resource capacity over the next 200 years?*

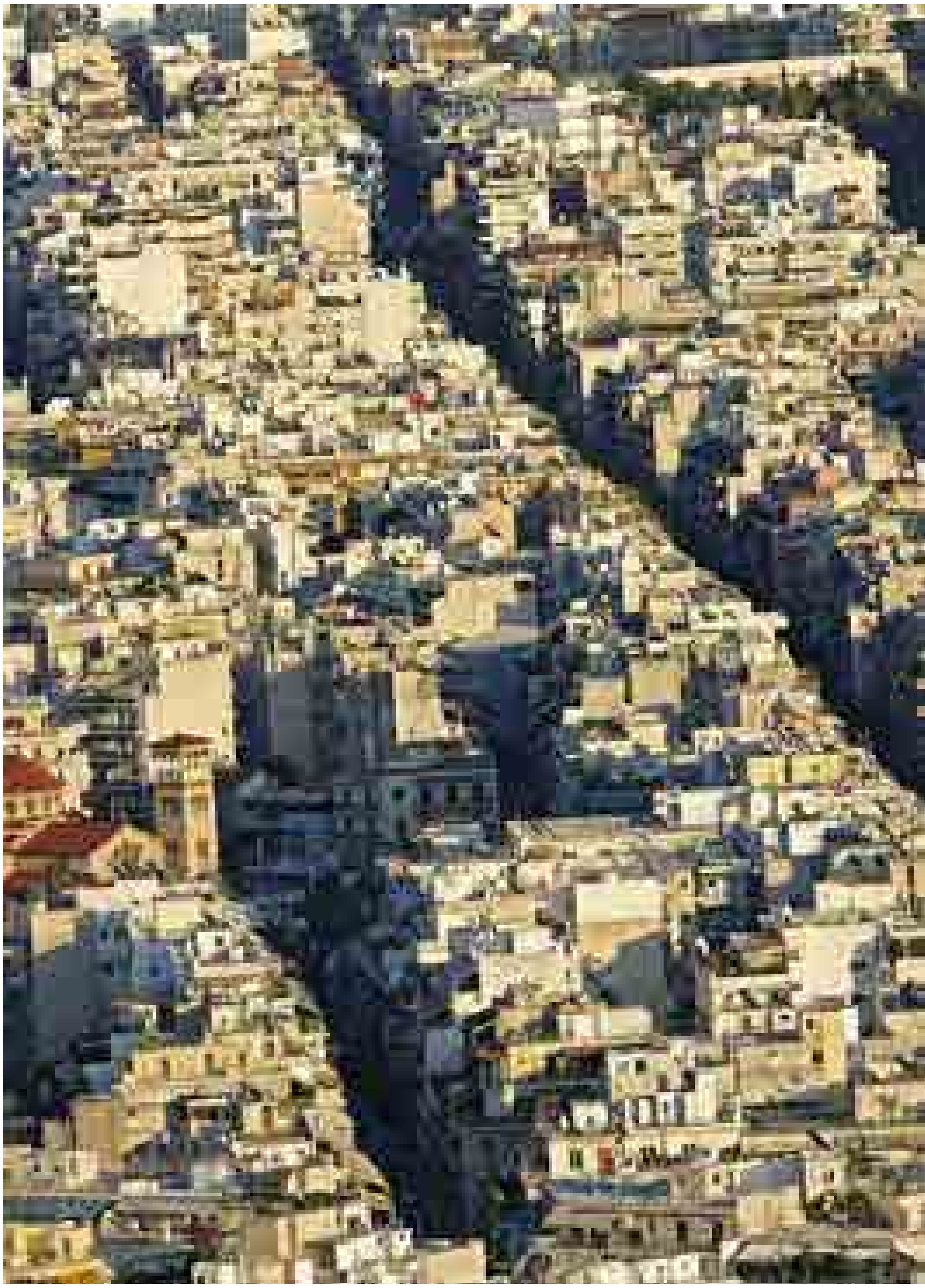
GG: There are really two sides to that. On the one hand, it's clear that enhancing the status of women, in particular, so that they are more empowered economically and better able to make choices about family size is key to reducing fertility and overall birth rates. And clearly there are a number of policy levers that governments can pull to facilitate that.

But on the other hand, we also need to recognize that there is only so much that reducing fertility rates can achieve; the global population is likely to grow in the decades ahead no matter what we do. So governments need to start thinking about how they manage a particular population size and how they can achieve efficiencies in their resource use to fit the needs of that future population.

JS: *Infrastructure can play a key role in achieving those types of efficiencies, right?*

GG: Absolutely. It's all about increasing the efficiency of water, of energy, of raw materials, of production capability – of any resource really; building a circular economy where all the resources used are either recycled or reused to the maximum extent possible. If we can make infrastructure deliver and use resources more efficiently, then we can stretch those saved resources farther to support a larger population.

As most infrastructure designers know well enough, population density is also essential to achieving resource efficiencies for individual assets and systems. Cities that offer alternative forms of transit and efficient public transit, for example, will use



far fewer resources per capita than those created around private transport. Ultimately, the way a city is planned and the density that is encouraged will be very important to our ability to manage into the future.

JS: *Are there specific resources that you are worried about?*

GG: I think water scarcity is one of the biggest threats facing the world population today. Recent projections show that the numbers of people living in absolute water scarce conditions will more than triple to 1.8 billion in the next decade. Less drastic water scarcity will impact large parts of the world, both developed and developing. And this is having a massive influence on potential food scarcity.

Already, around 16 percent of the world's food is imported from other countries, in many cases because water scarcity has made it more economical to import food than to use domestic water to grow it. So we are now starting to see countries – particularly in the Middle East and Asia – import water 'virtually', that is in the form of crops and other imports. In Jordan, for example, virtual water amounts to five times the renewable water endowment in the country.

JS: *Looking back over the 16 years since you wrote your book, has anything changed with regard to population and resource use?*

GG: I think the biggest change over the past two decades has been the increasing urgency of the sustainability challenge. In 1998, we decried the fact that countries were at threat of losing their self-sufficiency in food. Since then we've seen the situation change drastically: governments are now shifting food production and agricultural policy to rely on a mix of imported and domestically grown foods.

Energy availability has also moved up the agenda since we first wrote the book. Today it takes more and more energy to get to key resources, including energy itself. Oil wells are drilled in the harder-to-reach deep sea; mining companies dig deeper and deeper, often for diminishing quality returns; and fishing fleets have to go further to find their catch. All of this requires more and more energy at a time where it is not entirely clear that more energy is going to be available. It's all brought a greater sense of urgency to the situation.

JS: *What advice would you give infrastructure players and governments based on your experience?*

GG: I would suggest that societies need to do a better job of thinking long term, a skill that comes naturally to infrastructure planners, and to do so in a green way. For example, a power plant built today will be online for decades. Is it really smart to lock ourselves into decades more commitment to dirty energy, by building plants powered by fossil fuels? Infrastructure providers can have a huge influence in creating sustainable societies, through their capacity to conceptualize, build and implement greener infrastructure solutions for the long haul.

I also believe that we need to put more emphasis on projects that provide broader socio-economic security – economic employment opportunities, healthcare, education and so on – which, ultimately, provides greater sustainability and stability for populations, governments and economies. Infrastructure can help here as well. The World Health Organization (WHO) recently increased sharply its estimate of the number of people worldwide who die from air pollution, to seven million annually. Roughly half of these deaths are from outdoor pollution from automobiles and factories, while the remainder is caused by indoor pollution such as burning wood or dung for heating or cooking. There are huge infrastructure opportunities in either case to reduce air pollution and the deaths they cause, and in the long run, to stabilize populations.

Managing growth in **developing** world cities

*By 2030, more than eight in 10 of the world's urban dwellers will be living in the developing world.[1] But are developing world cities prepared for the massive demographic shifts that this rapid urban growth will bring? **Sanjay Sah**, KPMG in India, and **Rahul Asthana**, former Head of the Mumbai Metropolitan Region Development Authority (MMRDA), discuss how urban areas can cope with change and prepare for future growth.*

The challenge for most developing world cities is formidable. Few have the public finance capability to undertake the scale of investment required to support a growing city; fewer still have the ability to create and execute a long-term plan for sustainable urban growth.

The challenge is also unavoidable. In 2005, more than 1.2 million people were streaming into developing world cities every week;[2] the pace has only increased over the past decade. Rahul Asthana, who until recently headed up the Mumbai Metropolitan Region Development Authority (MMRDA), suggests that planners first need to dispense with the idea of trying to prevent urban migration. "Urbanization will, and must, happen," argued Mr. Asthana. "Planners need to prepare their cities to proactively capitalize on this growth rather than reacting to pain points once the population has already arrived."

ADDRESSING LAND USAGE AND VALUE

Mumbai is no stranger to massive urban growth and population shifts. The city's population nearly doubled in an early growth boom between 1981 and 2001. In the next decade the population grew by another 20 percent. And while the city's growth rate has now dropped to a somewhat more manageable rate, many of the challenges created by the earlier growth spurt continue to impact the city.

The city's slums are a daily reminder of the legacy of unsustainable growth. Today, more than 60 percent of Mumbai's citizens live in informal dwellings or slums. Breaking free from the slums is difficult; capital values on real estate are prohibitively high in Mumbai and there is a real lack of affordable housing.

"Cities need to be more creative about how they deal with slums and reconfigure those existing areas to provide both affordable housing options and more productive use of the land," noted Mr. Asthana. He points to the models being utilized by Mumbai's Slum Rehabilitation Authority (SRA) where low-income high-rises are constructed to house existing slum-dwellers, thereby freeing up significant land for redevelopment. The model is fairly self-funding; developers agree to build low-income high-rises in return for access to more productive and profitable land.

1 http://web.unfpa.org/swp/2007/english/introduction.html
2 http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/

> Without the ability and confidence to do what is right in the long term, even the best laid plans will go nowhere.
>
> **Rahul Asthana,** former Head of the Mumbai Metropolitan Region Development Authority (MMRDA)

Mr. Asthana – who at one time also served as the Chairman of the Mumbai Port Trust – notes that most existing cities contain under-capitalized or disused sites that could be renewed or redeveloped to create new and more productive precincts within the city. The Port of Mumbai, he points out, contains around 750 hectares of under-utilized land in the Central Business District that – if rehabilitated – would open up the entire eastern waterfront area to development.

IMPROVING CONNECTIVITY TO REDUCE MIGRATION

Another key challenge facing most developing world cities relates to transportation and connectivity. "Mumbai is not alone in needing more private transport infrastructure investment, both within the city and out to the hinterlands and outskirts," added Mr. Asthana. "Unfortunately, this is something that planners have not been able to achieve to the extent that is needed."

Mr. Asthana believes that – alongside better connectivity within the city – planners must also consider how satellite 'mega cities' might ease inner-city congestion and pressure. While the name may be somewhat misleading (megacities in the context of India can comprise of anything over 100 acres), the designation comes with significant benefits such as different zoning laws, higher floor space indexes, tax benefits and better urban planning. In return, developers commit to building all of the amenities, roads, water supplies and other critical infrastructure that are necessary for the city to thrive. To ensure that employment opportunities exist within the megacities themselves, the government has mandated at least 15 percent of the area be reserved for commercial zones.

"These are well-planned cities in the hinterland where the right mix of conditions and facilities are brought together to ensure that people can find a place to work and live without having to come into the city center," noted Mr. Asthana. "I'm not talking about creating a frontier mentality where we try to keep rural dwellers out in the fields – that has proven not to work – but rather an approach where we proactively create new cities and new areas of productivity that act as a magnet to rural migrants."

LEADERSHIP AND VISION

Yet, as cities struggle with all of the challenges brought by rapid urban growth, likely the most important success factor rests with the ability of the city's leadership to create, articulate and execute a sustainable long-term vision and plan for the city.

The reality is that – in most developing world cities – lines of authority for development and infrastructure are somewhat blurred. "In Mumbai, we have multiple agencies who often work at cross-purposes to each other," admitted Mr. Asthana. "You can't create a vision unless you have the political will, leadership and support to make the difficult and tough decisions, and that needs to come from one central authority or figure working across the various departments and agencies."

Mr. Asthana notes that infrastructure and development issues have a tendency to become very political very quickly. In response, he points to the value and stability created by infrastructure authorities such as the MMRDA in Mumbai. The independent agency is not only fairly free of political influence but also (through ownership of large tracts of urban land) self-funding, which means that they are able to make decisions that deliver long-term benefits rather than politically-expedient wins.

LESSONS FROM MUMBAI

Based on his extensive experience, Mr. Asthana offers three points of advice for city leaders in the developing world. First, don't try to stop the reality of urbanization. "Accept that it is going to happen and start developing areas to receive these masses of urban migrants before the pressure of rapid growth overwhelms the capacity of existing infrastructure and government services."

Secondly, Mr. Asthana suggests that planners be proactive by looking ahead to what the city and its population will need in the long term rather than just reacting to the pressures of the day. So, for example, instead of adding a new lane to an existing road, Mr. Asthana suggests that planners consider what the transportation environment will look like in 10, 20 or even 50 years and then start building to support that vision.

Finally, Mr. Asthana reminds city leaders that, before too long, they will need to make difficult decisions. "Creating, articulating and then executing on a vision won't be easy and some of the decisions that must be made will run counter to political, societal or community pressures," noted Mr. Asthana. "Without the ability and confidence to do what is right in the long term, even the best laid plans will go nowhere."

Planning cities
as if people really mattered

Accommodating shifting – and often expanding – populations within an urban setting is not just about building more homes, laying more roads and creating more jobs. It is also about building a fair and healthy society that recognizes the link between health, equity and the built environment. ***Joel Finlay****, KPMG in Canada, spoke with* ***Professor Hugh Barton****, former Director of the World Health Organization (WHO) Collaborating Centre for Healthy Urban Environments and the current Professor Emeritus of Planning, Health and Sustainability at the University of the West of England, about what infrastructure planners can do to help achieve a healthy society.*

ACHIEVING A 'HEALTH-SUPPORTIVE' ENVIRONMENT

The aspiration of city leaders for 'healthier' cities is nothing new. Since the WHO first launched the Healthy Cities program in 1986, thousands of cities around the world have joined the network by committing to "improve their city's environs" in order to create a health-supportive environment and achieve a good quality of life for their citizens.

What has changed over the past 25 years, however, is that the focus has shifted from building health facilities to building healthy environments. As Professor Hugh Barton, a former Director of the WHO Collaborating Centre for Healthy Urban Environments and the current Professor Emeritus of Planning, Health and Sustainability at the University of the West of England points out, "There has been a growing realization that pouring money into providing more health services to respond to the impacts of pollution and obesity-inducing environments is counter-productive; cities need to be investing in creating a better environment that reduces the need for health services in the first place."

EVOLVING LEVELS OF HEALTHY URBAN PLANNING

According to Professor Barton, who has co-authored numerous books on urban and spatial planning, including *Shaping Neighbourboods: For Local Health and Global Sustainability*, *Healthy Urban Planning*, and *Sustainable Communities*, most cities evolve through three distinct levels of health planning. Those in the first level, often in the developing or emerging markets, are still focused on the delivery of basic health and sanitation services, air quality, water quality, sewage treatment and so on.

Most developing world cities – and an increasing number of those in the emerging markets – are currently operating at the second level where they are directly investing in health outcomes by building parks, recreation facilities and bike trails to encourage healthier living. This is a good thing, argues Professor Barton, but is not nearly enough to create truly healthy cities and societies.

"It's only when you start thinking strategically and in an integrated way about the whole city or town, how it is going to evolve and how that will impact the health and welfare of people, that you reach that third level of evolution in healthy cities," added Professor Barton.

TAKING A HOLISTIC AND INTEGRATED APPROACH

It is widely understood that the availability of efficient public transit improves the overall health of a city. But, as Professor Barton points out, a public transit system on its own is only one small part of the equation. Urban planners also need to think about how the land around the system will be developed, how city areas are activated for alternative transport usage, how land values are affected and how accessible the transit is from key facilities.

"If you think about it, transport isn't about mobility, it's about accessibility and physical activity; in other words it's about people getting to places, not just about moving people around," added Professor Barton. "And if you take that perspective, you start to see a whole new way for cities and towns to function where people choose to engage in more active and healthier forms of movement as a way to interact with their surroundings and the built environment."

> "It's only when you start thinking strategically and in an integrated way about the whole city or town, how it is going to evolve and how that will impact the health and welfare of people, that you reach that third level of evolution in healthy cities.
>
> **Professor Hugh Barton**, former Director of the WHO Collaborating Centre for Healthy Urban Environments

SECURING A WIDER RANGE OF POTENTIAL BENEFITS

As a case in point, Professor Barton points to the town of Freiburg in South West Germany, where city leaders combined regulation and planning with renewed investment in public transit and the 'pedestrianization' of the city center to create a more livable and healthy city. In some parts of the town center, car use is down to just 10 percent while almost 70 percent of people use more active forms of travel such as walking or cycling.

The knock-on benefits can be transformational. In towns and cities like Freiburg, fewer families need two cars, thereby reducing the cost of living; pollution drops with less car use, thereby improving the health of the population; society starts to bind closer together as people interact on city streets and patronize local stores.

"This is where the benefits start to roll up into a real evolution for cities," noted Professor Barton. "But it's often difficult to achieve; you need to have political will, public support and private sector support to really build up the level of commitment it takes to make these types of fundamental and holistic changes to a city."

THE FREEDOM TO MAKE POSITIVE CHANGE

Based on Professor Barton's experience, he suggests that one key to helping cities become more focused on creating healthy environments is to improve the power of local authorities to plan, purchase and use land more effectively. Progress in countries like Germany, the Netherlands and the Scandinavian countries is outstripping that of the UK and the US, in large part because local authorities, working with local communities and investors, do not have the same ability to buy or control land use as in those countries.

"It does seem that high-quality places – those in which people love living and feel empowered to create wealth and live healthy lives – are those where city authorities have a good level of autonomy and freedom to do and achieve things," added Professor Barton. "If they can put the population's health and well-being at the top of their agenda then they can – with quite remarkable speed – create new environments in which people can live and be healthy." ■

An app for that:

Expanding infrastructure access and efficiency with technology

*When it comes to providing sufficient and appropriate infrastructure to meet the needs of shifting populations, governments essentially have two choices: increase the quantum of new infrastructure or improve the efficiency of existing infrastructure. It's not surprising, therefore, that city and government leaders are so keenly focused on leveraging technology to improve their infrastructure investments. Along those lines, **James Stewart**, KPMG's Global Infrastructure Chairman, sat down with **Paul Schindler**, SAP AG's Global Urban Matters Lead, to learn more.*

EFFICIENCY IS KEY

No matter whether you live in the developed world (where population shifts are changing the infrastructure demand patterns), or the developing world (where growing and increasingly affluent populations are demanding more access to infrastructure) – infrastructure budgets and assets are coming under increasing pressure.

In response, governments and infrastructure planners around the world are now taking a closer look at how they can leverage technology to improve the efficiency, effectiveness and flexibility of their infrastructure investments. Take, for example, the UK's investment into high-speed rail. By leveraging new technologies, the UK government has essentially improved the productivity and efficiency of the rail network, thereby delivering a better service, increased capacity and providing access to people right across the country.

BIG BENEFITS FROM SMALL INVESTMENTS

But, as Paul Schindler, SAP AG's Global Urban Matters Lead points out, not all infrastructure and urban technology investments need to be 'big ticket' in order to deliver results. To illustrate his point, Mr. Schindler points to the city of Pune, a large metropolis to the South-East of Mumbai in India. With visions of building a reputation for being a green and clean city, infrastructure planners decided to leverage mobile technology to create and manage a full inventory of its trees and to support their natural habitat's ongoing health and maintenance.

"While this is a great example of increasing a city's livability through the application of technology," noted Mr. Schindler, "it also shows that lean and quickly deployable solutions can make a big difference."

Relatively small investments in technology also have the power to enhance infrastructure resilience and recovery. Consider, for example, how sensors embedded into water systems could help monitor contaminants or help manage the water and power distribution systems. Mr. Schindler also points to projects such as NY-ALERT which provides an SMS-based warning system to the citizens of New York in case of emergency.

"There are significant benefits and opportunities out there, but the truth is that many of the challenges cities face cannot be mastered by governments alone," he noted. "That is why a growing number of major NGOs such as Direct Relief International[1] and Plan International[2] are also expanding their technology capabilities to optimize their response activities."

> A new set of tools and technologies, like in-memory computing, allows us to analyze complex problems at the speed of thought which, in turn, enables us to generate real-time insight in areas that we had never considered before.
>
> **Paul Schindler,**
> Global Urban Matters Lead at SAP AG

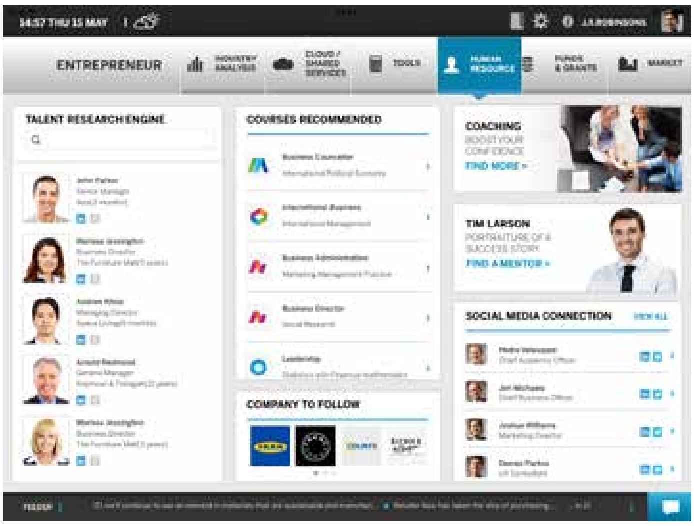
DRIVING ECONOMIC PROSPERITY

Technology is not only being applied to many of the world's 'hard' infrastructure problems; it is also being leveraged to help solve some of the other social challenges created by massive population shifts. A major challenge now facing many cities, for example, is the impact of rising unemployment within the young urban population. SAP's GENIE platform recognizes the need to bring together job seekers and companies in new and innovative ways. GENIE creates a virtual labor market that incorporates blended learning approaches to help train and up-skill job seekers.

