



**KPMG**

# INSIGHT

The global infrastructure magazine | Issue No. 12 | 2019

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**#EmergingMarkets**

# The next big growth opportunity

## About this issue




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If you are looking for outsized growth opportunities, unbridled innovation, sustainable investments and an energized workforce, you are probably looking at the emerging markets. And you are not alone.

Investors, developers and operators see the emerging markets as the next big growth opportunity. They recognize that growing populations and rising living standards are creating massive demand for new infrastructure. Improved security, enhanced rule of law and growing disposable incomes are turning once-risky schemes and proposals into real and bankable opportunities.

Yet — as this edition of *Insight Magazine* clearly illustrates — the emerging markets represent more than just another great investment opportunity. They are also a source of innovation, inspiration and development.

For example, our articles on PPPs in East Africa and on Bermuda's new airport show how emerging market governments are overcoming capability challenges. And our pieces on construction technology in South Africa and hyperloop in India demonstrate the emerging markets' potential to leapfrog the mature markets.

At the same time, this edition of *Insight Magazine* does not ignore the

unique social and affordability challenges facing many leaders in the emerging markets. Our article on Argentina's efforts to improve social housing and our piece on creating safer cities for women and girls, for example, tackle these issues head-on.

We will also be the first to acknowledge that — by creating an 'emerging markets' edition of this publication — we run the risk of suggesting that all emerging markets are somehow the same. They are not. Each market is vastly different and each project and opportunity is unique.

That is why, for this edition, we created a Regional outlook section where KPMG professionals from different emerging markets offer their views on the most pressing issues and most valuable opportunities in their respective markets.

To put these ideas, opportunities and trends into context — and to demonstrate how different markets are shaping their future infrastructure agendas — we have interviewed a broad cross section of policy makers, business leaders, investors, operators and promoters active in different emerging markets. Their views represent the real front-line of infrastructure around the world.

We believe that the views and ideas shared in this edition of *Insight Magazine* will influence the global

economy for decades to come; it is the assets and investments being made in the emerging markets today that will drive the global economy of tomorrow.

Consider this: by 2040, the emerging markets will require around US\$60 trillion in infrastructure investment.<sup>1</sup> Now just think about what that kind of investment will deliver — clean drinking water, accessible and affordable energy, safer cities, better connectivity... the possibilities are almost endless. And the potential should not be squandered.

On behalf of KPMG's Global Infrastructure network — a presence that includes more than 2,500 people working in more than 150 different markets — we would like to thank all of the leaders, authors and contributors who participated in developing this edition of *Insight Magazine*. We hope the topics, stories and ideas we have captured provide inspiration and drive greater awareness of the opportunities now at play in the emerging markets.

To discuss any of the ideas raised in this publication, to find out more about a particular market or to discuss your own unique emerging markets and growth plans, we encourage you to contact any of the authors listed in this publication or your local KPMG member firm. ■

<sup>1</sup> <https://outlook.gihub.org/>

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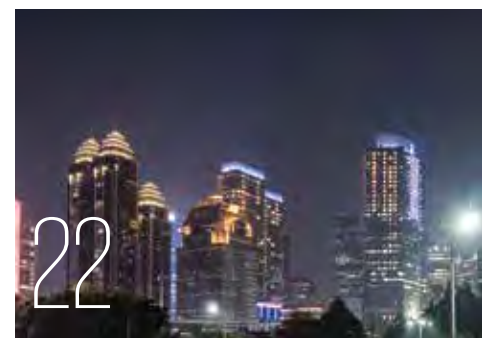
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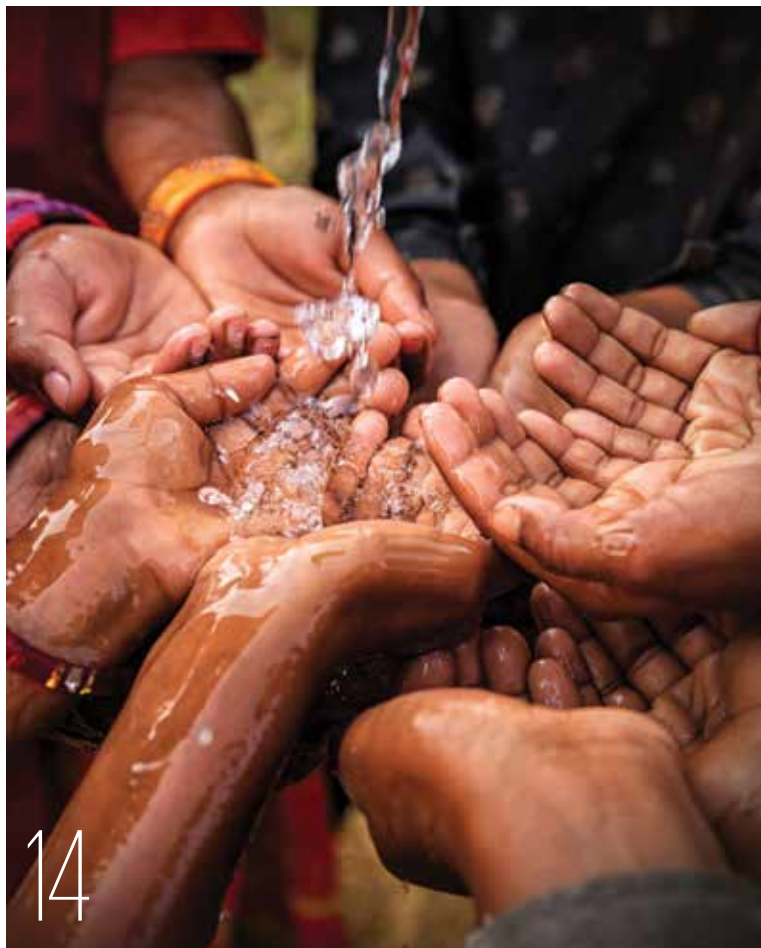
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Integrating informal  
settlements:

Argentina's

Barrio 31

Initiative

**R**apid urbanization has led to growing informal settlements in many cities across the emerging markets. Rather than bulldoze them, Buenos Aires is working to empower them.

**Mariano Sánchez**  
Partner  
KPMG in Argentina

**Diego Fernández**  
Secretary of Social and Urban Integration  
City of Buenos Aires



There are a number of global issues that sit at the top of the public consciousness. The unchecked spread of informal settlements is not one of them. That is a shame.

The reality is that more than a billion people currently live in informal settlements and slums around the world. Some 62 percent of urban populations in sub-Saharan Africa live in slums. So do about 24 percent of people living in cities in Latin America.<sup>1</sup>

Sadly, that number is growing quickly — according to UN-Habitat (the UN program that tracks these things) — more than 3 billion people will live in urban slums by 2050.<sup>2</sup> If estimates for global population growth are correct,<sup>3</sup> that will mean that more than one-in-three human beings will be living in sub-standard conditions within the next 30 years.<sup>4</sup>

### A problem that can't be ignored

“The growth of informal settlements is definitely one of the most relevant issues of today,” argued Diego Fernández, Secretary of Social and Urban Integration with the City of Buenos Aires. “With other important global problems, such as global warming, we’re at least aware of its significance and trying to move in the right direction, albeit too slowly. When it comes to the growth of informal settlements, we’re moving in the entirely wrong direction. And we’re moving in the wrong direction quickly.”

The impact that informal settlements have on their residents and their surroundings are fairly obvious. As UN-Habitat notes, “Compared to other urban dwellers, people living in informal settlements, particularly in slums, suffer more spatial, social and economic exclusion from the benefits and opportunities of the broader urban environment.”<sup>5</sup>

Those in informal settlements often lack access to health services, municipal services and employment opportunities. They are often discriminated against by the city’s other inhabitants. Violence in informal settlements is rife. Opportunities for personal development and economic growth (through legal means) are rare.

### Facing the challenge

Buenos Aires wants to change this cycle of exclusion. And they are taking bold steps to make that happen.



“This government’s policy objective is to create the right conditions to allow these areas, and people living in them, to achieve a high level of sustainable development,” added Fernández.