"We're very passionate about projects like GENIE which leverage technology to help improve city productivity, efficiency and overall quality of life," noted Mr. Schindler. "Besides helping the population gain new skills to meet the current and future job market, the platform also encourages job creation and economic growth by stimulating

Sources:

1 To find out more about Direct Relief International's use of technology, click here http://www.sap-tv.com/video/6826
2 To find out more about Plan International's use of technology, click here http://www.sap-tv.com/video/25071
3 The Human Face of Big Data, Smolan, R. and Erwitt J., November 2012



entrepreneurial environments and creating new financing solutions."

A DELUGE OF DATA

Technology, however, is largely driven by data. And the quantity of data available is almost limitless. As data-guru Anthony Williams notes in his forward to *The Human Face of Big Data*, "Virtually every animate and inanimate object on Earth could be generating and transmitting data, including our homes, our cars, our natural and man-made environments, and yes, even our bodies.[3]"

To harness the value of this new data, governments and infrastructure planners are now adopting and embedding new technologies into their infrastructure that improve the speed and accuracy of data analytics. As Mr. Schindler notes, "A new set of tools and technologies, like in-memory computing, allows us to analyze complex problems at the speed of thought which, in turn, enables us to generate real-time insight in areas that we had never considered before." The City of Boston, for example, uses Big Data to effectively identify problem properties across the city and to address these hot spots in a coordinated manner.[4]

THE TIME IS NOW

To make the most of today's technology, Mr. Schindler suggests that governments, planners and the private sector start thinking more holistically about their challenges. "Cities are complex entities with complex problems that require multiple sectors to work together to create and implement effective solutions; but this does not necessarily mean that the solutions themselves need to be complex," he noted. Indeed, sometimes the bigger and more tangible benefits can be achieved through fairly simple technology innovations such as opening up government data to the public or automating government service delivery.

But given the pace of demographic change and the growing demands for improved infrastructure, governments and planners have little time to waste. "Many of the technologies are available, mature and well-understood; the sooner you start leveraging them, the earlier you can reap the benefits," Mr. Schindler added. "Even if you start small and expand later, the point is that you start."

Sources:

[4] To find out more about Boston's use of data and analytics, click here http://www.sap-customers.com/video/1830

Powering up
development in rural Africa

As **Daniel Rea**, founding Trustee and former Chair of the North West Zambia Development Trust, walks through the main street in Ikelenge, Zambia, he cannot help but be proud of the impact that he and his team have had on the local population. School grades and attendance are improving; the local economy is growing; access to healthcare has broadened; and living standards are rising.

A DARK AND HARSH REALITY

Just 10 years ago, this rural village in the North-West of Zambia was stuck in a cycle of poverty and outward migration. Most people survived on subsistence farming and there were few employment opportunities within hundreds of kilometers of the village. On a good day, the local hospital, founded by missionaries over a century ago, might have used their diesel generator for 2 to 3 hours in the evening, but even this was unreliable and prohibitively expensive.

"Only about 3 percent of rural Zambians have access to a steady source of power, which makes it very difficult to improve productivity or enhance development outside of the cities," noted Mr. Rea. "When you really get down to the root causes of urban migration, many of the motivators – things like improved standard of living or greater employment opportunities – are directly related to access to power."

MAKING CHANGE HAPPEN

Recognizing this, Mr. Rea and a group of interested parties (including a UK-based doctor, a church group, Mr. Rea's uncle and others) set their minds towards harnessing the upper reaches of the Zambezi River – just 56 kilometers from its source – to power a 750 kilowatt hydroelectric facility.

"In 2004, we had a good idea, a thousand pounds in the bank and absolutely no experience with either fundraising or building something this technical," admitted Mr. Rea. "Yet just three years later we opened the facility after having raised over US$2 million dollars from charitable organizations and individuals."

Amazingly, the entire project was delivered by local villagers who – under the guidance of international experts – built the facility to a very high global standard. This approach provided three big benefits; first, the project injected much-needed income into the community; secondly, it created a local capability for developing similar projects; and, thirdly, it drove costs down to around half of what a typical build would normally cost using international contractors or developers.

A CATALYST TO DEVELOPMENT

Today, the isolated mini-grid reaches out for 30 kilometers and serves approximately 360 residential customers and around 20 non-residential users including the hospital, several schools, a commercial farm, a clinic and a handful of other social institutions. Electrification has also spurred investment in equipment and technology that would have otherwise been impossible: the hospital boasts incubators, sterilizers, electric washing machines and a new operating theater; schools, local businesses and even the public sector have also been investing.

"It's really had a snowball effect for development; the government is now building a big new secondary boarding school, lots of administrative offices and staff housing and, as a result, a new mini-town center is forming," said Mr. Rea. "It's quite exciting to think that a tiny little project in a forgotten corner of Zambia could trigger that kind of change in a community."

> “When you really get down to the root causes of urban migration, many of the motivators – things like improved standard of living or greater employment opportunities – are directly related to access to power.
>
> **Daniel Rae,** founding Trustee and former Chair of the North West Zambia Development Trust

MAKING IT PAY

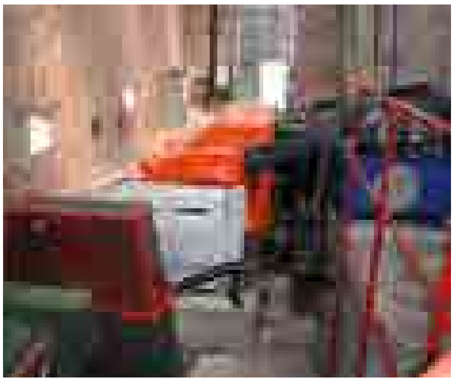
While the project has certainly achieved significant benefits for the community, it has not been without challenges. The operation currently recoups only around two-thirds of its operating expenses and therefore continues to rely on individual donors to subsidize its balance sheet. “One important lesson we took from this experience is the importance of securing an anchor customer right at the beginning,” noted Mr. Rea. “Villages don’t actually use that much power so – relative to the capital costs of putting in power lines – the revenue from residential services is often barely sustainable.”

Opportunity is – literally – on the horizon. The Zambian power authority (ZESCO) has recently announced plans to expand its grid to within 100 kilometers of the facility and Mr. Rea is seeking to persuade them to extend the final distance and link up to the hydropower plant. This would enable him to negotiate a Power Purchase Agreement (PPA) that would allow the plant’s excess power to be fed back into the network – benefiting the grid (which is in permanent power deficit) and the community scheme (by providing critical extra income).

ENCOURAGING LOCAL GROWTH

Mr. Rea also anticipates that local productivity will increase, thereby using up some of the excess power. Already a new aggregates business and a pineapple processing plant have sprung up to take advantage of the access to power. Individuals are also becoming more productive.

“We’re already seeing a shift from people using their power to run lighting or a radio towards more productive uses such as operating sewing machines, welders and irrigation pumps,” noted Mr. Rea. “It’s the point where power is being used productively rather than just for improving the standard of living that marks a jumping off point for development and for our facility.”



KEEPING THE LIGHTS ON

Securing the appropriate technical capabilities has also been a challenge. For day-to-day operations, the organization relies on “the smartest guy in the village” who has been trained to manage a wide range of basic operational issues. But for more technical or regulated aspects, the facility relies on a group of committed volunteers who either provide advice and support over the internet or – if needed – jump on a plane and spend time at the site.

“We’ve got experts from New Zealand, the UK and across Africa who provide advice over email and others that fly in for up to three months to work on safety line maintenance and other technical requirements,” noted Mr. Rea. He himself has been a volunteer for 10 years now, transitioning from supervising construction to taking responsibility for operations. With a full-time ‘side’ job in Lusaka, he now spends one or two weekends a month and most of his holidays at the site, travelling the 1,000 kilometers when he can, and doing the rest of the work by email in the evenings.

“The reality is that you need to have a threshold of competent professionals to keep the thing operating and there is a cost associated with that even when it is being provided by volunteers.” However, as Mr. Rea notes, for smaller facilities with low technical requirements, creating a virtual pool of experts who are able to visit the site if needed offers a sustainable and efficient approach.

“All we need to do now is connect to the national grid or secure another anchor customer and the facility will be fully sustainable indefinitely; just imagine what the impact will be on the population not only in this village, but also across the district over the next two or three generations.”

At the time of printing, the scheme had not yet been connected to the grid. Those interested in learning more about the project – or those interested in helping it continue its transformational work – are invited to contact Mr. Rea at dan.t.rea@gmail.com or visit www.nwzdt.org

Feed the world:
Invest in agricultural infrastructure

One of the greatest challenges the world faces today is in feeding our growing and shifting populations. To find out how agricultural infrastructure influences the global food debate, The editor of *Insight* sat down with **Dr. Arif Husain**, Chief Economist at the UN World Food Program; **Dr. Wang Yongchun**, Agricultural Information Institute (AII), Chinese Academy of Agricultural Sciences; and **Ian Proudfoot**, KPMG's Global Head of Agriculture.

EDITOR: WHAT IS DRIVING FOOD SECURITY AND AGRICULTURAL INFRASTRUCTURE TO THE TOP OF THE AGENDA TODAY?

Ian Proudfoot (IP): I think that, in terms of demand, there are really two issues driving food up the agenda. The first is that the world population is still growing and governments are recognizing that they will somehow need to feed all of these people if they hope to avoid future mass starvation or political insecurity. There's a realization that starvation causes nearly half of all deaths in children under five[1] and that something must be done.

At the same time, we're also seeing a growing sophistication in people's diets as they move out of poverty with a preference towards animal proteins. The problem is that creating sufficient animal proteins requires a rather complex supply chain and significant inputs of grains and plant proteins, which only increases the pressure on the agricultural system to produce more.

Dr. Wang Yongchun (WY): Producing more will certainly be key. But alongside the need to increase yields is the need to reduce waste and loss in the distribution and supply chain. According to the UN Food and Agriculture Organization, around one-third of all food produced for human consumption is wasted or lost.[2]

So it's not just about focusing on agricultural comprehensive development, increasing investment in rural land consolidation and further upgrading medium and low-yield farmland. It must also involve improving the efficiency of facilities for food collection, storage and transport, which can enhance overall agricultural supply capability and strengthen world food security.

Dr. Arif Husain (AH): Developing rural areas with efficient infrastructure is also critical to reducing hunger and enhancing the overall

"It must also involve improving the efficiency of facilities for food collection, storage and transport, which can enhance overall agricultural supply capability and strengthen world food security.

Dr. Wang Yongchun, Agricultural Information Institute (AII), Chinese Academy of Agricultural Sciences

1 www.wfp.org
2 *Food wastage footprint: Impacts on natural resources*, United Nations Food and Agriculture Organization, 2013

quality of life and creating political and economic security. Better roads mean better access to schools, hospitals and employment. New irrigation systems mean less dependence on rain and more resilience in the system. Most importantly, infrastructure improves access to markets for small-holder farmers which, when combined with irrigation, allows and encourages them to increase their yields and incomes.

I think we've also seen a number of countries struggle with political insecurity that has directly resulted from food insecurity embedded in a lack of rural and agricultural infrastructure. For example, many observers suggest that Syria's current crisis was born out of a drought in 2007-2008 that forced farmers off their lands and into cities which, in turn, reduced food security and put pressure on the existing urban centers. Many wonder what Syria's story would have been had these people in the rural sector had access to irrigation during that drought and social safety-nets when all else failed.

EDITOR: DO YOU FEEL THAT RURAL AND AGRICULTURAL INFRASTRUCTURE HAS BEEN UNDER-PRIORITIZED IN MOST COUNTRIES?

IP: I think in most countries, the undeniable answer is yes. It's often much easier – and politically expedient – to spend on urban infrastructure where the majority of the population lives and where unrest is often more pronounced. The reality is that the return on infrastructure investment is more obvious for governments in urban areas.

But there are a number of countries that have recognized the challenge and are working to get it right. Chile, for example, has decided to become the fruit basket of Asia and, to support that objective, have put a big emphasis on improving their agricultural infrastructure and distribution facilities. China is another country that has clearly put agricultural infrastructure high up the agenda.

WY: In recent years, the Chinese Government has increased its policy and financial support to agriculture, and stepped up the construction of agricultural infrastructure, especially the construction of rural roads and water conservancy facilities.

However, since most construction is for revitalization projects, such as dangerous reservoir reinforcement engineering, canal restoration and maintenance and rural road surface hardening, investment in agricultural infrastructure is still far from enough to meet the needs of rural and agricultural development.

AH: Yes, I think that underlines an important point. Infrastructure is not a one-time investment, it requires maintenance and upkeep to ensure it remains efficient. In the developed world and in a growing number of emerging markets like China and Brazil, there are departments of transportation and agencies responsible for looking after the roads and other infrastructure. But in many developing countries, there simply isn't the capability or financial capacity to take on the initial, and then recurring, investments.

"My advice would be to increase the opportunity set of small-holder farmers by extensively investing in rural infrastructure – particularly roads and irrigation systems – to help increase production and the rural supply chain.

Dr. Arif Husain, Chief Economist at the UN World Food Program

That's a long-term challenge for those seeking to improve their rural and agricultural infrastructure, particularly in larger countries where networks may be very spread out. There is clearly a role for public-private partnership under an appropriate incentive structure, which encourages investments in rural infrastructure to spur pro-poor economic growth and development.

EDITOR: BASED ON YOUR EXPERIENCE, DO YOU HAVE ANY ADVICE FOR GOVERNMENTS FACING FOOD SECURITY ISSUES OR STRUGGLING WITH INEFFICIENT OR INEFFECTIVE AGRICULTURAL INFRASTRUCTURE?

WY: Agricultural infrastructure construction often spans regions and continents and therefore requires extensive cooperation between participating countries, including the central government and local governments, market participants and social forces such as agencies, intermediaries, volunteers and communities.

I believe that China is now on the cusp of a new phase where agricultural development is driven by industrial development, and rural development is driven by urban development. This will create a unified system of agricultural infrastructure implemented across both urban and rural areas. In China, this can be achieved through systematic reform, which would include a combination of gradually induced changes and mandatory measures imposed by the government.

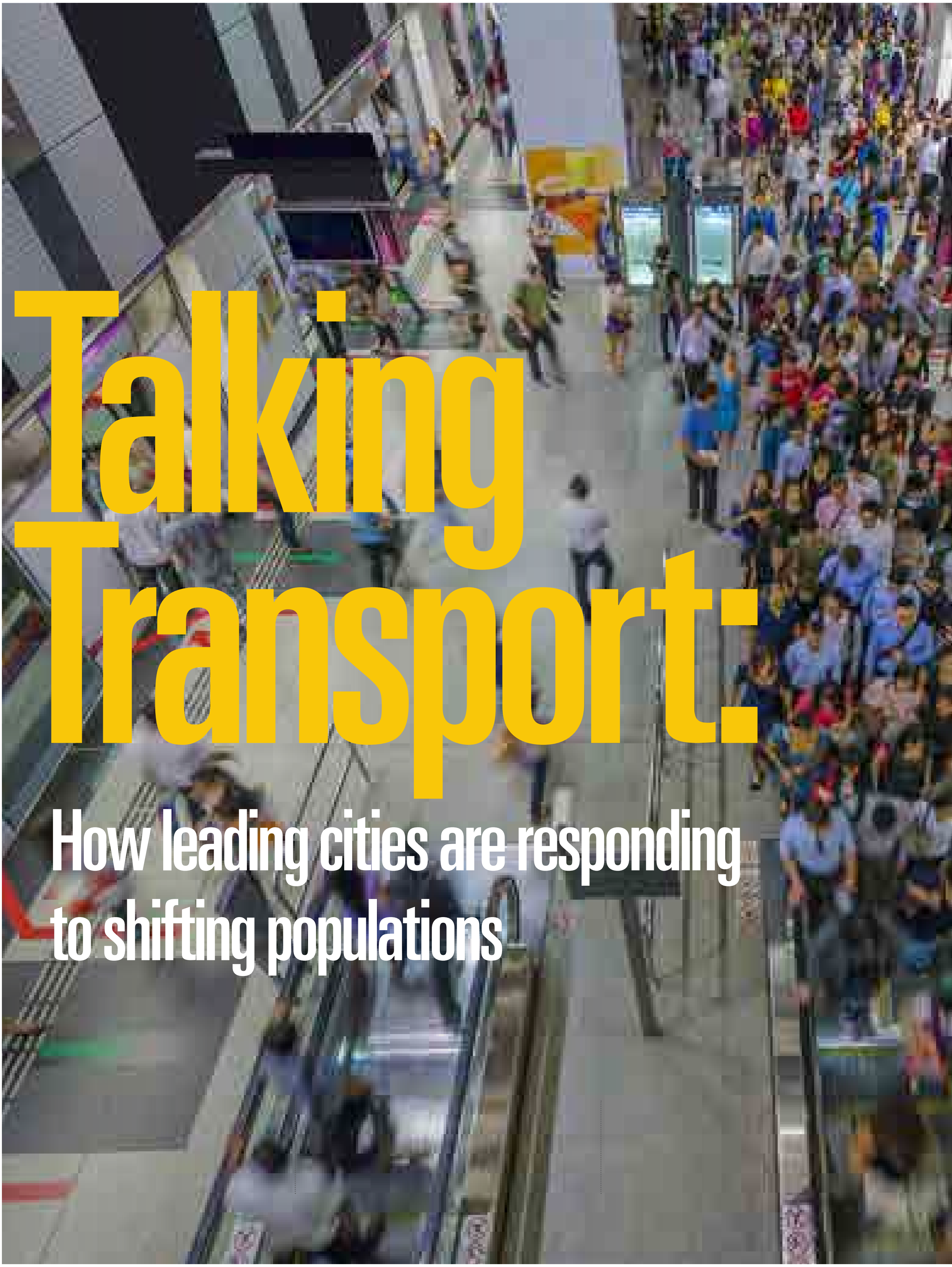
AH: In part, my advice would be to increase the opportunity set of small-holder farmers by extensively investing in rural infrastructure – particularly roads and irrigation systems – to help increase production and the rural supply chain. We also need to improve the way we measure and account for the more intrinsic value or 'positive externalities' of our investments; all too often we evaluate investments in roads based on purely economic data and largely ignore the value that comes from connecting a community to a hospital or a farmer to a market.

I think governments also need to recognize that – in a more efficient agricultural system – some existing small-holder farmers and their suppliers will need to find new jobs and therefore governments need to have a two-track approach. On the one hand, make farmers more efficient through rural infrastructure investment. But on the other hand, create some social safety nets in these rural areas to help farmers as they transition into new industries without falling into the inter-generational poverty and hunger cycle.

IP: I think we'd all agree that governments need to remember that agriculture is a very, very long-term industry; it will be volatile and there will be ups and downs. The key is to build enough capacity into your system through efficient and effective infrastructure to enhance the ability of the system to cope through all of that volatility.

I think a similar message is important for those private investors looking at agricultural infrastructure. Just because we've got this wave of demand coming – and it's going to keep coming – doesn't mean that the volatility has leveled out or that the inherent challenges associated with agriculture are gone.

The reality is that investment in agricultural infrastructure is not going to provide consistent, steady quarterly returns but, for governments and investors that take a much longer-term approach, it may be one of the most valuable investments available – from both an economic and a social perspective. Just come in to it with your eyes open and be prepared for an exciting ride.



Talking Transport:

How leading cities are responding to shifting populations

*Public transportation is a key issue for cities and regions around the world. To find out how transportation is being harnessed to manage shifting populations, **James Stewart**, Global Infrastructure Chairman, sat down with three industry experts: **David Prout**, Director General of the UK's HS2 high-speed rail scheme; **Desmond Kuek**, CEO of SMRT (Singapore's largest public transit operator); and **Anton Valk**, former Chief Executive of Abellio (an operator of buses and trains in the UK, Germany and the Czech Republic).*

James Stewart (JS): *When we work with cities and countries to help them understand and manage the impacts of population shifts, the issue of transportation is always high on the agenda. What is it about connecting people that is so important today?*

David Prout (DP): I think everyone – from the person on the street through to national governments – intrinsically knows that there is an incredibly important link between transportation, productivity and quality of life. One only need look at the obvious correlations between property prices and transportation connectivity in cities like London to see the real value that people put on access to good and efficient transportation. Governments are also now recognizing that they are competing on a global scale – against fast growing cities like Beijing and Casablanca – and that if they don't constantly invest in their infrastructure, they will quickly find themselves at a disadvantage in this global competition for investment and talent.

Anton Valk (AV): I think you are right. A lot goes into making a city more attractive but the biggest thing is its connectivity to the surrounding regions and, indeed, the wider world that make it a place where talent want to be or where companies want to invest. So, on the one hand you need to ensure that you have international connectivity to attract international attention. But, at the same time, you also need to make sure that you have strong regional links into the areas around the city to bring people to work and improve their access to everything that cities have to offer.

Desmond Kuek (DK): Our experience in Singapore has shown that it's not just about getting people from Point A to Point B. It's also about having an efficient transport system that combines access, convenience, comfort, reliability, safety and affordability. Increasingly, people also want to improve the quality of life in their cities and that often means improving the environment. As a result, we have seen public transit move up on the agenda of government and citizens as a cleaner and more efficient way to move people and goods around.

JS: *One of the things I often tell our clients around the world is that they need to start by improving their existing transportation systems and – most importantly – creating better integration between their various modes of transit. Do you have any advice on how cities can better integrate their transit systems?*

AV: In the past, planners tended to see different modes as almost competitors – cars versus trains – but I think most planners now understand that they need to offer people a

"I think everyone – from the person on the street through to national governments – intrinsically knows that there is an incredibly important link between transportation, productivity and quality of life.

David Prout, Director General of the UK's HS2 high-speed rail scheme

> One thing that has really helped drive integration has been the introduction of smart card technology, which has made it really easy for people to move from one mode of transit to another within a given system.

Anton Valk, former Chief Executive of Abellio (an operator of buses and trains in the UK, Germany and the Czech Republic)

variety of options that can be combined to get them to places quickly and efficiently. So now in the Netherlands we are seeing people bike from their homes to the train station and then, once in the city, they use the trams to get to their final destination. One thing that has really helped drive integration, however, has been the introduction of smart card technology which has made it really easy for people to move from one mode of transit to another within a given system.

DP: One of the advantages that we have with integrating HS2 into existing systems in the UK is that ours is a long-term scheme that won't open until 2026. This has provided our local partners along the proposed line with a lot of time to think about how they will integrate our stations into their existing systems. In Britain we also have a Local Growth Fund that will provide funding to help many of our local partners pay for this integration and for improving their existing local systems. So we have started from a good place in terms of lead time and funding for integration with our scheme.

DK: One of the ways that we have improved integration in Singapore is by taking a more customer-centric approach to our decision-making and policy implementation. Every process, every design and every operational change that we make at SMRT is now looked at both in terms of efficiency and from the commuter's perspective to understand how it impacts the choices that our commuters will make. We're also looking at how we can harness technology – smart applications on phones and other mobile devices for example, because these are so widely proliferated – to help people better plan their journeys and virtually access the transportation system before they even physically enter into our network.

JS: *Clearly governments need to think about how they can invest in the things around a transportation project in order to better integrate it into the existing transit and societal infrastructure. But I think one of the common challenges we see is that current methodologies for valuing and prioritizing transit investments do not really capture things like the changing dynamics of population or changing economic assumptions.*

DP: I would agree with that. When we look at appraising transport projects, about 50 percent of the benefits we attribute come from journey time savings. The problem is that this approach incentivizes you to prioritize schemes that are based primarily on speed. And that might not always be the most critical issue at hand – sometimes things like increased capacity, reliability and regularity of service are attributes that should be equally important, but they don't tend to make up a very large part of the traditional transportation appraisal benefits.

DK: The underlying challenge is really in understanding how the population of a city and region is likely to evolve and that's not

> "The underlying challenge is really in understanding how the population of a city and region is likely to evolve and that's not always easy to accurately project.
>
> **Desmond Kuek**, CEO of SMRT (Singapore's largest public transit operator)

always easy to accurately project. It is a dynamic process that constantly changes throughout the life of a city. What that means is that urban planners and designers need to take a continual and long-term view to balance all of the factors and trade-offs which, in turn, requires the design and implementation process to be integrated across all relevant agencies and community stakeholders up front.

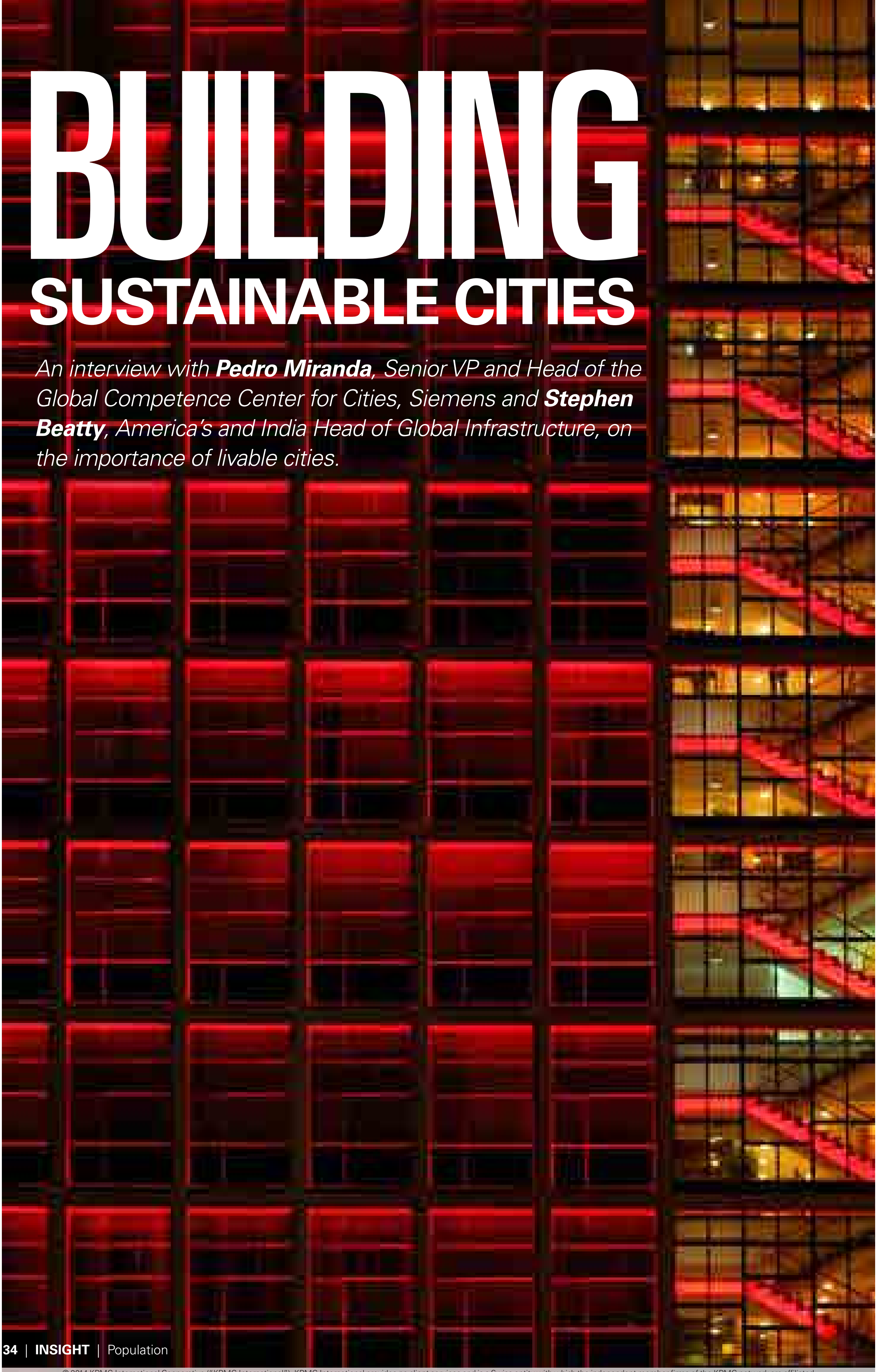
AV: It's also important to remember that choices in transport are politically driven by the electorate, in part because it takes a lot of leadership from government to get the big projects done. But transport projects also have a lot of effects and impacts on the area, the community and local businesses which, in the Western world, tends to mean that other measures – beyond direct economic benefit and journey time – are sometimes high on the agenda.

***JS:** Each of you has extensive experience leading large-scale transportation projects and operations. Based on your experience, what advice would you give transportation authorities and governments around the world?*

AV: I think the main point is that – in many places – there is still a lot to be done in improving existing services and products so that they are more efficient and better interconnected. But at the same time, planners also need to be able to recognize that some technologies or approaches are simply not viable in the long-term, no matter how much money you pour into them or how big a scale you achieve. So planners really need to come at transportation with the principle of creating an integrated system that grows in various ways and across various modes to offer more choice to passengers.

DP: It's also important that people remember that developing major infrastructure projects is a long-term and difficult business that often spans multiple economic, political and social cycles. But if it's a great project that improves the efficiency of a city or region, stick with it and you will eventually prevail. I'm absolutely certain that HS2 is going to deliver some fantastic investment opportunities for infrastructure players and amazing benefits for people right across the UK, not just in the City of London.

DK: I would suggest that sustainability will be the critical focus for transport authorities going forward: sustainability in terms of the environment; in terms of support for economic development of the city as a whole; and in terms of financing framework to build, maintain and renew the system in a meaningful and robust way. And I think the whole aspect of being able to engage and connect society through the transport network so that communities can have a stronger sense of shared belonging and ownership over the spaces that they live, work and play is an increasingly important aspect for city planners as the urban population grows.



BUILDING SUSTAINABLE CITIES

*An interview with **Pedro Miranda**, Senior VP and Head of the Global Competence Center for Cities, Siemens and **Stephen Beatty**, America's and India Head of Global Infrastructure, on the importance of livable cities.*

With the majority of the world's population now living in cities, it seems clear that more must be done to improve the efficiency and sustainability of our urban infrastructure. Not surprisingly, the topic of 'sustainable cities' has risen up the political agenda in almost every country around the world.

According to Pedro Miranda, Senior VP at Siemens and Head of the global technology firm's Global Competence Center for Cities, there are three main trends that are forcing the issue to the forefront: increasing life expectancy, climate change and urbanization.

"Many of these changes are more pronounced in the developing world where some of the most dramatic changes are occurring, particularly in life expectancy and urbanization," noted Mr. Miranda. "What this means is that our cities are growing in both number and size – in 1950 there were only 83 cities with a population of more than one million; today we have around 470 cities that serve as home to more than a million."

UNIQUE APPROACHES FOR UNIQUE CITIES

As a result, many of the world's cities – both in the developing and the developed world – are keenly focused on achieving a level of sustainability where economic growth, quality of life and environmental protection form the central pillars of infrastructure development and growth. Yet, while many cities are striving to achieve similar goals, the reality is that no two cities are alike.

"Consider the difference in density and development between New York and Los Angeles; both are developed world cities, both are 'world-class' and both attract significant investment, but they are completely different in terms of the pace of innovation, land use and planning priorities," added Mr. Miranda. "Similarly, the differences between London and Luanda are vast, yet both strive to achieve sustainability within their own unique context."

Much of the sustainability agenda is being driven by the evolving demands of local populations. Almost irrespective of their location, people tend to want to achieve a higher quality of life, enjoy better safety and security, suffer less traffic and congestion and make more efficient use of their time. Businesses, too, are seeking more efficient and sustainable cities in which to invest in order to achieve more efficient cost structures and lower costs.

MAKING A SUSTAINABLE DIFFERENCE

Technology will be key. "Cities around the world are very focused on leveraging technology to achieve greater sustainability, both in terms of hardware and software," noted Mr. Miranda. "In the transportation sector, for example, we are helping cities select options that not only improve the quality of life for the population, but also reduce energy consumption, emissions and cost at the same time."

Reducing energy consumption, in particular, will have a significant influence on other sustainability measures. And here, infrastructure developers have a key role to play. According to research conducted by Siemens, energy consumption accounts for around 40 percent of the lifecycle cost of a building. From a total investment perspective and considering a building life span of 50 years, only 20 percent is invested

"We need to take a longer-term view if we really hope to make a significant improvement in our cities; we need to look beyond political and development cycles to instead focus on planning for the long-term benefit of the city.

Pedro Miranda, Senior VP and Head of the Global Competence Center for Cities at Siemens

on the design and build phases while the remaining 80 percent is expended during the entire lifecycle in activities such as operations, maintenance, refurbishment and decommissioning.

"New building technologies will play a crucial role in the sustainability equation," added Mr. Miranda. "But we need to take a longer-term view if we really hope to make a significant improvement in our cities; we need to look beyond political and development cycles to instead focus on planning for the long-term benefit of the city."

Three significant challenges stand in the way of achieving greater urban sustainability: poor urban planning, the lack of a holistic approach and difficult financing environments. "Good urban planning and a joined-up and integrated approach to urban development are key. The problem of air pollution can't be solved without changing the way people travel and use energy; and quality of life can't be improved without making improvements in the environment," he added.

PAYING FOR CHANGE

Financing these urban sustainability improvements will be a major challenge for cities and their inhabitants. In most cases, infrastructure is funded in a way that aims to reduce the upfront cost of development and cover the capitalization of the asset – a process inherent in 'value engineering' – versus 'front-loading' investment in the design and build phase to deliver longer-term cost efficiencies.

"We spend significant time working with city and department leaders to help develop their business case for investments into sustainability," noted Mr. Miranda. "Many of these opportunities – particularly in energy conservation and transportation – deliver stable returns and are therefore able to meet the minimum requirements for 'bankability', which means that private investment can be brought in alongside public funds and capability to create a more holistic and sustainable funding and financing environment."

IDENTIFYING SUSTAINABLE SUCCESS

Selecting the right technology for each city will be a major success factor for civic leaders. In many cases, cities that have the right strategy to improve sustainability select technologies that may not be sustainable themselves – either due to rapidly changing technology or heightened total cost of ownership which drive up long-term costs. "It's very important to have an open and transparent discussion about technology, whether it is sustainable and how it impacts the long-term costs of ownership," noted Mr. Miranda.

Creating a baseline for improvement and setting some performance indicators will also be central to success. As Mr. Miranda points out, without a baseline for improvement, cities will be unable to identify the right priorities to ensure funding is being spent in areas that deliver the greatest long-term benefits.

"Once baselines and priorities have been set, it's really all about sticking to the plan regardless of politics or short-term populist demands," he added. "Cities that stick to their plan – like Singapore – are among the most successful in the world because they are focused on the long-term outcomes rather than the short-term gains. And at the end of the day, that's what sustainability is all about – understanding and delivering on the long-term needs of a city."

Creating sustainable communities:

A roundtable on mixed-use development

It is not just our populations that are shifting, it is also our approach to city planning. Today, city planners and government leaders are looking to create mixed-use communities that can not only harmoniously bring together a wide range of income levels, but that can also enhance the city's livability and sustainability.

To learn more about how mixed-use developments are being developed and delivered, **Stephen Beatty**, America's and India Head of Global Infrastructure, talked to **Meg Davis**, Vice President of Development at Waterfront Toronto in Canada, and **Navin Raheja**, CEO of Raheja Developers in New Delhi, India.

***Stephen Beatty (SB)**: The vision of creating mixed-use communities is clearly one shared by developed and developing cities alike. Yet our experience shows that demand for mixed-use is often driven by different objectives depending on the particular pressures within the city or region. What is it that is driving your city's vision of mixed-use communities?*

Navin Raheja (NR): I believe that India's ability to maintain its economic growth is dependent on us shifting our view of community development. More than 60 million people in India live in urban slums and if we don't find a way to integrate these people through mixed communities – where the various income groups complement each other and maintain the sustainability of the city – we will just see a further proliferation of the slums and the continued breakdown of infrastructure.

Meg Davis (MD): Actually, the underlying drivers for mixed-use communities in the developed world are not fundamentally different from those Navin mentioned. We recognize that to have a healthy, sustainable and vibrant city, you need a range of services and products, and that requires all sorts of people – at all sorts of income levels – to live, work and use all of those services. We also believe that mixed-use communities have more character, are more creative – more authentic even – and all of this contributes to the sustainability and livability of a city or neighborhood.

> I think you need to start with a very clear understanding of what your target community needs and how those needs will shift in the future.

Navin Raheja, CEO of Raheja Developers in New Delhi, India

***SB**: If we are brutally honest, one of the big challenges for creating affordable housing comes from balancing the needs of developers who are seeking to maximize their return from the project against the needs of the government who act as a proxy for the community in advocating for greater supplies of affordable housing. How is this balance managed in your cities?*

MD: Waterfront Toronto has a policy requirement of 20 percent affordable rental housing for all our communities; that goes for both public and private land developments within our jurisdiction. So we use policy to set the stage and make that requirement. Developers need to understand that when they get their development rights. But in our negotiations with private sector developers, we've often found that they are very keen to participate. It hasn't always been easy and the negotiations around how it is actually implemented can take some time, but we've seen developers come up with some great approaches as a result.

NR: The situation is somewhat more complex in India. Past policy reforms aimed at creating more affordable housing were often hijacked by unscrupulous developers and, as a result, much of the policy being formulated in India today is more focused on creating supply while reducing the potential for graft. Obviously, shifting millions of people who live on less than a dollar a day into affordable housing has a range of challenges that go with it. But I also think that many developers – us included – see their participation in mixed-use communities as a way to improve their reputations, credibility and – if done right – profits as well.

***SB**: Access to infrastructure and government services is obviously key to supporting and sustaining any urban area. What are some of the challenges that cities face in creating the right mix of infrastructure to support and encourage mixed-use communities?*

NR: I think you need to start with a very clear understanding of what your target community needs and how those needs will shift in the future. We spend a lot of time talking to the local community, studying the available infrastructure, looking at close-by employment areas and how the development will complement the surrounding area before we start planning. It's not just about creating housing stock; you also need to make these communities sustainable and in India that means thinking about how you provide services like education, healthcare, water and sanitation in an affordable way. Because if we don't, these people will quickly move out and eventually end up in another slum.

MD: Again, I think developed cities like Toronto need to consider many of the same issues that Navin is facing in India. Lower income families tend to need more services than others – community centers, libraries, access to public transit and so on – so we need to think about how we deliver these services to the right people in the communities. In our circumstances, it also requires the government to do more up-front investment into infrastructure; the roads, the sanitary system, parks, public spaces and community centers alike. Government is also putting some of its own capital into the development of the affordable housing to make the scheme more attractive to developers.

> It's really about having a clear mandate and staying true to that vision regardless of how difficult the road gets.

Meg Davis, Vice President of Development at Waterfront Toronto in Canada

***SB**: One of the factors for creating successful mixed-use communities around the world is the ability to create consensus, support and involvement from the various stakeholders involved in creating a community of this type. Would you agree?*

MD: Absolutely. One of the things that has really made our project a success has been the way we involved our stakeholders early and often throughout the process. I think many developers think that community groups are going to be confrontational or overly protective of their existing environment but, in reality, they can often be very open about bringing new uses into their community if they are consulted early. But it's not just talking to community groups; you also need to think about how you will engage the local business community, civic associations and infrastructure providers that will be critical to making the area vibrant and sustainable.

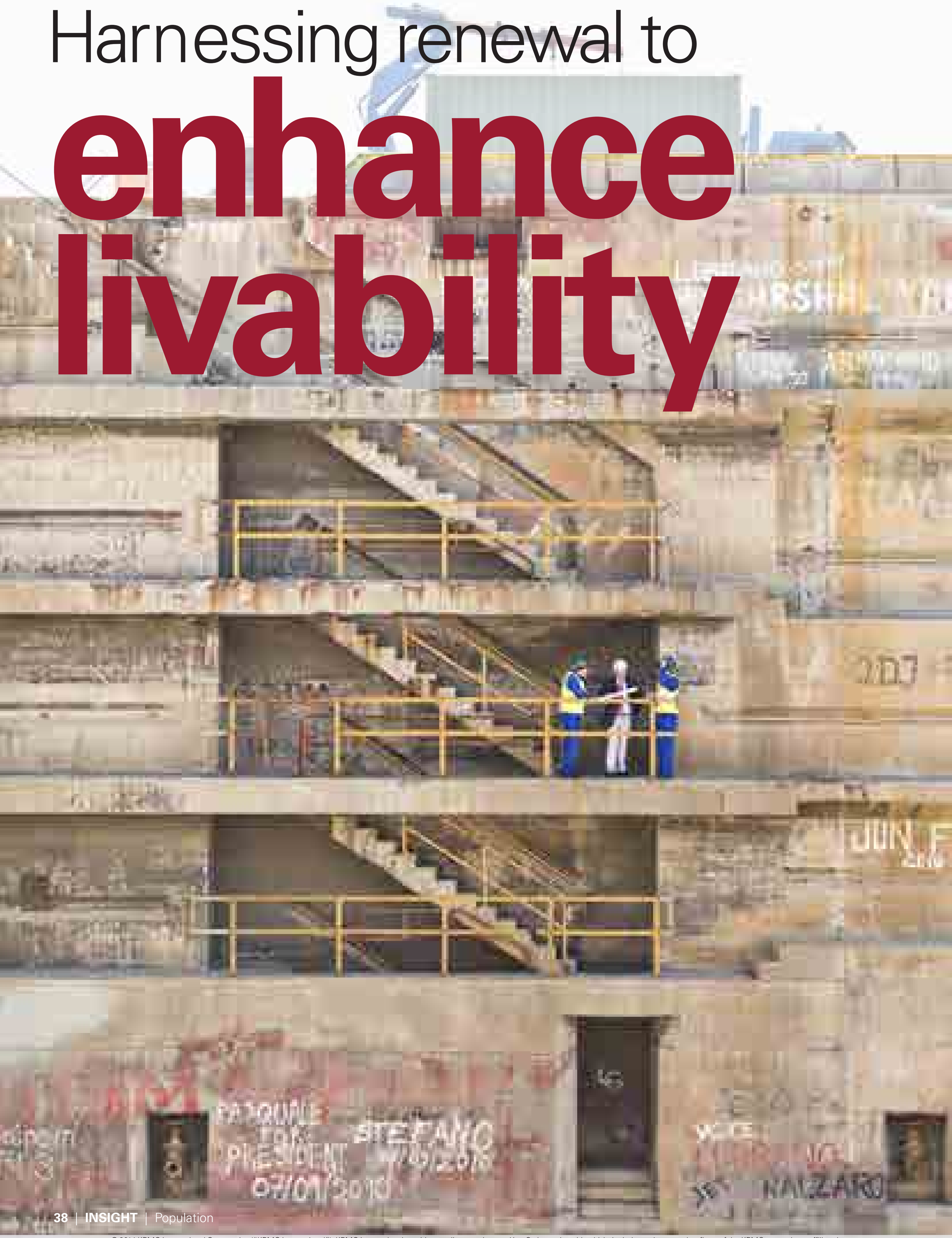
NR: I think you are right. But it's also about what you do with the information you get from those discussions. I believe that cities need to plan with more sensitivity to the requirements of the community itself rather than the requirements of the urban planners. If you don't incorporate their requirements and demands, there is a good chance that nobody will want to move in or – worse – that the community will fail socially and economically. We should be looking to the needs of the community to drive our decisions and then build the plans around that.