### Bienvenido a Barrio 31

Tucked between Buenos Aires’ main railway station and its port, Barrio 31 is one of the oldest informal settlements in Latin America. It is home to more than 40,000 people who live in its 10,000 (mostly poorly constructed) buildings.

The settlement is currently separated into two areas by an old highway, which is now being moved south of the city to ease traffic flow and reduce congestion. And that has provided the city government with an excellent

opportunity to improve the lives of the people in Barrio 31.

As part of the Barrio 31 Initiative, kilometers of roads are being paved, providing residents with more choices for mobility. Storm water and sewer networks are being installed, thereby improving health conditions. Secure sources of water and power are being provided. They have already completed the works on more than 12 kilometers of this vital infrastructure. Moreover, newly installed public lighting is helping to improve security in the streets and open spaces. Parks, recreation facilities and green spaces are being created and improved.<sup>6</sup>

### Delivering on the promise

“Hard infrastructure is key to enabling the development of these areas — roads,

<sup>1</sup> [https://www.un.org/en/development/desa/policy/wess/wess\\_current/wess2013/Chapter3.pdf](https://www.un.org/en/development/desa/policy/wess/wess_current/wess2013/Chapter3.pdf)  
<sup>2</sup> <https://www.un.org/youthenvoy/2013/08/un-habitat-united-nations-human-settlements-programme/>  
<sup>3</sup> <https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html>





“

We spend a lot of time going door-to-door talking to families about the services that are available to them and how they can access them.”

”

(a global retail and commercial bank) recently opened a branch in the Barrio. McDonald's will open a restaurant later this year. Fernández expects a number of other announcements to be made soon.

#### A template for success?

The Barrio 31 Initiative has captured the attention of development banks, policy makers, academics and not-for-profit organizations. The World Bank has put US\$170 million in credit towards funding many of the needed infrastructure projects. The Inter-American Development Bank has also extended a US\$150 million credit note to the project to help drive programs aimed at improving public spaces and redeveloping housing. In addition, in 2018 the International Society for Performance Improvement gave Barrio 31 its Roger Kaufman Award for Outstanding Social Impact.

“We — the City of Buenos Aires, our citizens and the Development Banks that support this project — see this project as a way to not just improve the lives of people in Buenos Aires, but also as a template for other cities in Latin America — and maybe around the world — to start helping informal settlements integrate into the cities around them,” added Fernández. “It is a global issue that cannot be ignored any longer.” ■

power, housing and services are all vital to economic empowerment,” added Fernández. “But our focus is on changing the softer realities — things like health, education and economic development. And that takes more than just hard infrastructure.”

Significant focus is being placed on the softer aspects. For example, residents of the Barrio have access to financial inclusion workshops, employment services and advice on a range of issues such as housing, health, education, justice, work, income and social policy. A new Health and Community Action Center is being developed to bring health services closer to the community.

“We’ve increased health clinic availability five-fold in the Barrio over the past few years. But if people don’t use the facilities, it’s not worth anything,” noted Fernández. “We spend

a lot of time going door-to-door talking to families about the services that are available to them and how they can access them.”

#### Integrating into the wider city

The Buenos Aires government also recognizes that informal settlements do not exist in a vacuum. If the city wants to help the residents of the Barrio integrate into the urban fabric, it will require the support of the broader residential and business community.

“We want people in the surrounding areas to understand that the real difference between them and the residents of Barrio 31 is not the people themselves but rather the opportunities available to those people,” added Fernández.

The city has also been successful in attracting businesses into the area. Santander

<sup>4</sup> <https://unhabitat.org/participatory-slum-upgrading-programme-fund/>

<sup>5</sup> [https://unhabitat.org/wp-content/uploads/2015/04/Habitat-III-Issue-Paper-22\\_Informal-Settlements.pdf](https://unhabitat.org/wp-content/uploads/2015/04/Habitat-III-Issue-Paper-22_Informal-Settlements.pdf)

<sup>6</sup> <https://use.metropolis.org/case-studies/the-urbanization-of-villa-31-an-informal-settlement-in-buenos-aires#casestudydetail>

# The great technology

leapfrog opportunity

**T**echnology has enormous potential to improve infrastructure development, delivery and operations in emerging markets. But it's important to heed past lessons and adopt new, innovative solutions.

**Salar Shemirani**

Manager, Global Infrastructure Advisory  
KPMG in Canada

**Ryan Peterson**

CEO and Co-founder  
Finger Food Advanced Technology Group

**Karl Westvig**

CEO  
Retail Capital



As we consider how to address the huge infrastructure gap in emerging markets, we should pause for thought. Following the same path that's been trodden in more mature economies simply won't deliver the step change that's needed.

Over the past decade and more, KPMG's annual *Global Construction Survey* repeatedly finds infrastructure development projects going over time and over budget, with a majority of project owners and contractors suffering significant failures — especially with major projects, which are increasingly complex.

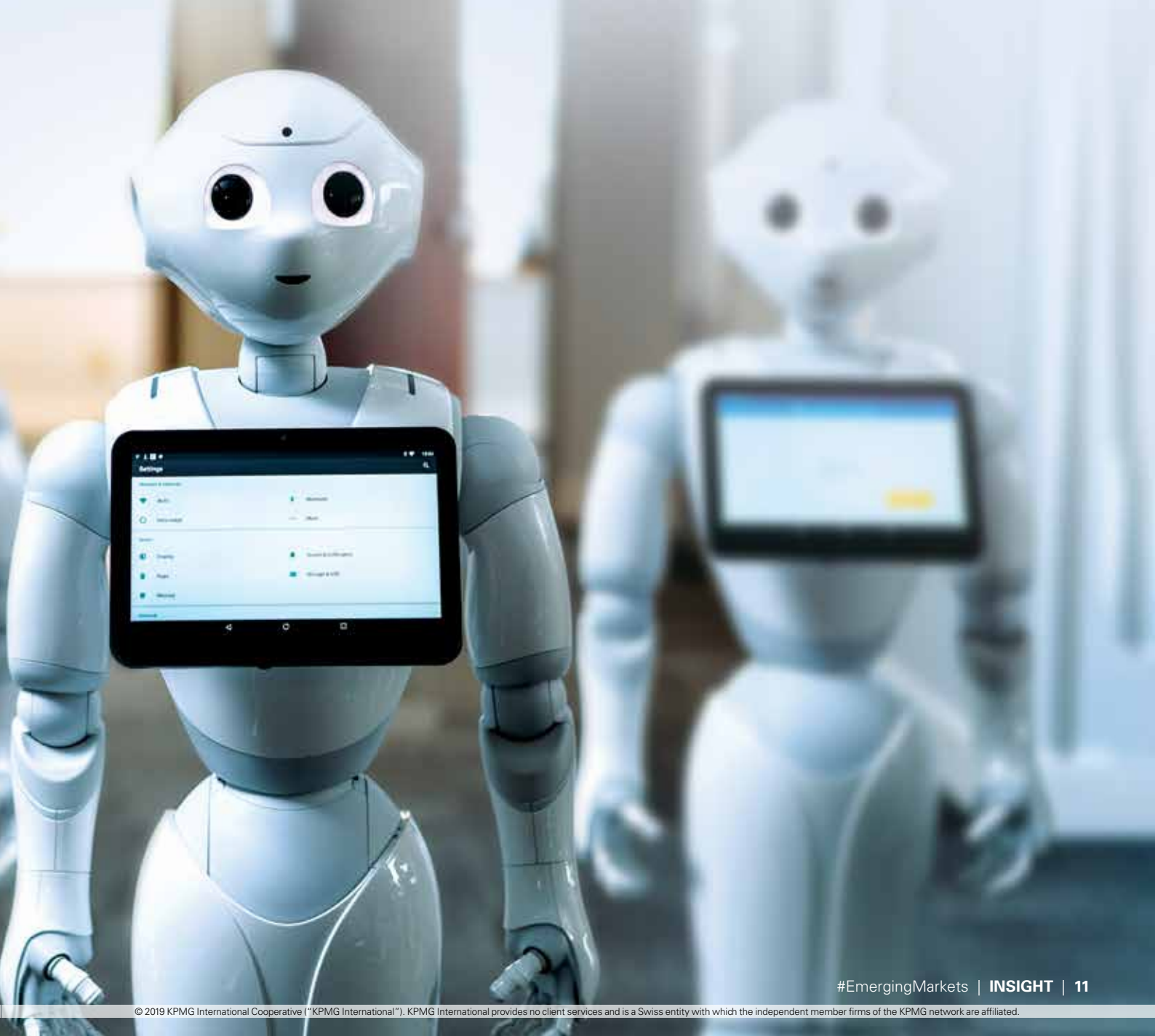
To take a fresh look at such challenges, we spoke to two technology pioneers from very different sectors, both of whom bring unique experience and insights on innovation. Karl Westvig, CEO of

South African financial services company Retail Capital, has successfully delivered solutions that bypass traditional channels and ways of working. And, as CEO and Co-founder of global technology solutions company Finger Food Advanced Technology Group, Ryan Peterson is at the forefront of exciting technologies like robotics, machine learning, virtual and augmented reality and blockchain.