***SB**: Any advice for those seeking to develop mixed-use communities in their jurisdictions?*

NR: I think the biggest thing to remember for those in the developing world is that these communities need to be sustainable economically, environmentally and socially. Mixed-use communities in these markets will have a very wide disparity of income levels – from those under a dollar a day to those who make hundreds of thousands a day – so it is vital that planners and developers carefully consider the long-term sustainability of all of the people living in that community.

MD: I think the same basic idea holds true in the developed world. For me, though, I think my advice would be to consider creating an organization like Waterfront Toronto to act as a facilitator between developers and the government, and which can act as an active participant in the development of the community. Then it's really about having a clear mandate and staying true to that vision regardless of how difficult the road gets. If it's what the city ultimately needs then stick to your guns. ■

Harnessing renewal to enhance livability



> What we've seen is that leaders who create a vision of a more livable city based on partnerships and collaboration with the community, businesses and across government can achieve great success.

Marilyn Ball, Chief of Planning and Infrastructure Services for the City of Brampton

***Marilyn Ball**, Chief of Planning and Infrastructure Services for the City of Brampton, speaks to **Stephen Beatty**, America's and India Head of Global Infrastructure.*

Creating a more 'livable city' isn't just about topping the rankings with the EIU, Mercer or Monocle magazine. It's about creating an environment where people want to live, where businesses want to invest and where infrastructure promotes a healthier and better quality of life.

Not surprisingly, many cities have started to rethink how they plan their infrastructure investment and policy with an emphasis on creating a more livable environment. For older, more established cities, however, this can often be a challenge made all the more burdensome by aging infrastructure, restrictive policy and outdated planning approaches.

A CASE IN POINT

The City of Brampton, about a 30-minute drive from Toronto, Canada, is a city that is rapidly moving up the list of 'livable cities' in North America. Established in the mid-1800s, the city is now Canada's ninth largest urban area by population. But, according to Marilyn Ball, Brampton's Chief of Planning and Infrastructure Services, by the 1990s the city had started to suffer from many of the same symptoms affecting other major urban areas. With suburban sprawl, the population had become sedentary and unhealthy, and infrastructure was becoming either outdated or restrictive.

"Part of the problem with most established cities is that they were often built to accommodate cars rather than people, so they quickly became very unsocial places characterized by wide streets, noise barriers, single-use areas and Big Box stores," noted Ms. Ball. "What this did was create cities that were not only prone to continued sprawl, but also very inflexible in the face of changing demographics."

TIME FOR RENEWAL

For Brampton, the growing need to re-invest in the city's aging infrastructure offered an opportunity to rethink the way that planning and development occurred. "One of the best ways to start making a city more livable is by optimizing the infrastructure that is already there," she noted. "Most urban areas tend to have an incredible network of roads and services in place, so it is important to capitalize on that investment by retrofitting it into healthy mixed-use neighborhoods served by multi-modal transit and transportation systems to give people more choice in how they get around and – at the same time – make the streets more beautiful."

A VISION FOR THE FUTURE

Like many other reviving cities, Brampton credits much of its success to recognizing the challenge early and acting on that insight to develop a long-term and cohesive vision for the city. But rather than simply espouse a new vision and go back to business-as-usual, Brampton took the opportunity to fundamentally reorganize its approach to city planning and operations in order to turn its vision into reality.

For example, just last year, the city underwent a massive reorganization that re-aligned city departments around common interests. Outward-facing public services such as fire, transit and recreation were brought together; internal support services including IT, HR and finance were united; and planning, urban design, development, engineering, park and road maintenance and capital construction were brought into a single group under Planning and Infrastructure Services.

"It's really allowed us the opportunity to coordinate our services and engage with the right stakeholders across the organization to achieve a common vision," she added. "There is a greater sense of ownership when everyone involved in the lifecycle of the project – from planning and design through to maintenance and operations – is brought together to create a solution that makes the city more livable for its people."

LEADERSHIP SETS THE TONE

Creating a new vision for a growing and evolving city is no easy task. Strong and visionary city leadership play a key role. "What we've seen is that leaders who create a vision of a more livable city based on partnerships and collaboration with the community, businesses and across government can achieve great success," Ms. Ball added. "Not only that, they can also create a sense of predictability for residents and businesses which, in turn, improves the economic and social health of the community."

City leaders must also be willing to take action to reduce the complexity of regulation and policy. Indeed, most older cities are burdened with a complex web of regulation that effectively limits the ability of government and the private sector to achieve positive change within the community. "City leaders will need to take a bit of a risk by creating a much more 'free-flowing' and flexible policy framework that enables investments to be made in the right places to improve the livability of the city," she added.

Prior to joining the City of Brampton, Ms. Ball worked as the Director of Development and Design at the City of Mississauga, another Canadian urban regeneration success story. "In Mississauga, the strategic planning process was about listening to stakeholders in the community, building consensus within the organization and seeking out best practices from other urban areas around the world before we were able to really articulate our vision for the future," she noted. "People expect to see fast action when they hear good ideas and managing the community's expectations isn't always easy. Identifying and implementing some quick wins to build momentum and demonstrate a city's commitment to change is important, and both Brampton and Mississauga have their success stories".

DEVELOPING SOCIAL INFRASTRUCTURE IN A TURBULENT WORLD

*A conversation between **Joel Finlay**, KPMG in Canada, **Dr. S.V. Subramanian**, Professor of Population Health and Geography at Harvard University's School of Public Health and **Dr. Mariana Arcaya**, urban planner and Social Epidemiology Postdoctoral Fellow at the Harvard University's School of Public Health.*

> Shifting demographics mean that our populations are no longer homogenous; the needs of some groups are now very different from the needs of others, even though they may live in close proximity to each other.
>
> **Dr. S.V. Subramanian**, Professor of Population Health and Geography at Harvard University's School of Public Health

As this edition of *Insight* clearly demonstrates, it is the needs of populations that drive infrastructure development and investment. As populations shift and evolve, so too must their supporting infrastructure.

Nowhere is this more acutely felt than in social infrastructure. In part, this is because many of the most significant demographic shifts impact those areas near and dear to social infrastructure. Consider, for example, the impact that an aging population may have on hospital utilization and location; or how the needs of a migrant population may influence the demand for social housing; or how falling fertility rates in much of the world impacts the need for schools and community centers.

DIVERGING NEEDS IN A CONVERGING WORLD

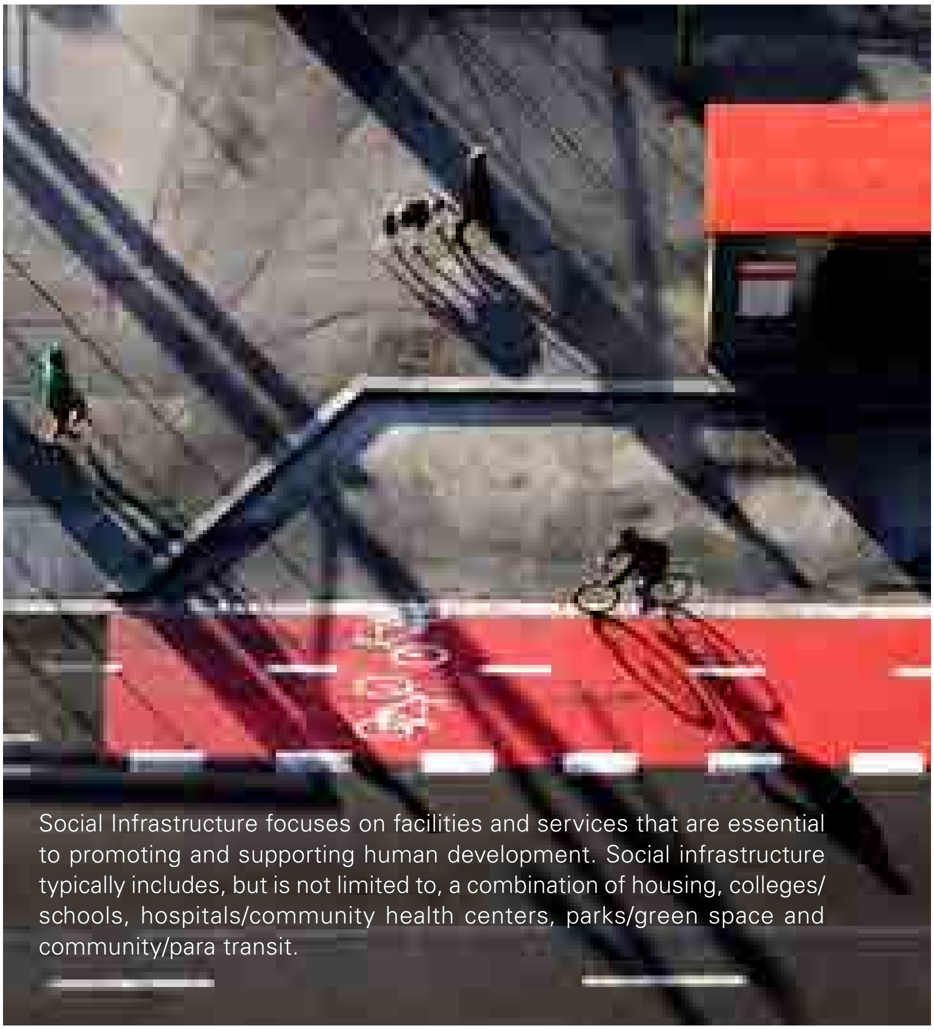
According to Dr. S.V Subramanian, a Professor of Population Health and Geography at Harvard University's School of Public Health, part of the challenge for infrastructure planners and policy makers is that populations are rapidly diverging rather than converging. "Shifting demographics mean that our populations are no longer homogenous; the needs of some groups are now very different from the needs of others, even though they may live in close proximity to each other," he noted. "Infrastructure planners and policy makers simply can't think just in terms of countries, states or cities anymore."

In turn, this has led infrastructure leaders to think differently about social infrastructure. "I think there is a growing acknowledgement that the needs of a population often shift faster than the infrastructure itself and that has led to some very interesting ideas on how we can make our infrastructure more adaptable and modifiable," added Dr. Mariana Arcaya, an urban planner and Social Epidemiology Postdoctoral Fellow at Harvard University's School of Public Health.

MEETING THE NEED RATHER THAN THE EXPECTATION

In the US, for example, many cities are dealing with what is commonly known as the 'suburbanization of poverty' where the more affluent are moving back into cities and the less affluent – often immigrants or marginalized sectors of society – are moving to the suburbs. "In many urban areas we are seeing a lot of discussion about how we can create multi-functional facilities that can adapt to the needs of the community, or how we can create more affordable housing units in suburban environments that were designed around large single family homes," she added.

Understanding the specific needs of the local population is key to prioritizing infrastructure spending in a shifting demographic environment. For example, rather than assuming that more healthcare is the most appropriate fix for an unhealthy neighborhood, the Harvard academics argue for social infrastructure investments that address the underlying community needs which contribute to the promotion and development of healthy communities. "Hospitals are vital once we are sick, but affordable housing, access to employment and safe neighborhoods can help keep us healthy in the first place," suggested Dr. Arcaya.



Social Infrastructure focuses on facilities and services that are essential to promoting and supporting human development. Social infrastructure typically includes, but is not limited to, a combination of housing, colleges/schools, hospitals/community health centers, parks/green space and community/para transit.

> **Hospitals are vital once we are sick, but affordable housing, access to employment and safe neighborhoods can help keep us healthy in the first place.**

Dr. Mariana Arcaya, urban planner and Social Epidemiology Postdoctoral Fellow at the Harvard University's School of Public Health

"What this shows is that infrastructure priorities can be informed by rich data from sources such as the census and satellite imagery, but it must be overlaid with data directly from the populations involved to create the right social infrastructure for the local community in the short-to-medium-term," added Dr. Arcaya.

A DIFFERENT APPROACH TO PLANNING

To get ahead of these demographic shifts and their resulting impact on social infrastructure, planners and civic leaders must start thinking differently about the way they currently assess needs. For some, this will require a new approach to conducting assessments that incorporates health, livelihood and environment; in short, all of the aspects that influence the human condition.

"The key to prioritizing and planning social infrastructure is for cities to address these three components in an integrated way; it's no longer good enough to develop a new road without first thinking through whether the local population could afford the housing, find access to employment and feed their families once they get out there," added Dr. Subramanian. As a case in point, he cites the practice of the former Mayor of Bogota (Enrique Peñalosa) to pave sidewalks before roads in areas where people generally can't afford car ownership. "Bogota's approach turns some of the standard planning philosophies on their head and marks a significant departure from the traditional linear way of planning infrastructure."

LEVERAGING THE PRIVATE SECTOR

However, as Dr. Subramanian quickly notes, social infrastructure can often be 'lifted at both ends' when both private and public sources are brought to bear. "In India, for example, there are no public funds earmarked for developing retirement or long-term care facilities so this has naturally fallen onto the private sector," he said. "So while public funds are being poured into improving the overall health and welfare of the community, it is private sources that are responding to the growing need for geriatric health services as India's population starts to live longer lives."

For Dr. Arcaya, part of the solution lies in better access to data and analytics. "Big cities like New York have the capacity to collect and analyze a wealth of data and community insights to help them better understand where social infrastructure is, and will be needed, and to share that data in an integrated way across the city departments," she notes. "But in smaller centers that lack resources for long-range planning and comprehensive needs assessment – and indeed in most developing world cities – planning often responds more to development pressures on the ground rather than to empirical analyses of what is actually needed now and in the future."

So while there may not be a single path to developing social infrastructure in the face of rapidly shifting demographics, one thing is clear: planners will need to start thinking in a more integrated and data-driven way if they hope to meet the needs of their populations into the future.

The sophistication of Asia Pacific: On the cusp of a golden age

*By **Julian Vella**, Asia Pacific Head of Global Infrastructure*

Whatever your perceptions of Asia Pacific may have been, be prepared to re-evaluate them. As this Special Report on Asia Pacific shows, countries right across the region have become increasingly sophisticated in their approach to funding, delivering and operating infrastructure. And while much work still remains, all signs indicate that the region is now entering into a 'golden age' of infrastructure.

I often have to laugh when I hear people talk about 'Asia Pacific' as if it were one homogenous region. Yet nothing could be further from the truth; try comparing the development challenges now facing Indonesia or the Philippines with those of Australia or Japan. Indonesia, the Philippines and many other countries in Southeast Asia are dealing with significant development objectives and seemingly unstoppable urbanization. Australia and Japan, on the other hand, are experiencing aging populations, shifting economic trends and calls for infrastructure renewal as well as new investment.

EACH ONE AS UNIQUE AS THE NEXT

This means the drivers for infrastructure development vary from country to country and city to city across the region. Even the diversity between neighbors can be dramatic (North and South Korea offering a prime example). Many countries in the region are largely focused on responding to pressures created by rapid urbanization and population growth. Those with burgeoning middle-classes are facing the pressure of growing consumerism and demands for more 'livable cities'.

Economic and development goals also play an important role in defining the infrastructure environment in many countries within the Asia Pacific region. As our article on Myanmar and Mongolia shows (see page 54), some are clearly working towards developing their economies through massive infrastructure investment programs. But the region is also starting to see the foundation of their economies shift as cost of labor rises in some countries, creating competitive advantages for others. As a result, we are seeing countries invest in infrastructure as a means of shifting their economic base (see our article on Singapore for a case in point).

A STEP-CHANGE IN SOPHISTICATION

One thing that is common across the region, however, is a growing sophistication in the way governments are planning, funding, delivering and operating their infrastructure. After decades of little to no 'innovation' in infrastructure delivery in many countries, the region has become a veritable hot-bed of change and new approaches.

Over the past few years, we have seen a remarkable increase in the number of projects being brought to market as public-private partnerships (PPPs) or private finance initiatives (PFIs). As our article on page 12 notes, Indonesia had a book of almost US$50 billion-worth of PPP projects in 2013. Our interview with Professor Sun Jie, Secretary-General of the Public-Private Partnership Research Committee within the Public Finance Academy of China's Ministry of Finance, demonstrates China's renewed commitment to developing the quality and quantity of their PPP-led projects.

> **More than anything, however, governments across the region – regardless of their stage of development – must take some time to reconsider how they incorporate population and demographic shifts into their infrastructure planning and prioritization.**

SEEKING ALTERNATIVE SOURCES OF FUNDING

In other markets, we are seeing governments conducting secondary asset sales as a way to recycle capital back into new infrastructure development. Australia is an obvious example of this (see our interview with Sir Rod Eddington, former Chair of Infrastructure Australia, for more on this), but other markets – Japan and Indonesia, for example – are also starting to look towards asset sales as a way of funding their infrastructure needs.

Governments are also starting to consider how they might start shifting the cost of their infrastructure to the consumer through user-pay approaches and tolling. However, affordability remains a key concern, particularly in countries where many still live on less than a dollar a day. As a result, many are now thinking about how to bridge the 'viability gap' between the cost of the service and the ability to recoup investments.

Observers of the region will also have noted a significant increase in regional investment, both in-bound and out-bound. China, South Korea, Japan and – increasingly – Australia have been enthusiastic investors, not only in greenfield projects, but also in secondary asset sales within the region. The formalization of the ASEAN bloc (see page 50) will only increase the pace and size of those investments as regional integration takes hold.

NO TIME TO REST

While progress has largely been positive and admirable, there are still some significant challenges facing many of the countries located within the region. For one, governments will need to engineer a quantum transformation in their capability to manage, identify and deliver the massive pipeline of projects now being planned. Without stronger capabilities – particularly in planning and structuring PPPs – few will be able to deliver on their infrastructure objectives (a sentiment echoed by Professor Sun Jie on page 56).

Policy reform will also be key in many markets as governments strive to improve their PPP environments and strengthen regulation in areas such as dispute resolution and contract certainty. Policy reform will also be key to improving the efficiency of markets, as illustrated by Japan's current energy market reforms (see page 58).

More than anything, governments across the region – regardless of their stage of development – must take some time to reconsider how they incorporate population and demographic shifts into their infrastructure planning and prioritization. As the main content of this edition of *Insight* clearly shows, it will be shifting populations that will largely drive the demand for infrastructure: and nowhere is this truer than in Asia Pacific. ■

Open for business: Australia's vibrant infrastructure market

With infrastructure sitting high on the agenda at the February 2014 G-20 Summit meeting of finance ministers, central bank governors and business leaders in Sydney, Australia took the opportunity to showcase some of its investment opportunities and new approaches to infrastructure.

***Stan Stavros**, KPMG in Australia's Head of Infrastructure & Projects sat down with **Sir Rod Eddington**, former Chair of Infrastructure Australia, to find out more about what makes Australia's infrastructure market worth watching.*

> One of the key things that bodies like Infrastructure Australia do is to champion the role of infrastructure in the economy and in the community and advocate for evidence-based approaches to the setting of infrastructure priorities.
>
> **Sir Rod Eddington,** former Chair of Infrastructure Australia

***Stan Stavros (SS):** Most countries are struggling with some pretty significant infrastructure challenges and it's not surprising that infrastructure is at the top of the agenda for Australia's governments, businesses and communities.*

Sir Rod Eddington (RE): Infrastructure is a big issue globally. The fact that infrastructure was one of the key issues for the finance and business leaders assembled at the G-20/B-20 Summit in Sydney just shows how important infrastructure is to national economies and global markets.

But the problem for everyone – G-20 nations and local councils alike – is that there are very limited government funds available for infrastructure given all of the other pressures on government revenue, particularly from health, education and welfare. So increasingly, we're seeing the conversation move toward creating a greater role for the private sector in infrastructure and bringing approaches like public-private partnerships (PPPs) front and center in Australia.

***SS:** There has been quite a bit of investment in the Australian infrastructure market recently from both domestic and foreign players. Why is Australian infrastructure becoming so attractive?*

RE: I think foreign investors recognize that Australia's infrastructure market is a fairly stable and profitable sector in which to invest. We have companies from Singapore that are major investors in the electricity grid, a Japanese company that owns the water business in the State of South Australia and the Canadian pensions funds have been active players in the market recently. Our own Superannuation funds have also kept up their investments in the Australian market and see infrastructure as an important asset class.

We're seeing quite a vibrant market for secondary assets in Australia. There is growing support for the concept of recycling government capital – selling existing infrastructure and reinvesting that capital into new infrastructure projects. In New South Wales, for example, the government recently signed a long lease on the main port and recycled the AUD$5.1 billion into new projects. Queensland is looking to do a similar thing with their ports and motorways and we're seeing a lot of interest from investors already.

***SS:** Some of this activity is being encouraged by government tax incentives where states get their tax equivalent payments paid up front as long as they reinvest that money into infrastructure, but how has regulation changed to encourage more private investment?*

RE: Every country has regulatory bottlenecks that need to be cleared and sometimes those cause unnecessary delays and complications. For example, we used to have a lot of duplication in our planning processes where a number of different government bodies would conduct their own individual impact studies on a project and we took a look and asked what information could be shared and what duplication could be removed to clear those bottlenecks. But it's a never-ending journey.

***SS:** What role does an advisory body like Infrastructure Australia play in creating a more positive infrastructure market?*

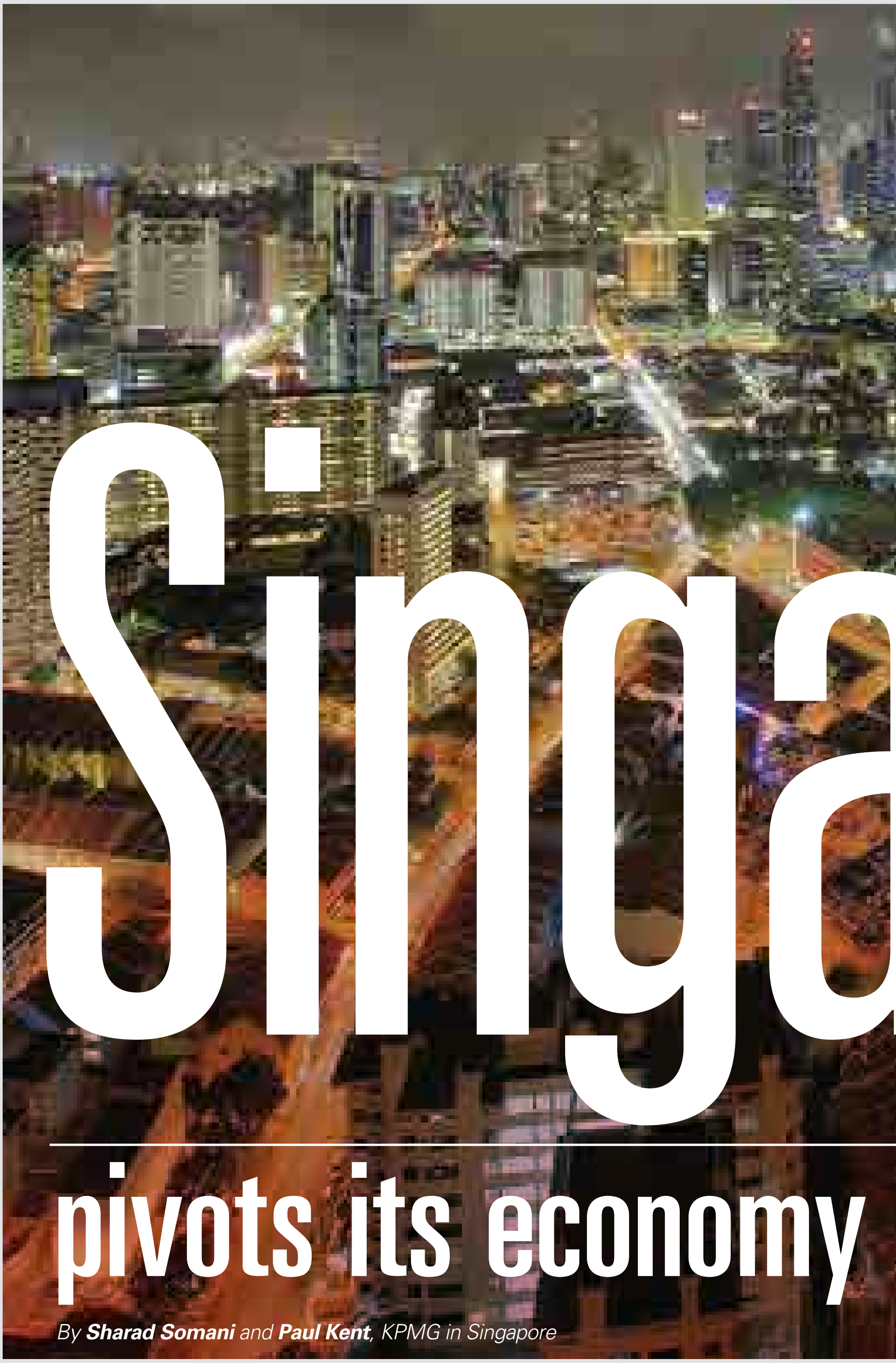
RE: One of the key things that bodies like Infrastructure Australia do is to champion the role of infrastructure in the economy and in the community and advocate for evidence-based approaches to the setting of infrastructure priorities. It really speaks to the important role that the private sector plays and speaks to the importance of transparency in the decision-making process.

The reality is we are but one voice in the infrastructure space and need to work alongside other key stakeholders to achieve our common goals. In Australia, we're trying to take a much more transparent and collaborative approach so that everyone from the Business Council of Australia – who have devoted a considerable amount of time and energy contributing to the public debate on infrastructure – through to community groups like public transport users, regularly have a voice in the prioritization process.

I think that's why governments are creating bodies like Infrastructure Australia or Infrastructure UK; to depoliticize infrastructure prioritization by creating an evidence-based agenda that encourages greater transparency and wider participation from public and private arenas.

***SS:** Is this uptick in activity within the Australian market the start of a growing trend?*

RE: I think anyone that is looking for a steady growth market with real opportunities for foreign investors should be looking at Australia, in part because we are taking an evidence-based approach that offers greater confidence to investors. But also because the government is actively working to make it even easier for private sector capital to participate in the sector. I think it is becoming increasingly clear that infrastructure is a sector in which Australia is open for business.



Singa

pivots its economy

*By **Sharad Somani** and **Paul Kent**, KPMG in Singapore*

For the past 40 years or more, Singapore has set the path for Asia's developing nations. Now the city state will need to reinvent itself again as it deals with shifting economic trends, markets and population demographics. Infrastructure will be key to the country's future.

GROWTH SLOWS

Singapore, long the favorite case study of urban planners around the world, is facing a simmering crisis. Productivity has been falling since 2010, in part because of the lure of lower-cost labor markets in nearby countries. As a result, the makeup of the economy is also shifting with manufacturing – once the core of the economy – now contributing just 20 percent to the country's Gross Domestic Product (GDP).

The city state's population is also undergoing significant change. Growth rates among citizens was just 0.9 percent in 2012,[1] the slowest rate in almost a decade. Singaporeans also live long lives – an average of 84 for women and 82 for men – meaning that the population is getting older; between 2002 and 2007, the median age of Singapore's citizens jumped 5 years to 40.[2]

INCENTIVIZING PRODUCTIVITY GROWTH

Recognizing that Singapore can no longer rely on population growth as a means of fueling economic expansion, the government has started to roll out a fairly comprehensive policy framework for enhancing productivity. Some initiatives – such as providing funds to help businesses restructure or topping up the 'Life Long Learning Fund' aimed at helping the population retrain – have focused on providing incentives for people and businesses to enhance their capability.

The government also recently announced an extension to their Productivity and Innovation Credit (PIC) scheme which offers businesses a 400 percent tax deduction and/or a 60 percent cash payout for qualifying investments. It's an impressive incentive: at the prevailing corporate tax rate of 17 percent, companies who qualify could get a tax savings of 68 cents on every dollar invested, meaning that more than two-thirds of the investment could be paid back within the first year through tax savings alone.[3]

Another major strategy for the Singapore Government is to pivot their manufacturing base from low-cost, low-value products to instead become a center of excellence for advanced manufacturing. As Leo Yip, Chairman of Singapore's Economic Development Board noted recently, "We aim to have Singapore ready to seize future growth opportunities and anchor our position as the advanced manufacturing hub in Asia."

SHARPENING THE FOCUS ON INFRASTRUCTURE

Underpinning all of the changes that will be required to achieve these goals is infrastructure. Numerous infrastructure projects are now underway including land reclamation projects, major urban renewal schemes and numerous expansions and improvements to the country's Mass Rapid Transit (MRT) system. With Lee Hsien Loong, Singapore's Prime Minister, acknowledging a lack of "20/20 foresight" in the country's infrastructure planning in 2013, the government is now also in the process of rethinking its approach to planning.

Sources:

[1] http://www.singstat.gov.sg/statistics/browse_by_theme/population/statistical_tables/popinbrief2013.pdf
[2] World Health Organization (2013)
[3] http://www.iras.gov.sg/irashome/picredit.aspx

pore

to maintain growth

During the Budget 2014 debate in Parliament, Deputy Prime Minister Tharman Shanmugaratnam noted that "productivity cannot just be summoned up...it will require entrepreneurial energies, business leadership, and everyone striving to do better at their jobs." Clearly, there will be a similar need for collaboration between public and private spheres in infrastructure for Singapore's strategy to work.

A WEALTH OF OPPORTUNITY

Looking ahead, we see a strong pipeline of opportunities emerging for infrastructure developers, investors and operators. Efforts to retool the population are expected to create increased demand for education and training facilities. The aging population demographic will likely require increased investment into health and community infrastructure. Pivoting to advanced manufacturing will require heavy investments into facilities, information and communications technology (ICT) infrastructure and ports.

> Recognizing that Singapore can no longer rely on population growth as a means of fueling economic expansion, the government has started to roll out a fairly comprehensive policy framework for enhancing productivity.

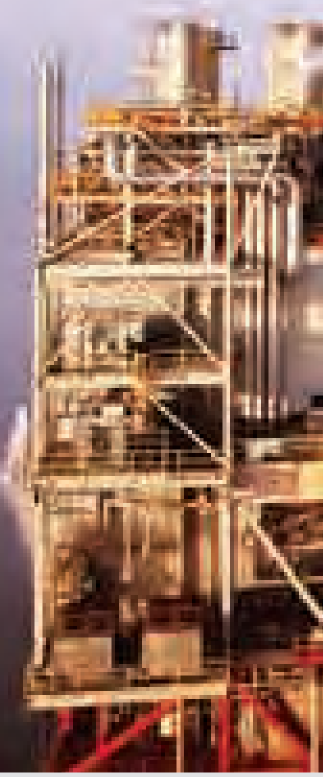
ICT infrastructure, in particular, has been championed by the government with companies being encouraged to invest in ICT technologies in three different ways: a 70 percent subsidy for the costs of ICT products and services; up to US$1million in subsidies for companies developing emerging technology solutions; and subsidies to support companies investing in broadband infrastructure. In other words, those infrastructure players that are able to incorporate a significant level of ICT technology into their assets may enjoy financial benefits as a result.

A ROADMAP FOR DEVELOPMENT

How Singapore manages its productivity and population challenges over the next 10 years will be carefully watched by urban and government leaders across Asia and the world. Moreover, if they succeed, the country may – once again – blaze the path for emerging market economies going forward.

As Deputy Prime Minister Tharman Shanmugaratnam told his colleagues during the 2014 Budget debate, "we have to prepare for a new world." Only time will tell what role Singapore will play in that new world.

Energy security in the ASEAN block: Myanmar takes center stage



*With the ASEAN region's economy expected to triple in size by 2035, energy demand will likely double over the next 20 years. The development of Myanmar's energy market will be particularly key to supporting the massive changes now underway within the block. To that end, **Anurag Chaturvedi** and **Sharad Somani**, KPMG in Singapore, spoke with **Ken Tun**, CEO of Parami Energy in Myanmar, about the promising opportunities developing in this South Pacific community.*

BUILDING A COMMUNITY

After almost 50 years in existence, the Association of Southeast Asian Nations (ASEAN) is now undergoing significant change. Many are undeniably positive: the opening up of Myanmar, increasing economic prosperity and the shift towards urbanization are all making the region more successful and stable for the long term.

Another very positive milestone will come next year when the ASEAN Community is properly established under three main pillars: the ASEAN Political-Security Community, the ASEAN Socio-Cultural Community and the ASEAN Economic Community (AEC). The formation of the AEC, the blueprint which member states adopted in 2007, will be particularly important as it strives to create a single market and production base across the region, as well as improve competitiveness, create equitable development and support the region's integration into the global economy.

A FOCUS ON ENERGY SECURITY

Given the ASEAN region's expected rates of growth – both economically and in terms of population, which is expected to rise by 25 percent over the next 20 years – it is perhaps not surprising that the AEC is keenly focused on creating energy security within the region.

For the most part, this is expected to be achieved through regional collaboration in the ASEAN Power Grid (APG) and the Trans-ASEAN Gas Pipeline (TAGP) projects, by developing renewable energy in the AEC and by pursuing opportunities for private sector involvement in financing and technology transfer. Already, the APG is involved in 14 electricity interconnection projects within the region, while the TAGP has seven similar projects ongoing in the gas sector and boasts 11 existing bilateral connections for a total of 3,020 kilometers of existing pipeline and an additional 4,500 kilometers in the works.

ALL EYES ON MYANMAR

While the ASEAN countries (with the exception of Thailand and Singapore) are collectively net exporters of gas, part of the region's future energy security will depend on the development of the energy market and economy in Myanmar. According to analysis by KPMG and the International Energy Agency (IEA), Myanmar's overall demand for gas is forecasted to almost triple over the next 20 years as electrification rates ramp up and economic growth expands, buoyed by new foreign investment.

The country has already identified 7.8 trillion cubic feet in proven natural gas reserves – a number many in the sector believe to be a gross underestimation – and (through the Myanmar Oil and Gas Enterprise (MOGE)) has conducted several rounds of auctions of onshore blocks which have drawn participation from a number of international players.

Yet auctions and tenders do not necessarily mean that the country is on the road to energy self-sufficiency. International players still seem somewhat shy to bid for work in Myanmar, a fact clearly illustrated by MOGE's recent awarding of offshore oil and gas tenders. Of the blocks originally offered almost a year ago, only 10 of the 11 shallow water blocks and 10 of the 19 deep water blocks were awarded to 13 international firms and a handful of local firms as their joint-venture partners in March 2014.

BUILDING NATIONAL CAPACITY

Many also worry that Myanmar has little national capability to properly capture the value of their energy wealth. "Some experts

> Myanmar is the largest exporter of gas in Southeast Asia, yet we import about EUR1.17 billion in fuel and our refining capacity is less than 5 percent of Thailand's.

Ken Tun, CEO of Parami Energy in Myanmar

predict that investments from the bidding round could be as huge as US$6 billion over their exploration periods. That's 10 percent of our Gross Domestic Product (GDP)," noted Ken Tun, CEO of Parami Energy in Myanmar. "The question is how local service companies and MOGE will capture the value-added segment of the market."

For its part, MOGE has been entering into Production Sharing Contracts (PSC) or Improved Petroleum Recovery Contracts (IPR) with international players since the Foreign Investment Law first came into place in 1988 which, in turn, has helped improve the organization's own capabilities. The government has also required international developers to join up with a local partner if they plan on bidding for the development of any of Myanmar's onshore or shallow water blocks.

Parami Energy is one example of the entrepreneurial spirit of Myanmar's fledgling energy industry. Over the past decade, the company worked hard to position itself as a provider of a wide spectrum of services to the oil and gas industry, from upstream exploration to downstream distribution. Today, Parami Energy holds a minority stake in an onshore block awarded to India's Jubilant Energy and, in the recently concluded round of bidding, won the rights to the AD-3 offshore block in partnership with UK-based Ophir Energy, even though this block did not require a local partner.

DEMAND, SUPPLY AND INFRASTRUCTURE

Other major challenges are impeding Myanmar's ability to capitalize on its energy wealth. Infrastructure is a critical one: today, the country has no existing or planned gas importing infrastructure to speak of, and plans for a Liquefied Natural Gas receiving terminal seem to have stalled. At the same time, demand is rising – particularly in the industrial segment where demand for gas is expected to grow six-fold over the next two decades.

Likely the biggest challenge facing domestic growth and energy security, however, is that Myanmar is currently exporting what little gas it produces under long-term export contracts. Two pipelines – both of which were built to export gas from fields in Myanmar to Thailand under a 30-year sale agreement – were built between 1999 and 2000; a newly-built pipeline exports gas from the Shwe gas field to China's Yunnan province. "Myanmar is the largest exporter of gas in Southeast Asia, yet we import about EUR1.17 billion in fuel and our refining capacity is less than 5 percent of Thailand's," added Mr. Tun.

AN EVOLVING MARKET EMERGES

Whether Myanmar can produce enough gas to meet its past export obligations and build infrastructure to transport feedstock, petroleum products and power to fuel growth in its domestic markets remains to be seen. What is clear is that the shortage of gas in Myanmar will remain an issue for ASEAN energy trade and security until new gas fields come on stream, though the timing and quantities involved remain uncertain.

It is also clear that Myanmar will require significant foreign investment and participation if it hopes to quickly bridge the energy and infrastructure gap. The country is certainly demonstrating that it is open for business (see Frontier Markets on page 54 for more). As Mr. Tun says, "Myanmar has great potential for investment in energy as well as in transport, labor-intensive industries and services. But we also need partners that can transfer knowledge, respect the environment, train our people and help Myanmar's businesses grow regionally."

Indonesia:

An emerging infrastructure opportunity

***Graham Brooke**, KPMG in Australia and Indonesia, discusses the challenges and opportunities of Indonesia's burgeoning infrastructure market.*

With growing concern about faltering growth rates within the BRIC countries, many infrastructure participants are now looking for the next big growth opportunity. Not surprisingly, Indonesia has risen to the top of the list.

STEADY GROWTH IN A SLOW GROWTH WORLD

Indonesia is already Southeast Asia's biggest economy – equal in size to that of Australia – and has enjoyed steady Gross Domestic Product (GDP) growth for the past 5 years. By 2030, the economy is projected to be the seventh largest in the world.[1]

But Indonesia did not emerge completely unscathed by the recent global economic slowdown. GDP growth, which hit 6.5 percent in 2012, sank to 5.7 percent[2] (still an enviable number when compared to many mature markets) in 2013.

A PLAN FOUNDED ON INFRASTRUCTURE

While – based on GDP growth alone – Indonesia may seem like another lagging growth economy, the reality is quite different. Sensing an economic slowdown, the Government of Indonesia introduced a robust plan of investment aimed at supporting economic stability and setting the stage for future growth. At the center of the government's plan is infrastructure.

Sources:

[1] http://www.mckinsey.com/insights/asia-pacific/the_archipelago_economy

[2] http://www.indonesia-investments.com/news/news-columns/analysis-what-caused-indonesias-slowing-economic-growth-in-2013/item1583

> The Government of Indonesia introduced a robust plan of investment aimed at supporting economic stability and setting the stage for future growth. At the center of the government's plan is infrastructure.

Central to the plan is the government's intention to lift the country's total capital expenditure on infrastructure by at least one percentage point of GDP by 2015. This is welcome news; Indonesia is currently ranked 82nd in the world in terms of overall infrastructure quality and in 2013 spent less on infrastructure (as a percentage of GDP) than their economically-smaller peers in Thailand and Malaysia.

A ROBUST PIPELINE; A MASSIVE OPPORTUNITY

Clearly, more will be needed. According to the National Development Planning Agency, Bappenas, Indonesia needs to spend approximately US$536 billion on infrastructure development between 2015 and 2019 to remain competitive. Of that amount, more than 20 percent is expected to be contributed through public-private partnerships (PPPs), creating massive opportunities for foreign and local developers and investors.

The list of priority projects for 2013 spans a wide range of sectors but particular attention has been placed on land transportation. Seven railway projects are on the books for 2013 for a total estimated project cost of around US$11 billion; seven toll roads are planned at a cost of US$4.65 billion; there is even a single toll bridge project currently estimated at US$25 billion. In total, Indonesia's 2013 pipeline is estimated to require some US$47 billion of investment.

IMPROVING THE INVESTMENT ENVIRONMENT

Some of this money may come from multilateral and bilateral sources. The government has been in talks with a range of aid initiatives including Australian Aid, the United States Agency for International Development (USAID), the Economic Research Institute for ASEAN (ERIA), the World Bank, the Asian Development Bank (ADB) and the Reconstruction Credit Institute (KfW) to see how aid dollars may help fill the existing gap.

The government hopes that private investment can be found to fill the rest. And they are making significant efforts to make the country more attractive to foreign participants. Some restrictions on foreign ownership have already been eased and government procurement processes have become much more transparent. Regulatory refinement has been ongoing and, when coupled with notable improvements in government capacity, has been instrumental in sustaining the country's recent track-record for attracting foreign direct investment.