Karl Westvig feels that starting from a lower infrastructure base actually presents a great opportunity to do things differently: "In South Africa we had a major water crisis in the Cape region, which led to a lot of corporates putting their own infrastructure in place to become more self-sufficient. It's been a similar story with solar and wind farms to secure off-grid electricity, given the unreliability of the national power service."

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You can't treat it as an old-world business problem — you need to learn the hard lessons from more developed markets and look for completely fresh ways of doing things. ”



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Mobile payments have heavily disrupted the financial services market and the engineering and construction industry could similarly embrace digital technology to drive efficiency.”

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Such an enterprising approach stems from thinking first about the services needed, rather than the infrastructure itself. “Everyone needs lights, TV and other household appliances, but it’s very expensive to deliver electricity across vast countries,” says Karl. “Instead we’re seeing more decentralization, with prepaid solar power, either from rented panels on your own property or via a nearby mini solar farm.”

An example of this trend is Kenyan solar energy company M-Kopa, which has acquired hundreds of thousands of business and consumer customers throughout Africa using its advanced pay-as-you-go platforms. This ability to use technology to connect customers with infrastructure is a growing trend.

“Infrastructure is ripe for disruption,” says Ryan Peterson of Finger Food, which works with organizations across industries including infrastructure, oil and gas, telecommunications, manufacturing and retail — in both mature and emerging

countries. “You can’t treat it as an old-world business problem — you need to learn the hard lessons from more developed markets and look for completely fresh ways of doing things.”

Such thinking is reflected in KPMG’s 2019 *Global Construction Survey*, where the top 20 percent of ‘future-ready’ organizations are embracing disruption from strategy to execution. These companies are learning how to pilot projects and ‘fail fast’, investing in innovation without fear or uncertainty — and achieving superior performance.

One of Finger Food’s projects, with Enbridge, involved the use of holograms to visualize underground oil and gas pipes and identify areas of potential concern. This avoided the need to visit pipelines in inaccessible locations like mountain ranges.

**Lessons learned from other industries**

Infrastructure can look to other sectors for inspiration. Mobile financial services have



taken off in a big way in countries where a large proportion of people have traditionally been unbanked. Karl Westvig's company Retail Capital, which provides loans to small-to-medium organizations, has grown fast on the back of the cellphone boom.

"Mobile payments have heavily disrupted the banking and financial services market and our business has moved swiftly to an app-based service. There's no face-to-face, and no documents change hands. Most consumers can't travel long distances on poor roads to a bank, so the lack of infrastructure is in fact driving creativity in services. The engineering and construction industry could similarly embrace digital technology to drive efficiency," explains Westvig.

It's not just financial services that is blazing a trail. Many other sectors — like healthcare, manufacturing, retail, media and telecommunications — have bypassed traditional infrastructure like road, rail, cables and grids to serve their customers and employees better and reduce their carbon footprint. According to Finger Food's Ryan Peterson, "Infrastructure companies need an innovation group that's really thinking deeply about how technology is going to affect their business model."

One infrastructure sub-sector benefiting from new ideas is tolling. As KPMG's 2019 global tolling benchmark paper *Open Opportunity* reports, the most forward-looking operators eschew cash and use Open Road Tolling (ORT) and Electronic Toll Collection (ETC). Tolling is relatively rare in emerging markets and such technologies can accelerate the efficient development of roads.

### Catalyst for change

Of the many new technologies, Peterson is especially excited about 5G. "It's a game changer — it's the next internet. In mining, for instance, machine-to-machine communication enables autonomous vehicles and other automation, which will save lives and increase efficiency in remote projects."

And Peterson thinks 5G may hasten the development of less mature markets: "Those countries that embrace 5G first are going

to leapfrog developed nations — some of whom are, frankly, a little sleepy in joining the race. It's that profound. This kind of technological adoption will help create brand new exports."

Peterson also cites data analytics as another vital advance for the sector. "Engineers currently spend far too much of their time just finding information and they rarely get the insights they need. With IoT available to collect vast amounts of data in real time, it's vital to have a system that digests the data and gives relevant reports to guide capital expenditure choices."

### Rethinking the business model

Ultimately, infrastructure owners and developers in emerging markets have to reimagine what they really stand for. Are they service providers — like M-Kopa — or more traditional infrastructure developers, builders, supporters or operators? And are they able to disrupt their own cultures, to become technology led organizations that deliver improved performance and returns?

Investors, like infrastructure funds and banks, have an important role to play in supporting emerging markets, encouraging the use of technologies to improve productivity and certainty over project outcomes. Non-profit funds are active in this space. Fusion Foundation has partnered with social enterprise i4SD to work on projects in South East Asia and sub-Saharan Africa, including smart meters and solar mini-grids and water access, using mobile pay-as-you-go technologies.<sup>1</sup>

If the sector gets it right, the emerging world could leapfrog more mature markets and hasten in a new age of fast, efficient and safe digital project delivery, which benefits infrastructure players and the countries and communities in which they operate.

Karl Westvig concludes with a word of advice for infrastructure organizations that want to radically transform their business model: "In my experience, you need to foster a culture of change and risk-taking. It takes a strong and visionary leader to steer the business in a different direction, but the results can be exciting and well worth the effort." ■

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Technology can inspire industries like financial services, power and energy to reduce or even eliminate their reliance on traditional infrastructure such as road, rail and networks.”

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<sup>1</sup> Fusion Foundation Partners with i4SD to Tackle Sustainable Development Challenges Through Smart Infrastructure and Digital Ecosystems, Fusion, i4SD press release, 4 June 2019. <https://www.globenewswire.com/news-release/2019/06/04/1864345/0/en/Fusion-Foundation-Partners-with-i4SD-to-Tackle-Sustainable-Development-Challenges-Through-Smart-Infrastructure-and-Digital-Ecosystems.html>

# Watering the green shoots:

## Africa's evolving PPP environment

**A**frica's PPP markets are evolving and local capabilities are rapidly improving. Yet the infrastructure investment gap continues to grow. What will it take to unlock capital flows to Africa's project pipelines?

### **James Woodward**

Head of Transport & Infrastructure,  
East Africa  
KPMG in Kenya

### **Judith Nyakawa**

Acting Director of the PPP Unit  
Kenyan Ministry of Finance

### **Emilio Cattaneo**

Executive Director  
Emerging Africa Infrastructure Fund

### **Janice Kotut-Sang**

Regional Director East and  
Southern Africa  
GuarantCo

### **Philippe Valahu**

CEO  
Private Infrastructure Development  
Group (PIDG)

In 2020, the taps will open at the Kigali Bulk Water Project in Rwanda's capital. Forty megaliters of clean water will stream out of the facility per day — enough to supply up to 500,000 domestic, commercial and industrial customers. The impact on Rwanda's biggest city will be massive.

Africa's PPP promoters hope that the flow of clean water from this project will also catalyze a new flow in infrastructure investment. That's because it represents one of the first water projects in sub-Saharan Africa to be developed using a Private Public Partnership (PPP) model. And it stands among just a handful of PPP projects now successfully completed in the Eastern part of the continent. Investors are watching the project carefully.

### Creating the framework for success

Getting PPPs completed in Africa requires some patience. "Even with all of the work

we have done over the past decade, it still takes far too long for projects to get to financial close," says Judith Nyakawa from her office in Nairobi. As Acting Director of the PPP Unit under Kenya's Ministry of Finance, she leads the country's efforts to improve the way various government departments implement PPP projects in Kenya.

Kenya is widely viewed as one of the more mature PPP markets in Africa. The country implemented their PPP Act in 2013 and is in the process of passing a number of amendments aimed at improving PPP processing turnaround times. Most other markets across Africa, however, are still trying to operationalize their frameworks.

The water about to flow from the taps in Kigali, for example, would not have been possible without Rwanda first developing the right legislative framework for PPPs in the water sector.

“Africa's PPP promoters hope that the flow of clean water from this project will also catalyze a new flow in infrastructure investment.”



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While South Africa is often cited as the most mature market on the continent in the development and execution of PPPs across multiple sectors, there are a handful of markets that are not far behind.”

“Our technical assistance team spent years working with the Government of Rwanda and the local authorities to create a framework that would allow a water concession to be tendered. It was a lengthy, but ultimately very successful, process,” notes Philippe Valahu, CEO of the Private Infrastructure Development Group (PIDG), the infrastructure development and finance organization that led the transaction.

### Being pragmatic about the pipeline

Over the past few years there have been strong signals that the PPP environment in Africa — and particularly in East Africa — is maturing. For one, many of East Africa’s governments are starting to take a more realistic view of their pipelines.

“Governments used to come to us with a list of US\$1 billion projects that everyone knew were too big to get traction. Today, governments are talking about executing on more realistic — albeit smaller — projects that demonstrate capacity and build investor confidence,” notes Emilio Cattaneo, Executive Director of the Emerging Africa Infrastructure Fund (EAIF), a PIDG company that arranged the debt financing for the Kigali water project supported by funding from PIDG’s Technical Assistance Facility.

In Nairobi, Nyakawa’s team is focusing on improving the way the project pipeline is prepared and presented to investors. “We want to make it as easy as possible for investors to see the value of investing



into Kenya. It’s not just roadshows and conferences. We are working with a range of PPP experts to improve the way we prepare, prioritize and promote our pipeline of projects across the country,” she points out.

### Crowding-in local currency investment

While significant effort is being put into attracting foreign investors and global infrastructure funds, the most exciting development in East Africa has been the growing involvement of local investors who — by investing in local currencies — are helping to reduce the overall foreign exchange mismatch that often plagues user-pay projects in the emerging markets.

“Historically, projects would be funded in dollars but user-fees would be collected

in local currencies. That meant that either governments or users were left holding the exchange risk. But if part of the funding were to be secured in local currencies — either through banks or through the capital markets — you can start to de-risk a project to a point where it fits within an investor’s criteria,” noted Janice Kotut-Sang, Regional Director East and Southern Africa for PIDG company, GuarantCo.

GuarantCo is one of a handful of organizations working across the region to encourage local currency finance for infrastructure projects. GuarantCo uses its Fitch AA- and Moody’s A1 ratings to provide guarantees to local banks and institutional investors investing into infrastructure. And that has helped to unlock greater investment flow from local capital markets.





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## Preparing for PPPs

Emerging market governments are starting to develop their skills, capability and capacity for attracting private investment to infrastructure. And, as Kenya's experience illustrates, many governments are making strong progress. But more must be done.

Our experience suggests there are five key fundamentals to enticing private investment to emerging market infrastructure projects:

- 1. Create institutional capacity** by improving regulatory systems, forging equitable dispute-resolution mechanisms and developing transparent procurement processes.
- 2. Prioritize projects and selection** based on economic and social priorities, allowing investors to focus on projects delivering the most benefits.
- 3. Improve project preparation** at national, local and agency levels to optimize their structure prior to procurement, including assessment of financial feasibility and risk.
- 4. Mobilize private capital** by MDBs and other public financing institutions developing mechanisms to support the provision of private finance to projects.
- 5. Promote international cooperation** by partnering with global institutions and companies, emerging-market governments and infrastructure investors.

Those markets able to demonstrate significant progress on all five fundamentals should be well-placed to attract the private finance they require to deliver on their infrastructure objectives. And that, in turn, should unlock an exciting and truly historic new golden era of economic and social development for the emerging markets and the world.

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Encouraging local currency investment is also a top priority for Kenya's PPP Unit. "We're looking at a range of ways to help crowd-in local currency financing. We believe that PPPs are a great way for Kenyans to invest into a long-term, stable asset class. We want to encourage meaningful participation from Kenyans and Kenya's institutional investors," adds Nyakawa from Kenya's PPP Unit.

### Looking for new opportunities

While South Africa is often cited as the most mature market on the continent in the development and execution of PPPs across multiple sectors, there are a handful of markets that are not far behind.

"We are seeing different levels of progress in different markets and different sectors. In Uganda, for example, the government has opened up power distribution to the private sector and that has spawned a vibrant PPP market in that sector. But, at the same time, other sectors are moving rather slowly. Each market is very different," observes the EAIF's Emilio Cattaneo.


As PIDG's Philippe Valahu points out, that has led to a range of different green shoots of progress across the continent: "We've been involved in small solar projects in Tanzania, geothermal projects in Ethiopia, social housing projects in Kenya and ferry-boat services on one of Africa's great lakes, Lake Victoria. The opportunities certainly aren't confined to a single market or sector."

Kenya's Nyakawa is certainly bullish about the country's investment climate. "We're ready. We have a strong and clear institutional framework for PPPs. We have a diverse and dynamic pipeline of projects. And we have the experience and capabilities to get the projects delivered. This is Kenya's time," she declared proudly.

In Kigali, the government is eagerly waiting for the water to start flowing from the new Bulk Water Project. The hope in Rwanda is that it will not only help to quench the city's thirst for clean water, but also the continent's thirst for infrastructure investment. Green shoots need water. ■

# Advancing... at hyper-speed:

India leads the race to  
deliver hyperloop

A Virgin Hyperloop One pod is shown on a test track. The pod is white with a large Indian flag graphic (saffron, white, and green) on its side. The text "Virgin hyperloop one" is visible on the side of the pod. The pod is mounted on a metal track structure. The background is a clear blue sky with some light clouds.

**Davinder Sandhu**

Partner & National Head,  
Transport & Logistics  
KPMG in India

**Harj Dhaliwal**

Managing Director  
Hyperloop One  
Middle East & India region

India seems set to pioneer hyperloop technology. Can the country leverage its leadership to both improve the transportation network and become a global hyperloop supplier and developer?

Travellers trying to get across the 160 kilometers from Mumbai to Pune — a sprawling city of more than 3 million people — have three choices: they can take a train, a bus or a car. The train trip (while scenic) can take upwards of four hours and involves multiple exchanges. Those lucky enough to meet only light congestion on the highway might be able to make the trip in just under 3 hours.

Virgin Hyperloop One promises to bring that travel time down to just 35 minutes within the next 10 years. If everything goes according to plan, it will be the first full-scale commercial hyperloop system in operation in the world.

As most readers of *Insight Magazine* will know, hyperloop is the radical new transportation technology proposed by

Elon Musk in 2012. It uses reduced-pressure tubes to allow pressurized capsules to travel at speeds of up to 1,200 kilometers per hour. There are currently a number of companies and organizations working to commercialize the technology. Virgin Hyperloop One is one of the most advanced.

#### The natural cradle of hyperloop

India is not the only country seeking to pioneer hyperloop technology. Plans are being developed to link Dubai and Abu Dhabi with a hyperloop. Mexico City and Guadalajara are also hoping to be among the first to showcase the new technology.

India, however, seems like a natural place for the technology to find its roots.

“Virgin Hyperloop One promises to bring travel time down to just 35 minutes within the next 10 years.”



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India is home to the fastest growing global economy, a vibrant young workforce, and world-class high-tech engineering skills.”