RESPONDING TO INVESTOR CONCERNS

But Indonesia's government also recognizes that more must be done in two key areas critical to unleashing foreign investment in infrastructure: improving PPP legislation and clarifying land acquisition.

While progress on improving PPP legislation has certainly been slow, improvements are being made. Over the past decade since Indonesia passed its original PPP legislation (PR67/2005), numerous reforms and revisions have been made to improve the procurement process. The Indonesian Parliament has also passed a number of new laws aimed at streamlining processes and providing enhanced clarity on procurement and private sector development.

Yet despite increasingly supportive laws and regulations, most PPPs in Indonesia have been hampered by both technical and practical issues, most notably related to land acquisition. Here, too, the government has made important progress. In 2012, a series of complementary laws were enacted to better clarify the land acquisition framework and set out the technical implementation guidelines and rules.

ISLANDS OF OPPORTUNITY

We believe that Indonesia represents a market of outstanding opportunity for those able to capitalize on it. The evidence is clear: improving PPP and land acquisition regulation; a massive pipeline of projects; a large and growing population; improving economic and political stability; and a thirst for foreign investment and participation seem set to catapult Indonesia to the top of the agenda for infrastructure participants.

Observers may want to watch the development of the Soekarno-Hatta International Airport Link (SHIA) as a PPP project. Given the world-class standards set for the project, it will likely serve as a demonstration of the level of maturity of Indonesia's program. We hope it succeeds.

2013 PPP Book sector snapshot

Sector	Estimated project cost (US$ bn)	Number of projects	Percentage of total
Railway	11.12	7	23.5%
Land transportation	0.02	1	0.1%
Toll road	4.65	7	9.8%
Water supply	0.24	2	0.5%
Sanitation	0.24	3	0.5%
Toll bridge	25.00	1	52.8%
Power generation	1.34	1	2.8%
Sea transportation	3.72	3	7.9%
Air transportation	1.01	2	2.1%
Total	**47.34**	**27**	**100%**

Source: 2013 Bappenas PPP Book

Asia's 'frontier markets': Infrastructure opportunities in Mongolia and Myanmar

*A conversation between **Julian Vella**, Asia Pacific Head of Global Infrastructure, **Roddy Adams** and **Sharad Somani**, KPMG in Singapore.*

Few readers of this publication will have crossed through the arrival gate at Chinggis Khaan International Airport; fewer still have likely stayed at The Strand Yangon. Yet Mongolia and Myanmar are markets worth watching and – for those able to take a pragmatic long-term view – investing in.

The truth is that few markets can rival the pent-up potential held within these two Asian 'frontier markets'. Both are rich in resources; both are enjoying a period of rapid economic and political liberalization; both boast a growing population and a burgeoning middle class; and both offer a long list of potentially valuable infrastructure opportunities.

SPOTLIGHT

> The opportunity for foreign players is potentially massive. One need only look at Rio Tinto's investment in the Oyu Tolgoi mine to see how early-mover advantages can be achieved by those willing to take a long-term perspective on these frontier states.

DIFFERENT PATHS CONVERGING

Let's be clear: there is also much that separates these two developing countries. Mongolia, for instance, has enjoyed democratic rule for decades and, as a result, boasts some relatively mature institutions. Myanmar has only recently come back into international markets after enacting significant political reforms.

The two country's geography and population are also remarkably different. Myanmar is home to more than 60 million people and sits at a strategic junction between Thailand, China, Bangladesh and India (making it a key pivot point in the development of the Asian Economic Community). Mongolia counts a population of around 3 million and – while straddling a border between Russia and China – is often chided for being in the 'far north' and remote.

FUNDAMENTAL SIMILARITIES

While stark differences certainly exist between the two markets, both are wrestling with similar challenges – ones that severely hamper infrastructure development. For one, both countries now require significant levels of investment to upgrade much-needed infrastructure and extend services into rural areas. Development banks and aid agencies are doing their part, but private investment must also be found to fill the gap.

Preparing and delivering this massive pipeline of work will require both countries to also vastly improve their capabilities and institutional capacity; neither yet have the scale nor expertise to manage the entire infrastructure investment process from end-to-end, let alone to prepare projects for tender at international standards. Both markets will also require significant development of their domestic banking systems to support new investment into their economies.

Other equally fundamental changes must be catalyzed within these countries if infrastructure investment is to be unlocked. Legal systems will need to be further developed, particularly in the area of equitable dispute resolution. Regulatory environments need to be created and balanced from an economic, environmental and safety perspective. Domestic contractor and supplier markets need to form and mature.

SETTING THE RIGHT PRIORITIES

Infrastructure in these two markets will also need to be de-politicized. Indeed, both countries will need to focus on prioritizing infrastructure development onto those areas that will produce the greatest benefit in the long term rather than pouring funds into short-term or populist endeavors.

Mongolia, for instance, plans to build a rail line from the South Gobi desert to the border with Russia (largely as a demonstration of its desire for deeper relationships with Europe). Yet by far the majority of Mongolia's existing trade goes south – to China – where rail connections between the two countries are either poor, still under development or non-existent.

Similarly, Myanmar's reported decision to award lucrative telecommunications licenses ahead of any supportive regulatory environment may have sent a message that the government was taking action to improve the unreliable network, but the lack of guidance or regulation only created confusion among investors and – ultimately – may have slowed development overall.

A VALUABLE LONG-TERM OPPORTUNITY

Yet despite these challenges, we are optimistic about the long-term potential of Mongolia and Myanmar. The reality is that both countries contain significant reserves of important commodities and will require infrastructure to turn these resources into foreign exchange and (hopefully) sustainable economic growth both in the cities and the rural areas.

The opportunity for foreign players is potentially massive. One need only look at Rio Tinto's investment in the Oyu Tolgoi mine to see how early-mover advantages can be achieved by those willing to take a long-term perspective on these frontier states (although, to be frank, the protracted negotiations in respect of the Investment Agreement between the Mongolian government and Rio Tinto has caused some concern in international circles). But, if recent progress can be maintained, the critical need for infrastructure-related expertise, capacity and capability in both markets suggests that they are poised to become hot-beds of foreign investment and activity.

However, while we may be bullish on the potential of these two frontier states, we are also pragmatic. That is why we continuously remind our clients that – while opportunities are certainly emerging – success in these markets requires long-term commitment; to the country, to the markets and to the communities in which they operate.

Those chasing longer-term growth opportunities over the next 5 to 10 years may want to start establishing themselves in these markets sooner rather than later.

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FINANCING China's urbanization:

An interview with Professor Sun Jie from the Research Institute for Fiscal Science of the Ministry of Finance

China is clearly in the midst of both the largest and the fastest economic transformation in human history. Millions of people have relocated to China's urban areas over the past 30 years; some 400 million more are expected to follow over the next 20 years. The big question is how China's various levels of government will finance all of the infrastructure that will be required to integrate the growing urban population.

THE VALUE OF URBANIZATION

Urbanization is central to China's next wave of growth and development. According to Zhang Ping, Head of the National Development and Reform Commission (NDRC), urbanization is "the biggest potential force driving China's domestic demand in the years ahead."

Essentially, China is deliberately moving from a capital investment-driven Gross Domestic Product (GDP) model to a more consumer demand-driven model. But this shift will largely rely on the country's ability to create efficient, productive and socially-attractive cities. Some suggest that over the coming decades, China will need to invest around US$6.4 trillion into its cities for its urbanization agenda to be successful.

Recently, **Anni Wang**, KPMG in China, had an opportunity to speak with **Professor Sun Jie**, Secretary-General of the Public-Private Partnership Research Committee within the Public Finance Academy of China's Ministry of Finance to learn more about the key drivers of China's urban development strategy.

Anni Wang (AW): *What has changed in the way that China approaches urbanization?*

Prof. Sun Jie (SJ): The urbanization which the central government is promoting is very different from pure city development. We used to put our developmental focus on cities, especially mega-cities such as Beijing, Shanghai and Guangzhou. Now the central government is promoting the idea of 'new-type urbanization', which allows them to put more focus on the development of small cities and small towns, and to improve their infrastructure and public services.

There are now two mainstream views of urbanization in China. One is to urbanize the 'migrant worker' population by inviting them to live in the cities; the other is to develop villages into towns and towns into cities. Either way, we will need a lot of investment in infrastructure. If we divert populations to the city, the city will expand, the needs for public services infrastructure will increase and the investment will expend.

I think that the existing infrastructure, including water, sewage, garbage treatment, gas, heating, electricity and basic public transport facilities, should be a priority for government to manage alongside the process of urbanization.

AW: *Financing and funding of infrastructure is clearly an important issue in China. What has caused the issue to rise up the agenda?*

SJ: Infrastructure is the foundation of social and economic development, regardless of social and economic status. We are striving to improve local infrastructure to push through the bottleneck of development, even if it means raising debts. There are some reports that suggest China's debt is too high, but it is important to note that China's debt structure is different from the West. We spent our money mainly on infrastructure construction and economic and social development while in Europe, for example, they are using debt to solve resident welfare issues which, ultimately, derive no direct revenue.

Apparently, our debt is high, but since our capital was invested in infrastructure projects, many of which will derive revenue in nature, then the risk we are bearing should be far lower than the risks that European countries will bear.

AW: *What role does the Public-Private Partnership Research Committee within the Public Finance Academy of China's Ministry of Finance play in supporting infrastructure finance?*

SJ: We are a professional academic and research institution and do not have any

financing duties. Our goal is to facilitate the exchange of academic and scientific research results. When local governments need help with their projects, the committee will introduce them to helpful member companies. At the same time, the committee will help the local government design their infrastructure projects into a more acceptable and implementable public-private partnership (PPP) project to attract investors.

We have established a think-tank to provide policy advice for the government, while scientific research conducted together with the Asian Development Bank is currently ongoing. We have also launched training programs to help businesses, governments and interested investors better understand China's PPP methodology and its operations.

***AW:** How would you characterize the current pipeline of infrastructure opportunities available for private participation? Is there room for foreign players to take part?*

SJ: In the past, foreign investors actively participated in many PPP projects in China. But the situation has gradually changed with the rise of a strong domestic investor sector. However, current PPP projects tend to have higher levels of demand and requirements; rather than just being a means of financing, it actually involves the entire project management process.

For developers and operators, this could be a great business opportunity. China's domestic private capital has become increasingly abundant over the past 20 years of development, so this creates a greater space for development. For foreign investors, this means that their advantage of being able to deliver significant capital for major projects has gradually weakened, while their advantages in providing management techniques and access to international capital markets have increased.

However, local enterprises understand the local market and how to operate locally better than their foreign competitors. Therefore, it is hard to say that one party has the absolute advantage; the key is how to leverage their advantages respectively.

***AW:** Are you optimistic about the future of China's urbanization?*

SJ: Urbanization has been a very important part of China's development strategy and is related not only to social development, but also to the future of China's economic transformation. Urbanization is not only about moving people from agricultural households into urban residents; it's also a critical means to ensuring the stable and rapid economic growth of our country.

Our rapid economic development of the past 30 years has created a large market and an increasingly affluent and urban population, so demand can be transformed into real purchasing power. This could be a way of advancing urbanization as well as the way of promoting sustainable development for the whole society.

“The urbanization which the central government is promoting is very different from pure city development.

Professor Sun Jie, Research Institute for Fiscal Science of the Ministry of Finance

Reforming Japan's energy markets

***Mina Sekiguchi** and **Shuji Miyasaka**, KPMG in Japan, discuss the current state of Japan's energy reform with **Nobuo Tanaka**, former Director General of the International Energy Agency (IEA) and former Director General at Japan's Ministry of Economy, Trade and Industry (METI).*

While the long-term impacts of the March 2011 disaster at Fukushima are still being debated, Japan has started to take decisive steps to reform their energy markets. We believe the reform roadmap will bring about greater energy security, competition and investment opportunities for those operating both in Japan and in the wider regional energy markets.

UNDERLYING ISSUES EMERGE

In the days and months that followed the March 2011 earthquake and subsequent tsunami, much of Japan's population suffered from rolling power blackouts.

With much of the finger pointing being directed at the Fukushima nuclear plant, Japan's energy regulator – the Ministry of Economy, Trade and Industry (METI) – quickly recognized that many of the real problems within the system were actually the result of the country's traditional regional monopoly system.

"What Fukushima made clear was that Japan was overly reliant on nine regional power companies and just two or three generation technologies, which ultimately left the country in a very weak position

> To truly achieve energy security and greater competition, Japan must follow Europe's example and start thinking about its collective regional energy security rather than just its domestic security.

Nobuo Tanaka, former Director General of the International Energy Agency and former Director General at Ministry of Economy, Trade and Industry (METI)

following the accident," noted Mr. Tanaka, former Director General of the IEA and a former Director General at METI.

A NEW APPROACH TO ENERGY SECURITY

Based on these findings, Japan's Cabinet approved the Policy on Electricity System Reform in April 2013, which set out a realistic step-by-step schedule focused on three main areas: the creation of cross-regional coordination between transmission operators; the encouragement of full retail competition; and the unbundling of the transmission and distribution sector.

"Many of the key issues are intertwined," added Mr. Tanaka. "Changing the energy mix to include renewables will require more interconnected networks to balance out the variable base loads but this, in turn, will require greater competition to encourage independent power producers and the unbundling of the distribution network."

TAKING A REGIONAL VIEW

While Mr. Tanaka firmly believes that METI's energy reform program will achieve many of its objectives, he also stresses the need for Japan's market to become more integrated regionally. In particular, he points to the success of Europe's energy market integration.

"When Germany decided to phase out nuclear generation while dramatically increasing renewables, they were able to rely on their neighbors to fill any gaps or troughs that the domestic system experienced as a consequence," said Mr. Tanaka. "To truly achieve energy security and greater competition, Japan must follow Europe's example and start thinking about its collective regional energy security rather than just its domestic security."

Greater competition and more regional cooperation will also encourage greater participation from foreign participants which, in turn, should add further strength to the market and reduce costs for consumers. The introduction of new generation capacity – particularly from renewable sources – will require significant technology, products, infrastructure and capabilities, all of which could be provided by foreign players.

"This kind of competition is most welcome in Japan and should help make our domestic market more competitive and secure," added Mr. Tanaka. "I think that, while Japan's energy market may not be growing as fast as China's or India's, there are still plenty of opportunities available in what is widely seen as a very stable environment."

THE NUCLEAR QUESTION

Of course, the outcome of the ongoing debate surrounding the use of nuclear power in Japan's energy mix will have a significant outcome on the country's markets. Today, Japan imports approximately US$40 billion worth of gas and oil to fill the gap left when its nuclear generators were shut down. Returning some of the remaining assets into operation would go far to helping improve the country's balance of energy trade.

Mr. Tanaka is optimistic that nuclear generation will eventually come back online. "We hope in the short term some of the reactors may start running and that will pave the way for other reactors to gradually come back online. But just how much of the original capacity will come back and how fast we can bring it back online is still a big unknown," he added.

Fostering positive population growth in Asia:

The ADB and multilateral banks

Henry **Antonio**, KPMG in the Philippines, sat down with **WooChong Um**, Officer-in-Charge of Regional and Sustainable Development at the Asian Development Bank (ADB), to discuss the role of multilateral banks in coping with population growth and infrastructure development.

As home to more than 60 percent of the world's population, Asia is currently experiencing one of the world's highest growth rates and, with it, significant demographic shifts.

According to Mr. WooChong Um, continued growth in the region will have both a positive and a potentially negative impact. "On the one hand, population growth increases demand on existing natural resources, imposes additional pressures on the environment and tests the capacity of already overcrowded cities to function effectively," he noted. "But on the other hand, more people also means more workers who can contribute to the economies of the world's most dynamic region."

SUPPORTING INCLUSIVE GROWTH AND REDUCING POVERTY

The ADB expects much of the population growth in Asia over the next two decades to take place in middle-income countries. As a result, the development bank is placing significant attention on these markets. "In lower middle-income countries we are focused on supporting inclusive growth, infrastructure development and better governance, while in countries categorized as upper middle-income our focus is more on providing catalytic solutions, being a partner in finance and a source of knowledge and innovation," added Mr. Um.

But the multilateral organization is also very focused on eradicating extreme poverty and reducing vulnerability and inequality. "The fact that 1.6 billion people in Asia live on less than two dollars a day is unacceptable," said Mr. Um. In response, the ADB is financing a wide range of initiatives, including infrastructure projects that connect poor people to markets and increase their access to social services. To support these investments over their lifecycle, the ADB also pursues policy, regulatory and governance reforms to strengthen public infrastructure management systems and promote the role of the private sector.

CREATING SUSTAINABLE SOLUTIONS

In particular, the ADB worries that population growth will put strain on the region's underdeveloped transportation networks. So they plan to spend almost US$30 billion over the next 15 years to support transport, with an increasing emphasis on sustainable transportation.

"We are boosting support to low-carbon and environmentally sound modes of transport, including public transport and non-motorized transport; an increasing share of our support to the transport sector will be made up of railways and inland waterways," noted Mr. Um. "For example, we have been assisting the Government of the Province of Sindh, Pakistan in its efforts to implement a bus rapid transit corridor and strengthen institutions and organizations managing the urban transport sector."

Recognizing the dire predictions made in the UN's recent report on the impacts of climate change *(Climate Change 2014: Impacts, Adaptation and Vulnerability)*, Mr. Um points out that the ADB is also investing heavily into clean energy and systematically screening their investments to identify those most at risk of being adversely affected by climate change. "We are fostering partnerships to share knowledge and good practices in addressing climate change, and facilitating access by our developing member countries to expertise on climate risk and vulnerability assessments," he added.

SPOTLIGHT

> The ADB encourages governments to formulate integrated plans that address both the needs of growing populations and their known climate risks and then work with us to help build their resilience to this confluence of challenges.
>
> **Mr. Um,** Officer-in-Charge of Regional and Sustainable Development at the Asian Development Bank (ADB)

NEW PRODUCTS, APPROACHES AND FOCUS AREAS

Besides investments into hard infrastructure such as transportation, the ADB is also working to ease the impact of population growth in Asia in a number of ways. For example, the organization plans to commit about US$2 billion annually to remove constraints to food security and reduce the vulnerability of poor populations to rising food prices. To reduce vulnerability to natural hazards, the ADB is expanding its support for integrated disaster risk management and the development of disaster risk financing instruments.

"We're currently in the midst of a medium-term review of our long-term strategic framework for 2008-2020 and, as a result of this review, we also expect to substantially increase our financing for education, health and social protection, all of which are critical to supporting growing populations," added Mr. Um. "We are also strengthening our support for scalable inclusive business models that provide livelihood opportunities and essential goods and services to lower income populations."

Yet the ADB also recognizes that the scale of investment required to support the growing population is beyond the financial capabilities of either national governments or multilateral banks. That is why the organization is exploring the creation of an Asia Pacific Project Preparation Facility to help support the development of projects that require a larger scale than the ADB could provide on its own. The organization also hopes to expand their ability to provide local currency financing solutions and make use of credit enhancement products.

Mr. Um has one piece of important advice for government leaders seeking to manage massive population growth in Asia. "The ADB encourages governments to formulate integrated plans that address both the needs of growing populations and their known climate risks and then work with us to help build their resilience to this confluence of challenges," he suggests.

Infrastructure's wicked problem

A society must live within its means and make investment decisions that reflect the reality of its economy without overburdening future generations. Separating the infrastructure society wants from the infrastructure it needs is a judgement call.

*By **John Kjorstad**, KPMG in the UK*

If there was one infrastructure problem you could solve, what would it be?

Infrastructure is an economic enabler, not a panacea. Too often, the benefits of a high-profile project are amplified, oversimplified or politicized – carrying with it an enormous weight of expectation that the asset will single-handedly transform an economy.

Rome was not built in a day, and an empire didn't spring from its famous aqueducts alone. Likewise, I sincerely doubt Arthur Powell Davis ever predicted a sleepy rail town called Las Vegas would become the "entertainment capital of the world" if the United States Government would only invest in his designs and build what would later be known as the Hoover Dam. No one in 1902 could have anticipated that cheap hydroelectric power and liberal gaming laws might combine to light a beacon and draw millions of visitors from all over the world to a neon strip in the desert.

Infrastructure is a holistic concept. The sum of many interdependencies that make up the essential services a civilization is able to provide its people. These services do not create an economy, they facilitate one. Infrastructure gives a society its best chance to succeed. It makes our lives more efficient so that we can be more productive with our time.

Justifying investment in infrastructure is often a challenge. The International Centre for Infrastructure Futures calls it a "wicked problem" – or one that is difficult or impossible to solve because of incomplete, contradictory and changing requirements that are often difficult to recognize.

A society must live within its means and make investment decisions that reflect the reality of its economy without overburdening future generations. Separating the infrastructure society wants from the infrastructure it needs is a judgement call. Public leaders tasked with this decision are essentially conducting a beauty pageant in order to prioritize investment opportunities. They will typically reward the most economical projects – those that are self-sustaining with predictable, well-defined cash flows.

However, beauty is in the eye of the beholder. How do you measure the full economic impact of human capital created in a school or preserved in a hospital? How would you qualify or define value-for-money?

What return does society expect from its infrastructure investment?

There is no simple formula to answer any of these questions – and no Frank Capra treatment to ponder what life might have been like if infrastructure had never been built. We mostly have empirical evidence gleaned from centuries of operating and maintaining our existing estate. So in the absence of definitive data, let's pose a philosophical question: If there was one infrastructure problem you could solve, what would it be?