“India is home to the fastest growing global economy, a vibrant young workforce, and world-class high-tech engineering skills,” noted Harj Dhaliwal, Managing Director for Hyperloop One’s Middle East and India region. “It’s an ideal market to launch hyperloop technology.”

The project has also received significant political and governmental support. Devendra Fadnavis, the Chief Minister of Maharashtra (the state where Mumbai and Pune are located) has voiced strong support for the project and has visited the test tracks. The state government signed a framework agreement with HyperLoop One at a global investor meet that was attended by Prime Minister Modi.

#### The first step in a larger plan

While other markets are also making plans, India seems to be progressing the fastest.

The Maharashtra government recently approved the development plans and named a consortium that includes Virgin Hyperloop One and DP World (the global logistics and port operator) as the Official Project Proponent.

Current plans suggest that the procurement process will close at the end of 2019 and project construction will start as early as 2020. Dhaliwal expects safety certification to be awarded by 2024 and full commercial operations to start on the Mumbai-Pune line by 2029.

The hope is that the system can then be scaled to different city-pairs in India. Dhaliwal notes that earlier estimates of five viable routes between different Indian cities had evaluated a 55-minute commute for a Delhi-Jaipur-Indore-Mumbai system, 50 minutes for a Mumbai-Bangalore-Chennai commute, 41 minutes for a Bangalore-



Thiruvananthapuram commute and 20 minutes for a Bangalore-Chennai commute on the hyperloop system.

“Once a hyperloop network is established, goods, services, education, and people can all zip across the country faster than an airplane with no direct emissions,” noted Dhaliwal. “We envision a future in which businesses can manufacture in one city and export from another; where people can live in one city and work in another; where friends can live in different corners of a country but meet up for dinner in less than an hour.”

### Enhancing the network effect

One of the top priorities for the project team is to ensure that the new technology fully integrates into the existing transportation modes in both Mumbai and Pune.

“Hyperloop is a revolution for intercity travel, yet we are still big fans of traditional metro, monorail, and bus systems for intra-city travel,” said Dhaliwal. “We recognize that last-mile solutions are increasingly necessary to create clean and efficient transportation webs, not just isolated projects.”

The hyperloop team is working hard to develop integration strategies with existing systems such as the Mumbai Metro, the MMR railway, the Mumbai monorail, PMDRA buses and the proposed Pune metro line. The project also includes an option to add a third station (known as ‘portals’ in hyperloop-speak) at the Navi Mumbai International Airport once it is completed.

“View this from a multi-modal transport perspective and the real benefits of a system like this come through,” added Dhaliwal.

### Creating a Center of Excellence

While commuter convenience is certainly high on the agenda, one of the main reasons that countries are competing to be the first to launch an operating, commercial hyperloop is economic. Simply put, they hope to develop a national hyperloop capability that can then be exported to other markets.

“Maharashtra will create the first hyperloop transportation system in the world and a global hyperloop supply chain starting from Pune,” announced Chief Minister Fadnavis recently. “Maharashtra and India are at the forefront of hyperloop infrastructure building now and this is a moment of pride for our people.”<sup>1</sup>

Dhaliwal agrees, noting that the state of Maharashtra boasts the largest gross value-add of any state in India. “The majority of system components can be locally sourced from the state of Maharashtra and exported all over the world,” he noted. “India is well positioned to unlock significant opportunities for growth and careers on the forefront of the next transport revolution and this will create thousands of new hi-tech jobs and add billions in wider socio-economic benefits.”

“

Maharashtra will create the first hyperloop transportation system in the world and a global hyperloop supply chain starting from Pune.”

### Advancing into the future

As Dhaliwal and Chief Minister Fadnavis note, India has set a consistent precedent for technological leapfrogging — the country is a global leader in IT, biometrics, mobile broadband, renewable energy and now space travel. And it has accomplished many of these feats at a fraction of the cost of other countries.

The hope is that the addition of hyperloop technology into the transport mix will catalyze another opportunity to seize the lead globally.

“Hyperloop technology adoption is a real enabler for India to leap-frog to a higher trajectory of growth, akin to the role that mobile phones have played earlier in terms of technology adoption as well as economic growth,” added Dhaliwal. “The race is on to develop and build the world’s first hyperloop system and Maharashtra is leading the way. How quickly others follow is just a matter of time.” ■



<sup>1</sup> <https://www.dezeen.com/2019/08/07/mumbai-pune-hyperloop-virgin-maharashtra-india/amp/>

# Indonesia's bold infrastructure plan

**Dr. Wahyu Utomo**

Deputy Minister of Infrastructure and Regional Development  
Coordinating Ministry of Economic Affairs of the Republic of Indonesia



**E**arlier this year, Indonesia announced a raft of infrastructure projects worth more than US\$400 billion. Where will the investment go and how will international infrastructure players participate?

President Joko Widodo understands the link between infrastructure investment and economic growth. When first elected four years ago, he announced a US\$350 billion infrastructure plan that promised to remove existing bottlenecks and improve access to infrastructure outside of the main island of Java.

This year, his government announced an even more ambitious plan for 2020 to 2024. More than US\$400 billion will be spent across hundreds of projects. Twenty-five new airports are in the pipeline, as are power plants, waste-to-energy facilities and lots of mass transit projects. The plans also include developing the groundwork for a new capital city.

#### Enhancing existing value

It's not all big-ticket items. In fact, much of the infrastructure plan focuses on enhancing the value of the assets created in that first round of investments.

"Our success in delivering backbone infrastructure projects over the past few years will have a massive economic impact on Indonesia going forward," said Dr. Wahyu Utomo, Deputy Minister for Infrastructure and Regional Development at Indonesia's Coordinating Ministry of Economic Affairs. "Now we need to start focusing on improving the supporting infrastructure that is needed to unlock the value of those backbone investments."



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Much of the investment will go towards creating new mass transit options and improving the efficiency of existing options. ”

Around 60 percent of the planned investment is earmarked for transportation projects.<sup>1</sup> As Dr. Utomo notes, many of Indonesia’s urban areas suffer from growing congestion and connectivity challenges. Much of the investment will go towards creating new mass transit options and improving the efficiency of existing services.

#### A bigger role for private players

Initial plans anticipate that about 40 percent of the funding will come directly from the government while around a quarter will come from various state-owned enterprises. The government is hoping to encourage the private sector to invest the remaining 35 percent.

“The private sector has been very engaged in Indonesia’s infrastructure markets and we hope to encourage that participation to continue and grow,” noted Dr. Utomo. “We also hope to expand private sector participation outside of economic infrastructure to include social assets and services like education, health and social services.”

#### The energy to expand

Energy projects are expected to receive the second largest slice of the planned budget. Some will go towards improving the country’s overall energy capacity and diversifying its mix.

“We were able to develop a very robust electricity market in a very short amount of time,” noted Dr. Utomo. “Now we need to do the same for the oil and gas sectors. The government recognizes that investments into energy don’t just drive foreign direct investment and create export potential. They also allow the country to achieve energy security and diversify our energy sources.”

New waste-to-energy projects are also in the plan. “The goal is to both reduce our waste in an environmentally-friendly way and to improve the energy supply,” added Dr. Utomo.

#### Making investment easier

Beyond simply announcing a massive pipeline, the Government of Indonesia is also working hard to create the right environment to attract investment. Reducing regulation has been a key priority for this government.

“Speed of service, speed of giving out permits, are the keys to bureaucratic reform,” President Widodo told a recent rally to outline his vision for the country. “When I see there is an inefficiency or lack of effectiveness, I will remove it.”<sup>2</sup>

Earlier this year, the President noted that his government had reduced the number of permits required to invest into power plants by more than 75 percent (from 259 just a few years ago).<sup>3</sup> Major new regulation has also been passed to support private investment into other sectors and to help improve the land acquisition process.

#### Improving capacity and creating a track record

At the same time, the government is also focusing on improving the quality of the projects it is bringing to market. A pool of funds has been set aside for enhancing the quality of project preparation. And a new team has been created to help identify and clear roadblocks in the development and implementation process.

Dr. Utomo also notes that more capacity building will be required at the local and regional level, particularly in key growth markets. For example, some of Indonesia’s 12 Special Economic Zones are operated by local government and private companies. These players often require additional support to meet the needs of international investors.

“We need to further enhance our track record for bringing projects to market successfully,” added Dr. Utomo. “That, in turn, will help improve private sector appetite for future infrastructure projects in Indonesia.”

<sup>1</sup> Indonesia National Development Planning Agency, 2019 (via Bloomberg at <https://www.bloomberg.com/news/articles/2019-05-16/indonesia-has-a-412-billion-plan-to-rebuild-the-country>)

<sup>2</sup> <https://www.reuters.com/article/us-indonesia-politics-widodo/indonesia-president-pledges-more-infrastructure-investment-in-second-term-idUSKCN1U90HD>

<sup>3</sup> Ibid





## Seeing results

Many of the key indicators suggest that Indonesia is making great progress in delivering on its infrastructure-driven objectives and vision. The country's debt ratings have been upgraded to investment grade. International rankings of national ease of doing business and competitiveness also show remarkable improvements in Indonesia's business and investment environment.

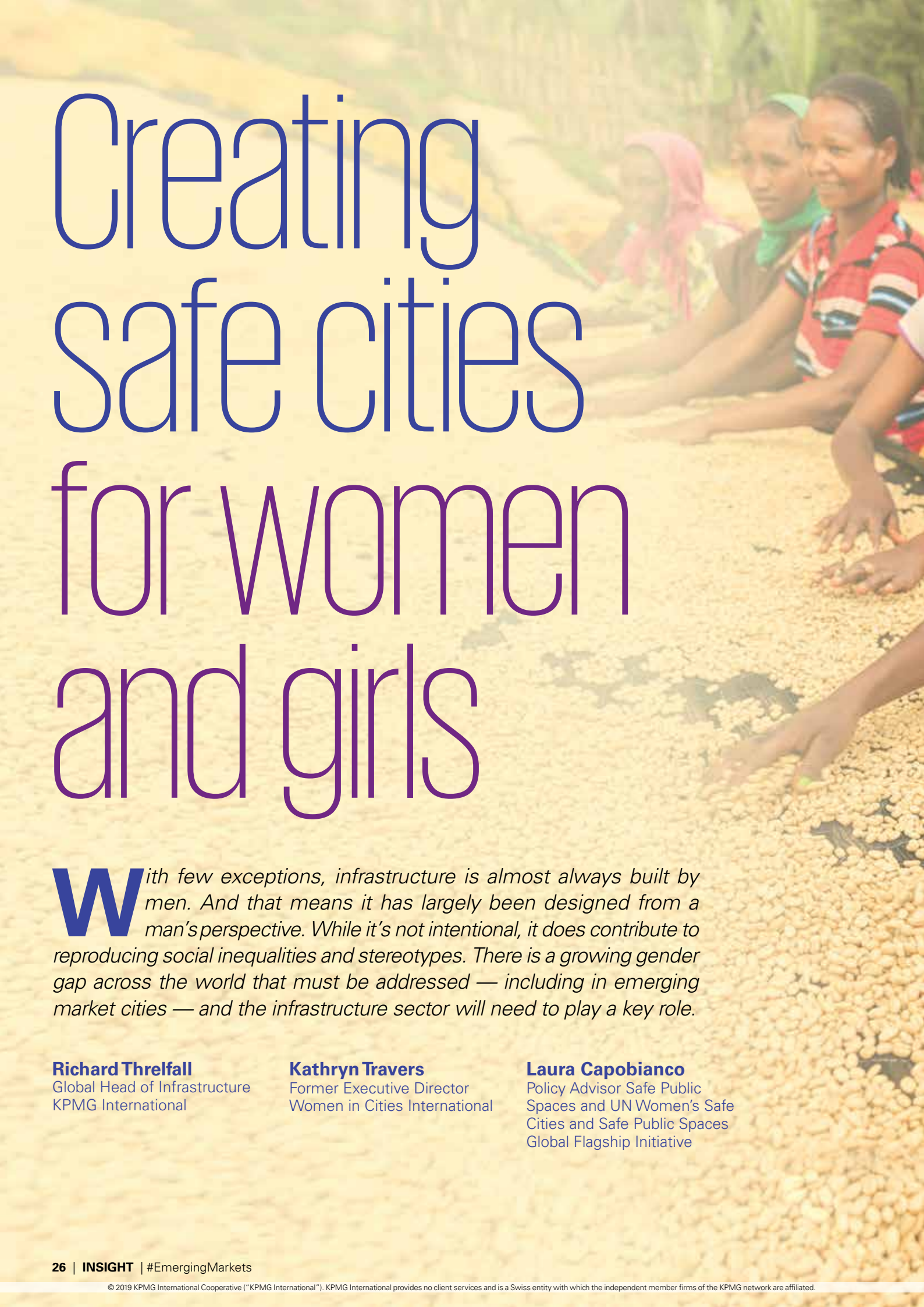
"We still have a lot of work to do, but my conversations with international investors suggest that we are on the right track towards creating a very welcoming investment climate for foreign investors," added Dr. Utomo. "We're building capacity, we're simplifying our processes, we're passing supportive regulation and we're designing innovative incentives to help draw investors to our pipeline."

Indonesia's plan may be bold. But the government is taking the right steps to deliver on it. ■

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Conversations with international investors suggest that we are on the right track towards creating a very welcoming investment climate for foreign investors. ”

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# Creating safe cities for women and girls

**W**ith few exceptions, infrastructure is almost always built by men. And that means it has largely been designed from a man's perspective. While it's not intentional, it does contribute to reproducing social inequalities and stereotypes. There is a growing gender gap across the world that must be addressed — including in emerging market cities — and the infrastructure sector will need to play a key role.

**Richard Threlfall**  
Global Head of Infrastructure  
KPMG International

**Kathryn Travers**  
Former Executive Director  
Women in Cities International

**Laura Capobianco**  
Policy Advisor Safe Public  
Spaces and UN Women's Safe  
Cities and Safe Public Spaces  
Global Flagship Initiative



“

It's not just about installing good lighting and removing dilapidated buildings; women and girls often cite things like uneven pathways, a lack of visible sightlines in parks and alleyways, and poorly maintained public spaces like parking lots and public toilets as elements that signal the space may not be safe for them. ”

Women do not feel safe in their cities. Research from the US shows that around two-thirds of women have experienced some form of sexual harassment in public spaces in their lifetime.<sup>1</sup> More than half of women in Guatemala City say they feel unsafe walking alone in public spaces during the day.<sup>2</sup> The way infrastructure is planned and maintained has a lot to do with that.

Indeed, poorly planned infrastructure can actually create opportunities for violence against women and has a direct impact on whether a woman or girl feels safe in their surroundings. It's not just about installing good lighting and removing dilapidated buildings; women and girls often cite things like uneven pathways, a lack of visible sightlines in parks and alleyways, and poorly maintained public spaces like parking lots and public toilets as elements that signal the space may not be safe for them.<sup>3</sup>

The challenge is particularly acute in the growing cities of the emerging markets. Rapid (and often unregulated) development and expansion has created some chaotic and unsafe environments. In those places where planning is rigorous, decision-makers are often more focused on achieving the lowest cost than addressing the gender gap. Existing assets are operating beyond capacity and that is creating street-level competition for public services; women and girls are often left behind.

#### Locked out

Ensuring women and girls feel safe in their cities is not a trivial thing. The experience and fear of harassment and violence may influence a woman's choices on where or when they work. It could affect their access to employment, education, recreation and cause them to alter their travel routes through a city. It might impact their choice of transportation. It could also limit a woman's access to critical city services such as housing, sanitation, legal and support services.

“Creating safe cities is about strengthening women's empowerment, giving her choices and reducing her risk of all forms of violence,” noted Laura Capobianco, a Policy Advisor on Safe Public Spaces and UN Women's Safe Cities and Safe Public Spaces Global Flagship Initiative. “It requires comprehensive

infrastructure interventions — both in terms of hard infrastructure such as roads, markets, public toilets and lighting, as well as soft infrastructure like vocational skills training and services related to economic, health, culture and social development.”