Many of us might focus on situations where poverty amplifies the importance of critical infrastructure. Even this is not an easy choice. For example, do you build affordable housing to replace a dense urban slum? Or focus on waste management to remove the rubbish piles next to that slum. Health is a concern, so perhaps you aim to provide public toilets and clean water from effective treatment facilities that eliminate pollution in the river nearby. Or you choose to address the issue of unemployment and provide tangible skills training, basic education and financial support for small businesses. You soon realize that all of your efforts are hindered if you cannot reliably provide enough energy to support these developments. The cheapest power source may not be the cleanest, so while you may solve one problem you may actually create or add to another.

This is the complex world of infrastructure where so often we think in terms of single projects rather than holistic solutions. The utopia our leaders seek is not within an individual asset, but a symphony of cost-efficient public services conducted in harmony to improve our overall quality of life.

Infrastructure requires a comprehensive plan of action, and strong communication across its networks. This naturally exists in most political systems, but our true understanding of the interdependencies of infrastructure and effective governance thereof is woefully lacking. How joined-up is the thinking across departments? How coordinated is the management? What happens when services collide?

For example, a health authority might like to build a new hospital near an existing one in a city center to consolidate and concentrate its services; however, the local transport department might prefer such a facility is built near important motorway connections or a passenger railway hub to avoid congestion and account for future demographic shifts. At what point in the planning process do the two departments open a dialogue to discuss the project, and who bridges the gap between their diverting agendas? What other interdependencies, such as the power grid or water supply, will be impacted by this decision?

As Bob Dylan might say, "the answer my friend is blowin' in the wind." It varies widely from government to government. The US, for example, learned a lot about interdependency in infrastructure in the aftermath of Hurricane Katrina in New Orleans. The federal government has taken actions to address it through the Department of Homeland Security and its National Infrastructure Simulation and Analysis Center (NISAC). How many other governments are being equally proactive?

Wicked as it may be, there is no one infrastructure problem to solve; but the problems we have may have overlapping solutions. The earlier this is recognized, the earlier it can be addressed. The earlier it is addressed, the more cost-effective the final solution can be.

Emerging trends, markets

the world of

and ideas that can change infrastructure

*As KPMG professionals meet with infrastructure leaders around the world, they are frequently asked which trends will shape the sector over the near-term. Here are 10 trends – and some interesting markets and projects to watch – from KPMG's Global Infrastructure leaders **Nick Chism**, **James Stewart**, **Julian Vella** and **Stephen Beatty**.*

TREND 1: POPULATION DRIVES DEMAND

The challenge of moving projects from development into procurement has likely been the hottest infrastructure topic over the past few years. But, while much debate has been had, little progress has been made.

If governments hope to stay ahead of increasing demand, however, they will need to take action now and commit investment decisions. The rise in demand is unyielding: populations are steadily increasing and – in the developing world – urbanization is rapidly becoming the norm. Yet, while there should be no doubt that more infrastructure will be needed, many governments seem ill-equipped or unprepared to manage the program of work required.

This is a shame. The reality is that any lack of clarity on how to pay for infrastructure will result in projects lingering in the development pipeline when they should be moving forward.

TREND 2: INVESTMENT CATALYZES GROWTH IN DEVELOPING MARKETS

There should be little doubt that infrastructure represents a path to economic growth. But achieving the required improvement in infrastructure will cost dearly; Asia alone is thought to need some US$11 trillion in basic infrastructure investment between now and 2030.[2] Africa and Latin America may require substantially more.

Not surprisingly, these new markets continue to be the focus of growth for many infrastructure players as companies push the boundaries of their traditional markets to develop projects and sell materials in faster developing jurisdictions. We've also seen increasing outbound capital from investors in Japan, South Korea and China making a strong push into lucrative global markets, and we expect this to continue in 2014 and beyond.

TREND 1
Market to watch

Brazil

Brazil has invested heavily in stadiums, transport and urban regeneration in the run-up to the 2014 World Cup. The impressive scale and pace of public investment will continue in the near-term as the country prepares for the 2016 Olympic Games in Rio de Janeiro.[1] The challenge for Brazil will be to transfer this momentum to the wider infrastructure program while international investors wait for much anticipated market reforms to be implemented.

TREND 2
Market to watch

Africa

There are several rapidly emerging markets for infrastructure investment in Africa, with many countries enjoying long periods of political and economic stability. While it seems that the continent has turned a corner in recent years with countries like Nigeria, Kenya and South Africa carving out expanded roles in the global economy, affordable power and clean water remain critical issues that need to be addressed, with improved education and healthcare not far behind.

TREND 3 Market to watch

India

While India has made solid commitments to infrastructure, creating a robust domestic market for private investment, the country will undergo a critical election in 2014 that will shape its future for the next 5 years. If the new government comes with a strong mandate to get the slowing Indian economy back on track, we can expect an uplift of business sentiment, pro-growth policy reforms by the government and fast decision-making by the bureaucracy.

TREND 4 Idea

Creating sustainable sources of funding in Canada

Public authorities around the world are looking for creative ways to sustainably pass the cost of building infrastructure on to those who will benefit the most. In Toronto, for example, a provincial government-appointed industry panel supported by the private sector has recommended raising local gasoline and corporate tax rates to fund congestion-reducing transit improvements,[3] similar to the structure in place for London's Crossrail.

TREND 5 Idea

Decoupling politics from infrastructure in the United Kingdom

The decoupling of infrastructure and politics is a widely debated topic in many countries and very few have found an effective solution. In the UK, a review of infrastructure planning released in September 2013 suggested that Britain should set up an independent commission to plan long-term infrastructure and keep major projects from being derailed by political infighting.[4] Sound advice, but ironically muffled by the fact that the report was commissioned by the shadow government.

TREND 6 Idea

Successful urban funding models in India

Recognizing the need for a coordinated regional approach to development, the state government created the Mumbai Metropolitan Region Development Authority to take a lead role in preparing infrastructure development plans, formulating policies and programs, implementing projects and helping to direct investments in the region. When it was created, the agency was given large tracts of valuable land which are now leased out with the resulting revenues used to finance infrastructure projects.

TREND 3: COAXING OUT THE NEW MODELS

One area that will require significant attention over the next few years will be the development of new infrastructure models to better recognize long-term objectives and lifecycle value. Unfortunately, new funding and finance models have been slow to develop and the institutional debt market has made less progress than anticipated.

But new models must emerge if deal flow increases as expected and capacity in the financial markets comes under significant pressure. We believe that this, coupled with the need to finance complex assets such as nuclear power and high-speed rail, will ultimately force new models to emerge.

TREND 4: PEOPLE WILL PAY, BUT WHAT CAN THEY AFFORD?

The affordability of infrastructure continues to be a major issue as governments strive to shift the cost burden to the end-user and cost reduction continues to come more sharply into focus. In their struggle to cope with increasing demand and get the funding balance right, many governments concede that they cannot go it alone. Difficult political decisions need to be made.

The reality is that consumers in recovering economies are still feeling the economic pinch while, in the developing markets, 'affordability' is often a question of survival. This is where the private sector can lend support by proactively identifying potential solutions. More could be done to accurately reflect the long-term benefit and value of developing infrastructure – particularly analyzing all of the wider economic impacts and providing that critical link to economic growth.

TREND 5: RELEASE THE PROJECTS

While many governments publish their infrastructure pipeline, the reality is that a significant number of the projects they contain are stuck in the development and approval stages. However, some progress is being made as multilaterals and other public sector finance institutions increase their support.

The Asian Development Bank, for example, has completely changed its engagement model to focus more on assistance during the development stage of a project. Development finance institutions operating in Latin America and Africa have started to offer project development facilities to support feasibility studies and other early-stage development. And in Europe, the European Investment Bank deployed its Project Bond Initiative in Spain, while Infrastructure UK actively promoted a new British government guarantee scheme targeting similar long-term capital.

TREND 6: CITIES ARE STILL THE FUTURE

With urbanization as the norm in many developing countries, the prominence of cities is once again driving the infrastructure development agenda for regional and even national governments. However, the debate has now started to shift from the fashionable concept of smart cities driven by technology to sound planning practice with viable housing and employment opportunities woven into the urban fabric.

At its root, this is an integrated discussion about creating effective and efficient urban environments and placing sustainability, strong transportation links and an improved quality of life at the core of the conversation. But blue tarpaulins are not a long-term roofing solution. Governments must focus on three key aspects to avoid shanty towns and runaway urbanization – smaller cities (satellites as opposed to megacities), protecting work/life balance and developing rural economies.

TREND 7: THE WAR FOR TALENT IS MORE PRONOUNCED

Clearly, the more successful governments become at unlocking projects, the greater the demand will be for project managers, engineers and a wide range of other infrastructure skill sets. But with an emphasis on execution in 2014, the war for talent is more of a problem today than ever before.

Yet while some countries (particularly China) are being proactive in developing capacity and managing it forward, we believe that the issue is not being addressed well enough and will remain one of the greatest drags on the world's ability to meet growing infrastructure challenges. So while some targeted training programs are being established in both corporate and academic campuses, we believe the focus must now turn to governments to start supporting and promoting appropriate skills training.

TREND 8: ASSET OWNERSHIP IS DIVERSIFYING

Historically, governments have been the principal owners of infrastructure, with very few exceptions. But with the emergence of direct pension investors and dedicated infrastructure funds, ownership is now diversifying as long-term buy-and-hold investors build market share alongside infrastructure funds, traditional owners and shorter-focused private equity investors. Government and regulators will be challenged to stay ahead of such a diverse set of owners.

The positive side of this asset diversification is stronger competition and better asset management. Increasingly, the new owners want to be more active in their portfolio of investments and are hiring infrastructure management expertise to drive operational and capital efficiency. This should lead to better maintenance and utilization as long-term investors seek to maximize the usable lifespan of a project.

TREND 9: ENERGY GOES BACK TO THE FUTURE

With investment decisions increasingly being driven by cost and the economy, many governments are supporting the view that a diversified mix of energy sources will be needed long into the future. Indeed, the reality is that coal and gas-fired power stations will need to coexist alongside wind farms and solar projects; coal is abundant and remains a massive part of new generation almost everywhere in the world outside Western economies.

Other sources are increasingly making up a greater part of the mix. Shale gas has already caused dramatic disruptions in international energy markets, and will continue to alter new generation developments in North America, while governments from the United Arab Emirates to the United Kingdom will continue to pursue nuclear energy. And, wherever power demand and unexploited resource coexist, large-scale hydro will remain attractive.

TREND 10: TRANSPARENCY RISES UP THE AGENDA

Managing corruption and bribery is one of the many challenges facing governments, investors and their advisors today. In many cases, what should be black and white is often grey. It is not just about procurement; it includes the potential abuse of market power (monopoly), degradation of the environment and so on. At least two major global infrastructure companies have recently been embroiled in corruption crises.

Corruption (broadly defined) is a barrier to developing a consensus on the need to invest, how to invest and attracting infrastructure investment. Attitudes against it are hardening. This, alongside the need to demonstrate value-for-money, will drive the political agenda for greater transparency in infrastructure. Yet this is only part of the drive for greater transparency. While debating the merits of potential projects, transparency is an important ally for building a stronger business case for infrastructure investment.

TREND 7

Idea

Developing skills and capability in the

United Kingdom

Opened in 2011 by Crossrail and supported by the British Government,[5] the Tunnelling and Underground Construction Academy (TUCA) in London reflects a recognition that the volume of tunneling and underground work planned for the city (projects like the Thames Tideway Tunnel and, potentially, High-Speed 2) was unprecedented and demanded a unique skill set that was already in short supply. It is expected that TUCA will train at least 3,500 people in underground construction alone over its lifetime.

TREND 8

Market to watch

China

China has invested heavily in its own infrastructure and is currently exporting that capacity internationally. As the country's sphere of influence continues to grow, it has developed a more collaborative approach to outbound investment. And while inbound infrastructure investment opportunities for foreign companies in China remain limited and difficult to execute, there may be some light at the end of the tunnel as discussions about a domestic public-private partnership (PPP) program develop.

TREND 9

Coming soon? Data drives more effective and efficient infrastructure

As the pace of technology quickens, governments and the private sector are collecting more data about infrastructure than ever before. Yet surprisingly, we have yet to really see anyone bring data and analytics together and effectively utilize them to better plan, deliver, operate and maintain infrastructure. We believe that the sector will soon recognize that the value of data is no longer in the ability to create and store it, but rather in the insights which can be derived from it.

Sources:

1 *http://www.austrade.gov.au/Export/Export-Markets/Countries/Brazil/Industries*

2 *http://www.linkedin.com/today/post/article/20131211014357-265091024-10-trends-that-will-affect-business-in-2014?trk=mp-reader-card*

3 *http://www.theglobeandmail.com/news/toronto/panel-recommends-gas-tax-hike-to-help-fund-toronto-area-transit/article15910196/*

4 *http://www.yourbritain.org.uk/uploads/editor/files/The_Armitt_Review_Final_Report.pdf*

5 *http://www.crossrail.co.uk/careers/tuca*

Integrating India's infrastructure:

The Adani Group shares the secret of success

Having started operations with just one berth in the North-West of India in 1998, the port of Mundra, part of the Adani Ports & Special Economic Zone (APSEZ), is now India's largest and is widely considered to be one of the world's most integrated multi-purpose and multi-cargo commercial ports.

To find out how this tremendous success was achieved in such a short span of time, **Sameer Bhatnagar,** KPMG in India, sat down with **Gautam Adani**, Chairman of the Adani Group.

Sameer Bhatnagar (SB): *Many regard you as India's King of Ports. How has your business model set you up for success?*

Gautam Adani (GA): It is our belief in an integrated business model that has been the key to our success. Each of the dimensions we focus on feed off each other: ports require rail linkages and the more cargo you attract to the ports, the more economically feasible the rail investment becomes. Being able to offer land around the port which connects to the rail line allows industries to further capitalize on the supply chain advantages offered by our facilities. Ultimately, it's this strategic virtuous cycle that capitalizes on the integrated business model which has been the springboard for our success.

It is this model that has allowed our group to grow tenfold in the past 10 years. We are now the number one player in India across every one of our market segments, be it ports, power, agribusiness, mining or coal trading. The port at Mundra is India's biggest, having handled 100-million metric tons of cargo in 2013 and has been the catalyst for our growth.

SB: *Creating such a large development to high international standards in such a short period of time must have been challenging. What were some of the challenges you faced over the past 16 years and how have you overcome them?*

GA: Most of the big challenges we faced were the result of being the 'first-mover' in the Indian market. Policies were often still being formulated by the government and we did not have the brand recognition as a major player in these sectors, so it was often difficult for us to attract the best industry talent.

Our own internal priorities have also created unique challenges. For example, we are very focused on speed of execution and therefore it was difficult to find suppliers who could meet our timelines as well as the high standard of work expected. We were also focused on creating capacity well ahead of demand which creates significant risks, particularly if the economy were to stall.

I think our greatest success in overcoming these challenges was – and continues to be – achieved by empowering our people and trusting them. Many of them initially were new to these types of businesses and had to learn on the job. Looking back, this brought certain advantages: our team wasn't hampered by preconceived notions of how things should be done or what their role entailed. They took a fresh perspective on everything they did, and just believed they could make this happen. One of the results is the Mundra Port.

SB: *How did that 'first-mover' advantage impact or influence the benchmarks you monitored during development and operations?*

GA: Given our first-mover status, many of our benchmarks are focused on speed of execution rather than comparing against other similar projects. In fact, speed of execution has been our mantra from the beginning and it is something we won't compromise on – even if it means spending more to meet our timelines. As a result, we tend to deliver projects a third faster than traditional similar builds anywhere in the world.

Another area that we were very clear about is the level of automation, use of technology and quality of our equipment. It is easy for people to pigeon-hole India as a country built on low-cost labor; but the reality is that our ports are as automated as any of the best around the world. We are constantly evaluating what technologies and equipment our competitors are using to ensure that we always offer the best in class. There is no compromise on this technology front. We were clear we would set our own path here.

Overall, based on my own personal journey, I strongly advocate leading organizations be their own benchmark. Benchmarks can often be limiting because, once people hit the benchmark, they tend to stop trying to improve further. I have found that there's absolutely no limit to what ordinary people can accomplish if they're given the opportunity and the encouragement. Our people are the best testament to this.

SB: *Do you have any advice for foreign players seeking to enter the Indian marketplace?*

GA: I would say that foreign players need to plan long term and think locally if they want to succeed in this market. Over the next three decades, India will be one of the world's top three markets for literally everything related to infrastructure. Those interested in participating in this boom should start planning now; those that succeed in this market will have patience, will take a longer-term view and will partner with local organizations to accelerate their learning about the Indian market.

Long-term thinking is also important for growth. I believe that, only when you think in the long term can you think big and not be restrained in your vision. Over the past few years, many businesses seem to have moved away from this belief and have actually created opportunities for those companies that refuse to be shackled down by short-term goals.

SB: *Can you share any of your future plans for the Port and the Group?*

GA: Our vision is to be a globally-admired integrated infrastructure company and every step in our journey of connecting ports to power plants to mining has moved us towards increased alignment with our vision. By 2020 we want to be producing more than 20,000 megawatts of power; extracting 200 million metric tons of coal from our own mines; and managing 200 million metric tons of cargo at our own ports – all seamlessly integrated. In fact, we now expect to achieve our 200 million metric tons of cargo goal by 2017 and are in the process of revising this target for 2020.

Also, our recent acquisition of Australia's Carmichael coal mine (which, at peak production can produce 100 million metric tons of thermal coal annually) and the Abbot Point Port not only represents the largest investment from India into Australia ever, it also allows us to unlock enormous resource potential and increase traffic through our other facilities and ports.

I firmly believe that we will remain the top domestic private player in all of our core business sectors across resources, logistics and energy. As we grow, I also expect that we will expand into other areas adjacent to our core as we come across new business opportunities. We are only just starting on our journey to integrate infrastructure across India. I am certain that Adani Group will play a leading role in that transition and therefore do its part in nation-building.

Gautam Adani is a first-generation entrepreneur and the Chairman of the US$9 billion India-based Adani Group, a globally integrated infrastructure company. The group operates in three business verticals: resources, logistics and energy.

Adani Enterprises Ltd. has been rated amongst 50 top-performing Asian Companies by Forbes magazine

UK's Electricity Market Reform

Twists and turns (and a few bumps) in the road to implementation

*By **Anurag Gupta**, KPMG in the UK*

As many readers will already know, the UK Government kicked off an ambitious re-design of the way it supports low-carbon generation in 2011 with a white paper laying out the vision for Electricity Markets Reform (EMR). Three years – and a lot of hard work – later, it now looks like the reform is likely to be fully implemented by the end of 2014. But what has changed in the meantime and what will the implications be for UK energy market participants?

EMR – A BRIEF RECAP

The government's energy policy seeks to meet the energy 'trilemma' of ensuring a secure energy supply, meeting statutory decarbonization targets and keeping the cost of energy affordable for consumers. At the same time, the EMR also seeks to design an investable opportunity in low-carbon generation that provides some certainty around expected revenues (while still complying with EU State Aid guidelines and preserving free market dynamics).

THE TWISTS, TURNS...

While the government still publicly maintains that all three 'trilemma' factors are equally important, security of supply remains chief among them with a focus on affordability.

In September 2013, opposition leader Ed Miliband pledged to freeze energy prices until 2017 if his party wins the general election in 2015. Three months later, the coalition government pledged to cut energy bills by GBP50 a year, via a series of measures, including a slash in green taxes for gas and electricity firms.

The announcement by the Competition and Markets Authority of a review of the Big Six utilities on claims of anti-competitive pricing has moved the energy market near the top of the political agenda.

Anurag Gupta, KPMG in the UK

The announcement by the Competition and Markets Authority of a review of the Big Six utilities on claims of anti-competitive pricing has moved the energy market near the top of the political agenda.

Against this backdrop, it is hardly surprising that some recent EMR tweaks appear to be affordability-driven. Here is a summary of what has changed:

- **Carbon Price Floor (CPF):** When first announced, the Department for Energy and Climate Change (DECC) had set a minimum price for carbon emissions from electricity generation by 'topping-up' the price of CO_2 per ton with prices rising over time. However, in the most recent budget speech, the UK Chancellor announced a cap on the price that would stand for the rest of the decade, noting that the future trajectory would be reviewed later in the decade. This has three broad implications: first, it highlights the potential policy risk that investors face in the UK; secondly, it creates new budgetary challenges for developers looking to secure Contract for Differences (CfDs) for future projects; and thirdly, post-CfDs it exposes low-carbon generation to market prices now reflecting even greater uncertainty on carbon pricing.
- **Contract for Differences (CfDs):** Due to higher-than-anticipated interest in the CfD program, the government announced in January that – rather than use a first-come-first-serve allocation method – it would instead offer two allocation rounds per year for all low-carbon technologies. The government has also grouped technologies into either 'established' or 'less established' categories, with a view to allocating CfDs to the 'established' group via a competitive sealed-bid auction. And while the government intends to set the amount of budget available depending on the allocation and the technology group, there is no indication yet whether budget will be ring-fenced for any 'less established' technology.
- **Capacity Market:** When first announced, many in the industry considered the non-performance penalties proposed on generators holding capacity contracts to be, in the words of one industry participant, "draconian and ruling out our participation". The proposal's 10-year cap of capacity contracts was also seen to be a deterrent to unlocking investment. In response, the DECC has recently made a number of changes, including: offering 15-year agreements for new capacity; confirming existing capacity access to rolling one-year agreements (three years if refurbishment is required); capping penalties at 200 percent of monthly and 100 percent of annual income; and capping the capacity auction at GBP75 per kilowatt hour.

These announcements are welcome developments and should help unlock the necessary investment to tackle the UK's looming capacity shortage. The first capacity auction will take place in December 2014, subject to State Aid clearance being received, and two transitional auctions for demand side capacity will occur in 2015 and 2016. This will help grow the demand-side industry and ensure effective competition between traditional power plants and new forms of capacity.

When first announced, the EMR consisted of four policy measures:

1. The Carbon Price Floor (CPF) – sets a minimum price for carbon emissions from electricity generation in the UK by 'topping-up' the price of CO_2 per ton from the level as traded through the EU ETS scheme to GBP70/tCO_2 by 2030.
2. The Emissions Performance Standard (EPF) – sets an annual emissions limit on the amount of CO_2 (450g CO_2/kWh per unit of capacity) that each new fossil fuel power station may emit.
3. Capacity Market – a new market designed to pay reliable generating resources a 'standing charge' for being available during times of system scarcity and is open to both existing and new generation and also to Demand Side Response (DSR).
4. Contract for Differences – a new system of long-term CfDs that provide long-term electricity price stability to developers and investors in low-carbon generation.

... AND BUMPS

Eagle-eyed readers will have noted the reference to State Aid above. Due to their nature, the UK must notify the European Commission (EC) about the capacity market and CfD elements of the EMR for State Aid clearance.

Late last year, the government formally notified the EC regarding the Hinkley Point C New Nuclear Investment Contract (an early form of the CfD) and pre-notified the EC on other renewable Investment Contracts and EMR policy aspects with full notification expected soon. The Hinkley Point C notification has been referred for full public consultation, with the EC questioning the level of support and implied rate of return for the developer. Given that the UK's actions are being widely viewed as precedent-setting for other European jurisdictions, this move was not entirely surprising.

The UK Government remains hopeful of a positive resolution to the State Aid notification, albeit on a longer timeline than was originally anticipated. However, many would suggest that an in-depth investigation on Hinkley Point C would be well worth the effort if this helps expedite the State Aid process for the other Investment Contracts and the EMR overall.

We believe that the UK's EMR program, which is arguably the biggest change in the electricity markets since deregulation over a decade ago, is firmly on track for 'go live' later this year despite the twists, turns and occasional bumps on the road to implementation.

Securing the future of UK rail: Turning smart technology risk into reward

By **Charles Hosner, Alejandro Rivas-Vasquez** and **Cornelius Namiluko**, Cyber Security, KPMG in the UK

The rapid proliferation of smart rail technologies will be an undeniable leap forward for the rail sector, delivering improved efficiency, unprecedented interoperability and reduced operating and system costs.

But – particularly in the early days of adoption and integration – it will also create some notable risks; cyber security being chief among them. The good news is that many of the highest-impact risks can largely be mitigated, but only if all players in the sector – network owners, operators, service providers and technology firms – work together to achieve common goals around safety and security.

One would be hard pressed to overstate the impact that technology has had on the rail sector. Every major step forward in the industry's evolution has been born out of innovation and technology. Today is no different: the wide-spread adoption of smart rail technologies promises to unleash unprecedented improvements in efficiency, safety, customer satisfaction and – for those involved – revenues.

But, while reward always comes with risk, the impact of cyber security risks on critical infrastructure in general (and smart rail in particular) are not openly acknowledged and tend to be poorly understood.

A little while ago, KPMG was asked to review the security around the new European Railway Traffic Management System (ERTMS) by the EU ERTMS Key Management Working Group; the report highlighted a number of actual threats and vulnerabilities that could be exploited, leading to potential disruption of services, financial loss and, in the worst case, loss of life.

THE VULNERABILITY WITHIN

Anyone reading this article will already be familiar enough with smart technologies to picture what would happen if hackers – state-sponsored or otherwise – were to gain access to control systems or even individual pieces of running stock. Trains could be forced off the rails, be tricked into colliding at high speeds or even be held hostage. The safety implications are about as varied as the imagination can stretch.

Those with a bit more IT background will understand that any IT system that requires interconnection between moving parts will have some vulnerabilities related to the communication of data.

Very simply put, smart rail works by sending vital pieces of information (such as location, speed, track use and proximity of rolling stock) between onboard control systems, central control centers and tracks. If any piece of that network information is not transmitted, is not received or is in some way manipulated, then the system doesn't work.

The threat is real. Already, we have seen multiple examples of incidents that have a pedigree of state-sponsored cyber attacks intended to support or progress a political agenda.

Evidence suggests that events in Crimea sparked immediate reaction between pro-Russian and pro-EU hackers.

> Even if network operators were to have the most secure systems in the world, hackers could still get in through a poorly secured on-board unit on a train or an unprotected rail sensor.

The more likely risk, however, comes not from state-sponsored terrorists, but rather from those somewhat less bent on loss of life: hackers, hacktivists and teenage ne'er-do-wells, for example. Consider, for instance, what impact a concerted Distributed Denial of Services (DDoS) attack on a control center would have on network operations. Millions in lost revenues, loss of public confidence and regulatory fines are just some of the potential hazards of poor cyber security in smart rail.

DON'T BE THE WEAK LINK

The issue is not one that can be ignored. All signs now indicate that ERTMS is the basis of the UK's future train operations, and is being considered by a number of other major jurisdictions both inside and outside of the EU (many consider Beijing's metro system to be an early pre-runner of an 'ERTMS-like' system).

Those actively executing contracts or operating trains with their national rail networks and those hoping to secure new contracts will want to get ahead of the cyber security issue.

The reality is that this is not the network operators' problem alone, but rather one shared with all of the operators and service providers that work within the network.

KPMG recently worked with the UK ERTMS program to analyze the potential vulnerabilities of the UK system and provide recommendations and security control advice to the UK's Network Rail.

What the team found was that the system is, as they say, only as strong as its weakest link. Even if network operators were to have the most secure systems in the world, hackers could still get in through a poorly secured on-board unit on a train or an unprotected rail sensor.

TAKING THE RIGHT STEPS

The issue should raise a number of important questions for industry board members. What risks are involved in deploying smart technologies? How do these risks affect me as an industry player? How can we meet the regulatory demand for change while helping to ensure the security of the overall network?

Based on this experience, we believe that – to help mitigate some of these risks – each player in the ecosystem will need to start by identifying and quantifying the specific risks that this technology may pose to their operations (either directly or indirectly). This will also require players to clarify how they will be expected to respond should these risks become reality.

With this in mind, players will quickly want to start thinking about how they plan to implement, maintain and update smart technology systems while ensuring the highest levels of security and efficiency across the platform.

It is expected that national entities in charge of local ERTMS implementations outside of the UK would also consider such high-level matters in formulating their plans.

TIME TO ACT

While it is true that ERTMS and other smart rail systems are only now being formalized and discussed across Europe and in the UK, the reality is that it will take some time for key players to properly prepare their security protocols ahead of any smart system implementation.

Moreover, those hoping to participate or operate within a future smart system will want to ensure that they have addressed these vulnerabilities in their proposals and that they can field the right capabilities to properly and securely manage the network.

The good news is that – with proper time and attention – the cyber threat on smart rail systems can be minimized if not altogether mitigated. But organizations will need to start now if they hope to close all of the potential vulnerabilities ahead of the implementation of any new system.

The reality is that the implementation of smart train systems will revolutionize the efficiency of rail operations – a prize that is certainly worth achieving – but only if the industry takes the right steps to safeguard the system.

We therefore believe it is critical that each player in the industry implement appropriate controls that mitigate the risks associated with using such technologies and that we work together as a sector to create secure, efficient and effective rail network for the people of the world.

Global diary

KPMG professionals are committed to sharing insights and exploring issues and opportunities through industry events. Below is a selection of recent and upcoming forums organized, or with significant involvement, by KPMG's Global Infrastructure practice. Follow the links to learn more or email us at: infrastructure@kpmg.com

Abu Dhabi, UAE

World Economic Forum Summit on the Global Agenda

18–20 November, 2013

The Global Agenda Councils convene globally-recognized experts and thought leaders to provide interdisciplinary thinking, stimulate dialogue, shape agendas and catalyze initiatives. Through ongoing collaboration and debate, as well as through findings, the Global Agenda Councils transform implications and recommendations into key deliverables such as the Outlook on the Global Agenda and Global Agenda Survey, as well as Council-specific projects and reports. James Stewart, KPMG's Chairman of Global Infrastructure, is a current member of the Global Agenda Council on Infrastructure.

http://www.weforum.org/events/summit-global-agenda

Hamilton, Bermuda

Bermuda Chamber of Commerce Annual General Meeting

9 April, 2014

The Bermuda Chamber of Commerce Annual General Meeting is a key event that hosts several industry, community and political leaders to address challenges and opportunities facing the small island nation. Stephen Beatty, America's and India Head of Global Infrastructure, hosted the event and addressed the process of developing and re-developing infrastructure, as well as the challenges of moving projects forward.

www.bermudachamber.bm

Berlin, Germany

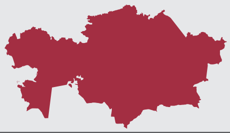
Infrastructure Investor Summit

4–5 March, 2014

The eighth annual Infrastructure Investor Summit brought together prominent infrastructure thought leaders to discuss, debate and examine the critical factors and trends shaping the asset class and wider investment climate. Tony Rocker, KPMG's Infrastructure Investment specialist, attended this event on behalf of the Global Infrastructure practice.

www.infrastructureinvestor.com/berlinsummit2014/

Astana, Kazakhstan



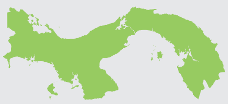
Asian Development Bank (ADB) Annual Meeting

2–5 May, 2014

The 47th ADB Annual Meeting was a statutory occasion for organization Governors to provide guidance on ADB administrative, financial and operational directions. The meeting provided opportunities for member governments to interact with ADB staff, non-government organizations, media and representatives of member countries, international organizations, academics and the private sector. Robert Sutherland, KPMG in Canada, attended this event on behalf of the Global Infrastructure practice.

www.adb.org/annual-meeting/2014

Panama City, Panama



World Economic Forum on Latin America

1–3 April, 2014

The ninth World Economic Forum on Latin America took place in Panama City and brought together more than 650 leaders from industry, government, academia and civil society, including seven heads of state and government. Over the three days of the meeting, under the theme Opening Pathways for Shared Progress, participants explored a range of issues affecting Latin America as it defines its role in a challenging global context. Stephen Beatty, America's and India Head of Global Infrastructure was invited to moderate a panel on upgrading LATAM's infrastructure.

www.weforum.org/events/world-economic-forum-latin-america-0

Warsaw, Poland

European Bank for Reconstruction and Development (EBRD) Annual Meeting & Business Forum

14–15 May 2014

The theme for EBRD's 23rd annual meeting was 'Changing Economies, Changing Lives'. Discussion at this event revolved around the profound transformation of European business and infrastructure over the last 25 years – and cast a probing eye on what the next 25 years will bring. James Stewart, KPMG's Global Infrastructure Chairman, was invited to present on accelerating infrastructure to boost growth and employment.

www.delegate.com/annualmeeting/2014

Asunción, Paraguay

Organization of American States (OAS) Private Sector Forum and General Assembly

2 June, 2014

This year's OAS Private Sector Forum and General Assembly will focus on 'The Americas in the Changing Global Economic Scenario: The Role of Public-Private Partnerships'. In general, the OAS Private Sector Forum provides one of the few formal platforms for public-private dialogue geared towards enhancing competitiveness and employment generation in the Americas. Stephen Beatty, America's and India Head of Global Infrastructure, has been invited to participate on a panel about public-private partnerships governance for development.

http://www.oas.org/en/

Macao, China

International Infrastructure Investment & Construction Forum (IICF)

6–7 June 2014

The fifth annual International Infrastructure Investment & Construction Forum is an important platform for industry professionals to exchange strategic thinking and insights on international infrastructure opportunities and the evolving role of project financing, ownership and development.

www.iiicf.org

Singapore

World Cities Summit 2014

1–4 June 2014

The unifying theme for the World Cities Summit 2014, "Liveable and Sustainable – Common Challenges, Shared Solutions" builds on discussions from the World Cities Summit Mayors Forum 2013, where cities looked at the state of urban challenges today and identified principles of shared solutions applicable to cities spanning the range of development, socio-economic and political contexts. James Stewart, KPMG's Global Infrastructure Chairman, will participate as a speaker at this high-profile event.

www.worldcitiessummit.com.sg

Various Locations

Women's Infrastructure Network (WIN)

Various dates

KPMG is proud to play an integral role in the formation of WIN. KPMG, in collaboration with Freshfields Bruckhaus Deringer, initiated WIN in the United States in 2008. Since then, WIN has expanded and created chapters in the United Kingdom, Ireland and Canada. WIN's mission is to help women emerge as leaders in the infrastructure sector, and to assist collaboration between the public and private sectors in the development and provision of infrastructure globally. For a list of upcoming events in your region visit:

www.womensinfrastructure.net

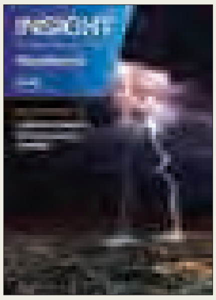
KPMG's premier annual event for CEOs, divisional heads and financial executives in the power & utilities sector is being held in London, UK at the beginning of October 2014. The intensive program focuses on strategic, financial, environmental and risk-related issues, including infrastructure, and provides insight into the tools and strategies to help manage them.

Bookshelf

To access the publications listed here, visit: **kpmg.com/infrastructure**
or email us at: **infrastructure@kpmg.com**

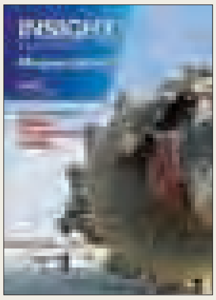
Insight – The Global Infrastructure Magazine

Insight is a semi-annual magazine that provides a broad scope of local, regional and global perspectives on many of the key issues facing today's global infrastructure industry.



Issue No. 5 – Resilience

This edition of Insight magazine explores everything from new approaches to resilience, to learning the critical lessons of effective crisis response – and includes an exciting Special Report on Latin America's burgeoning infrastructure market.



Issue No. 4 – Megaprojects

This edition of Insight magazine explores some of the key challenges and opportunities impacting megaproject delivery, and includes a Special Report on Africa's infrastructure market, a key growth area.

Issue No. 3 – Infrastructure Investment: Bridging the Gap

This edition explores the complex world of infrastructure finance and funding, including critical topics ranging from direct investment to innovative financing and funding models and the evolving infrastructure fund market.

Issue No. 2 – Urbanization

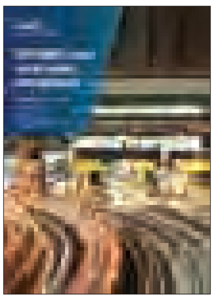
This edition explores the infrastructure challenges being faced by cities, including feature interviews with key city leaders and private sector executives to shed light on how they are specifically responding.

Latest insights – KPMG Global Infrastructure publications and reports

KPMG member firms are privileged to be involved in many of the exciting changes that are happening in every corner of the world, across many sectors and at various stages of the lifecycle of infrastructure. We continuously seek to share the insights we are gaining in the process.

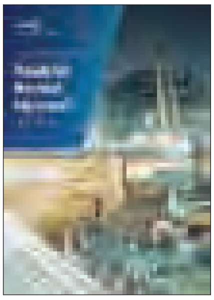
Infrastructure 100: World Cities Edition (Second Edition)

Infrastructure 100: World Cities Edition provides insight into the infrastructure projects that make great cities, with a particular focus on the innovations that make them 'Cities of the Future' – places where people want to live and do business.



ISO 55001: A new era for asset management

This paper discusses the benefits of an integrated holistic approach to asset management, looks at the requirements of ISO 55001 and explains how companies comply with the standard and improve asset performance.



Global Construction Survey 2013: Ready for the next big wave?

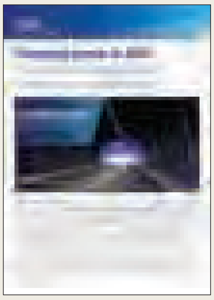
This year's report catches the industry in a more upbeat mood after gauging the views of 165 senior executives of leading engineering and construction companies from around the world to determine the state of the industry and opportunities for growth.

Foresight

In the complex world of infrastructure, hot topics of conversation and industry 'buzz' are constantly changing. *Foresight: A Global Infrastructure Perspective*, is a series of articles that feature our take on some of the hot topics, trends and issues facing our firms' clients.

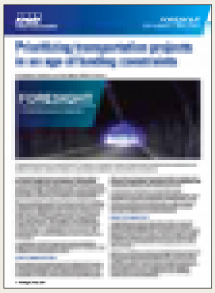
COMING SOON – *"Conversations with..."*

Look out for a new series of Foresight articles featuring interviews with influential infrastructure leaders from around the world. Who would you like to see featured? Let us know at: infrastructure@kpmg.com



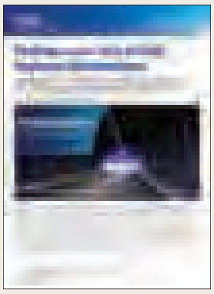
SPECIAL EDITION: Emerging trends in 2014

In this special edition of Foresight, four of KPMG's Global Infrastructure leaders look back on predictions from 2013 and share their views on new trends that will change the world of infrastructure.



Prioritizing transportation projects in an age of funding constraints

In this edition of Foresight, Stephen Andrews and Clay Gilge address the prioritization of transportation projects as current financing models cannot fully compensate for shrinking government budgets and greater pressure on assets.



Finding a new way to fund highway infrastructure

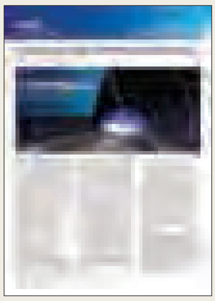
In this edition of Foresight, Scott Rawlins and James Ray cover new ways to fund highway infrastructure as the shortfalls of the 'gas' tax are resulting in a widening funding gap for financing high-quality road networks.

Optimizing the US public transport assets

In this edition of Foresight, Scott Rawlins, James Ray and Liam Kelly look at new ways to fund transport infrastructure by leveraging and outsourcing government assets to generate income through commercial deals with private companies.

Brazil's ports are up for grabs

In this edition of Foresight, Mauricio Endo discusses the announcement that licenses to operate Brazil's publicly-owned port terminals are open to all bidders in order to increase the capacity and efficiency of these aging infrastructure assets.

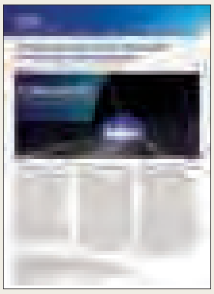


The death and rebirth of infrastructure debt markets

In this edition of Foresight, Darryl Murphy touches on a myriad of former and current funding mechanisms for infrastructure development with a focus on the resurgence of debt solutions.

A new view of asset management: ISO 5500X

In this edition of Foresight, Daniël Pairon and Rodney Nelson deduce that successful asset management is not just about managing expenditures and 'down-time' but also delivering improved efficiency and whole-of-life asset costs.



Powering up for growth: An assessment of the power sector in Myanmar

In this edition of Foresight, Sharad Somani discusses the challenges and opportunities affecting the power sector in Myanmar – Southeast Asia's newest country open for business.

Japan's new start: Abenomics and infrastructure

In this edition of Foresight, Yoshihide Takehisa addresses Prime Minister Sinzo Abe's new economic policy designed to end the country's prolonged economic recession and revive the sagging economy.

KPMG's Global Infrastructure practice

Integrated services. Impartial advice. Industry experience.

When it comes to infrastructure, KPMG firms know what it takes to drive value. With extensive experience in most sectors and countries around the world, our Global Infrastructure professionals can provide insight and actionable advisory, tax, audit, accounting and compliance-related services to government organizations, infrastructure contractors, operators and investors.

We help clients to ask the right questions that reflect the challenges they are facing at any stage of the lifecycle of infrastructure assets or programs – from planning, strategy and construction through to operations and hand-back. At each stage, KPMG's Global Infrastructure professionals focus on cutting through the complexity of program development to help member firm clients realize the maximum value from their projects or programs.

Infrastructure will almost certainly be one of the most significant challenges facing the world over the coming decades. That is why KPMG's Global Infrastructure practice has built a team of highly-experienced professionals (many of whom have held senior infrastructure roles in government and the private sector) who work closely with member firm clients to share industry best practices and develop effective local strategies.

By combining valuable global insight with hands-on local experience, KPMG's Global Infrastructure practice understands the unique challenges facing different clients in different regions. And by bringing together numerous disciplines such as economics, engineering, project finance, project management, strategic consulting and tax and accounting, KPMG's Global Infrastructure professionals work to consistently provide integrated advice and effective results to help member firms' clients succeed.

For further information, please visit us online at **kpmg.com/infrastructure** or contact:

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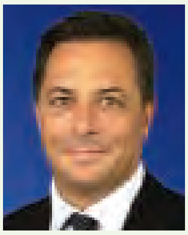

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