If unlocking city infrastructure and services for half a city's population wasn't enough of an incentive, there are also good economic and policy reasons to focus on safe cities. According to recent studies, violence against women reduces global GDP by 2 percentage points (or around US\$1.5 trillion<sup>4</sup>) per year; creating safer spaces could catalyze a boom in sustainable growth in cities.

Policy leaders will also recognize that creating safe cities is key to achieving many of the UN's Sustainable Development Goals (SDGs): Goal 4 on education, Goal 5 on gender equality, Goal 11 on inclusive cities and Goal 16 on peace and justice. All countries and stakeholders, acting in collaborative partnerships, will implement the SDGs and governments will report on meeting targets related to the safety of women and girls in cities and other settings.

#### Making it real

At UN Women, Laura Capobianco and UN safe city country teams in many countries have been talking to cities and infrastructure leaders about the need for 'gender responsive' urban planning and infrastructure.

“This is simply about creating the space to ensure different voices are embedded into the planning process,” added Capobianco. “The aim of gender responsive planning is to encourage decision-makers across all policy areas to ensure that the needs and concerns of all women and girls are considered at all phases of a planning process — from inception, planning and design through to implementation, operation and monitoring.”

The Safe Cities and Safe Public Spaces for Women and Girls Global Flagship Initiative was created to help city leaders develop and implement tools, policies and approaches designed to assist in the prevention of sexual harassment and other forms of violence against women and girls in public spaces across different settings.

<sup>1</sup> Stop street harassment (2018) The Facts Behind the #MeToo Movement: A National Study on Sexual Harassment and Assault. United States.

<sup>2</sup> <https://lac.unwomen.org/en/noticias-y-eventos/articulos/2018/11/feature-women-in-guatemala-steer-change-look-solutions-to-end-sexual-harassment>

<sup>3</sup> UN Women (2019) Safe Cities and Safe Public Spaces for Women and Girls Global Flagship Initiative: International Compendium of Practices. New York: UN Women

<sup>4</sup> Cited in UN Women (2016)

The first five cities selected to participate in the Global Flagship were Quito, Ecuador; Cairo, Egypt; New Delhi, India; Port Moresby, Papua New Guinea; and Kigali, Rwanda. More than 40 cities have participated to date. Tactics and strategies for making infrastructure more gender responsive are often high on the agenda.

### Taking action

Embedding women's and girls' voices into the infrastructure planning process doesn't have to be difficult. In fact, one of the more common approaches involves what's called a 'women's safety audit'.

"Women's safety audits are a practical, easy-to-use tool that can help ensure women's and girls' voices are included in the urban planning process," noted Kathryn Travers, former Executive Director of Women in Cities International, an NGO focused on encouraging the participation of women in urban development and a global safe cities partner to UN Women. "They allow women to engage with their built environment in a way that speaks to urban planners without requiring them to have any formal training."

In a women's safety audit, local women and girls (as well as NGO and community leaders) use a checklist to evaluate specific elements in the built and social environments of a particular space. They are encouraged to note anything that hinders or strengthens their sense of safety in that place and to make recommendations for change.

"Women's safety audits recognize the 'lived experiences' of women and girls in the spaces they use regularly; it allows women who use a space to influence the safety of that space," noted Travers.

### Influence change

Much can be done in partnership to build on positive results<sup>5</sup> and to ensure that monitoring continues to progress across the world, including in many emerging market cities. "Strong political will is key to strengthening and sustaining action in cities," added Capobianco. "More and more governments today are taking or recognizing the importance of developing an integrated approach that focuses on economic empowerment, increasing political participation of women and youth, and ending violence against women and girls."

However, it is clear that much more needs to be done. And that will require sustained, coordinated action on the part of policy makers, infrastructure providers, community groups, and other civil society organizations.

"Each partner can work within their area of influence to help step up action on gender equality and safety in cities," added Capobianco. "This is our opportunity to collectively build and scale up safe and sustainable city approaches that allow all women and girls to achieve their full potential and achieve full participation." It's an opportunity not to be squandered. ■

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### Global tool, local approach

While women's safety audits tend to follow a fairly well-defined framework, the approach should always be tailored to each situation and assessment.

For example, in Papua New Guinea — where more than 800 different languages are spoken — organizers of a women's safety audit conducted in a local market where vendors are predominantly women, replaced all of the questions with pictures, icons and emoticons.

"The tool is about more than just generating new design ideas and improving operational safety. It's about women and girls feeling empowered in the process — giving them accessible tools that recognize their unique insights, experiences and lives," added Kathryn Travers.

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Women's safety audits are a practical, easy-to-use tool that can help ensure women's and girls' voices are included in the urban planning process. ”

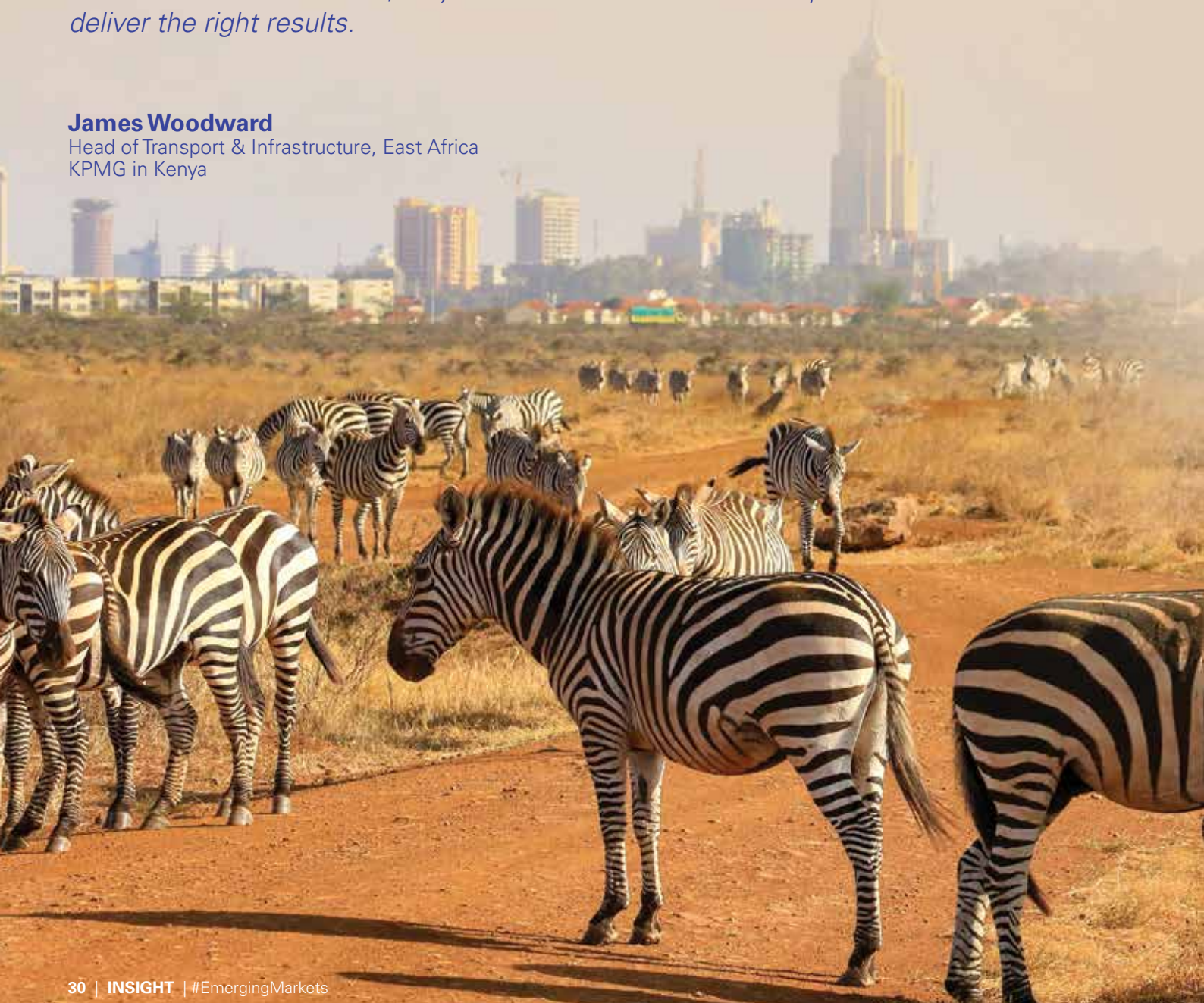
<sup>5</sup> UN Women (2017) Safe Cities and Safe Public Spaces: Global results report; UN Women (2018) Fourth UN Women Safe Cities and Safe Public Spaces Global Leaders' Forum: Proceedings report. Action Aid (2017) Whose City? An evaluation of urban safety for women in 10 countries.

# Kenya transforms its social housing program

**G**overnments across Africa are struggling to meet their affordable housing goals. So rather than just doing more of the same, Kenya has decided to take a different approach to the issue. The foundations are sound; only time will tell if the audacious plan will deliver the right results.

## **James Woodward**

Head of Transport & Infrastructure, East Africa  
KPMG in Kenya



Africa is in the midst of a massive housing crisis. In many markets across the continent, birth rates continue to rise; Africa's families are getting bigger and younger. Yet, generally speaking, economic growth rates have been unable to keep up. Affordability has become a key issue.

Unfortunately, our experience and research across Africa suggests that current approaches to delivering low-cost housing have not been working. Almost every African government has a national housing agency whose job is to churn out as many low-cost homes as possible. The problem is that they rarely (if ever) deal sufficiently with the affordability issue. And that makes them largely unsustainable.

The affordability issue cuts two ways. On the one hand, families that are moved into low-cost housing are often unable to afford the increase in costs that may come with a new home. Vertical slums quickly form. At the same time, few governments have the financial resources to supply subsidized housing at the scale required. Neither governments nor their citizens can afford the current approach.

### A different approach

When Uhuru Kenyatta was re-elected President in 2017, his government outlined what it called Kenya's Big 4 Agenda: universal healthcare coverage; food and nutrition security for all; an increase in manufacturing to 20 percent of GDP; and — critically — 500,000 new affordable homes. Half-a-million homes would make a huge dent in the country's affordable housing gap.

More than just setting a target for more low-cost housing (which would likely carry

the same affordability risks as before), Kenya's government has taken a rather different approach. Here are five innovative elements of the plan:

— **Creation of new funding mechanisms.**

The Government has created a National Housing Development Fund that will be funded through a 1.5 percent employee payroll levy and a further 1.5 percent employer contribution. Employee funds will be held in a segregated account to be used by the employee as an offset against a deposit for purchasing affordable housing. If not utilized for affordable housing, the funds accrue to the employee after 15 years or on retirement.

— **A clear linkage between manufacturing GDP and affordable housing.**

Kenya's government is focusing on encouraging growth in manufacturing sectors that would support the development of the housing agenda — concrete manufacturers, construction materials, and so on. The hope is that, by creating a strong local supply chain and a stable source of demand, the government can encourage growth in the manufacturing sector while also reducing the cost of input material for the housing program.

— **Reduction of development costs and risks.**

In most cases, Kenya's government will not only provide the land for development, they will also provide the connecting infrastructure required to link each of these new estates to the grid. Standardized and pre-approved unit designs allow for rapid planning approvals. Perhaps most importantly, the government is providing a guaranteed offtake for every unit built through the National Housing Development Fund.

— **Upside opportunity for private developers.**

While the developer will be expected to utilize at least 70 percent of the land to build affordable housing, the remainder can be developed for a wide range of commercial or residential uses. Ultimately, the developer will also benefit from the real estate uplift that will come from higher quality development.

— **Access to affordable mortgages.**

In partnership with The World Bank, Kenya's government has created the Kenya Mortgage Refinance Corporation with 20 percent ownership by the Kenyan government and 80 percent owned between 20 local banks, savings cooperatives and The World Bank. The KMRC will provide long-term funding to local banks and savings cooperatives, which in turn will enable these institutions to extend loan tenors to mortgage buyers. In a country with a population of over 45 million people and less than 30,000 mortgages, the KMRC is a positive step forward in supporting affordable finance for the 97 percent of formally employed Kenyans with household incomes of less than \$1,000 per month.

### Go big and go for homes

While, at the time of writing, the plan was still clearing a few regulatory and legislative hurdles, it is clear from President Kenyatta's Big 4 Agenda that there is significant political appetite for making sure that shovels are put into the ground as soon as possible.

Building 500,000 new affordable homes is an audacious goal. Making sure they are affordable for the people who live in them will make it a goal worth achieving. Kenya's progress will certainly be worth watching. ■



# Building confidence: Brazil opens up for business

**B**razil's new government has an aggressive infrastructure investment plan. And it is taking significant steps to try to create an environment that attracts foreign investment and private participation into the market. Recent activity suggests its efforts are bearing fruit.

To find out more about how Brazil has restored investor confidence and revitalized its infrastructure sector, **Mauricio Endo**, KPMG in Brazil's Head of Government and Infrastructure, sat down with three public sector leaders with direct oversight over key aspects of the country's infrastructure plan: **Natália Marcassa**, Secretary of Development, Planning and Partnership at the Ministry of Infrastructure; **Diogo Faria**, Secretary of Infrastructure Development at the Ministry of the Economy; and **Jonathas Castro**, Executive Secretary of the Government Secretariat at the Presidency of the Republic and former National Secretary of Sanitation at the Ministry of Regional Development. Here are some highlights from their conversation.







We have started to move towards a much more centralized structure with a dedicated agency to coordinate infrastructure investment. ”

**Mauricio Endo: We have seen significant foreign interest and activity in Brazil's infrastructure markets recently. In your opinion, how has Brazil's infrastructure environment improved over the past year?**

**Jonathas Castro:** I think what we are seeing is foreign investors responding to the changing regulatory climate in Brazil. We've significantly improved governance. And we have started to move towards a much more centralized structure with a dedicated agency to coordinate infrastructure investment. I think these are some of the reasons that investors are becoming much more confident about Brazil.

**Diogo Faria:** Jonathas is absolutely right. And we are continuing to review virtually all of our regulatory frameworks to ensure they work to attract and ease the flow of foreign capital into Brazil's markets. At the same time, the government is also taking steps to reduce the influence of state-owned companies in the economy. And we are putting more focus into improving project analysis capabilities and long-term planning. Regulatory change is part of the mix, but it takes more to create an attractive investment climate.

**Natália Marcassa:** I see lots of evidence that the plan is working. Take, for example, the recent auction for the North-South Railroad concession — undoubtedly one of the greatest early achievements of President Bolsonaro's administration. The auction attracted multiple foreign and local investors and, ultimately, was won with a bid that more than doubled the minimum. Clearly, Brazil's infrastructure auction processes are being very well received in the international markets.

**Mauricio Endo: President Bolsonaro's infrastructure plan calls for a doubling of infrastructure investment to approximately US\$65 billion per year by 2022. Where do you expect to see the greatest levels of activity and private investment?**

**Natália Marcassa:** The transportation sector is certainly going to attract a lot of interest from foreign players. Through the Ministry of Infrastructure, we are planning the world's largest public-to-private asset transfer program in the transport sector.

More than US\$52 billion worth of assets will be transferred including more than 16,000 kilometers of main roads, about 15,000 kilometers of railways, airports and port terminals. The next phase of airport auctions scheduled for October 2020 will also attract a lot of attention.

**Jonathas Castro:** As a country, we have big goals for our sanitation sector. We are aiming to expand access to clean water to 99 percent of the population and sewage to 92 percent of the population in the next 14 years. That is going to require around US\$143 billion in new investments across water, sewer, residues, drainage and other sanitation assets. Right now, the government is finalizing new legislation that will make it much easier to attract private investment to the sector. I think we're going to see a lot of activity in the sanitation space over the next ten to fifteen years.

**Diogo Faria:** Transportation and sanitation are certainly high on the government agenda. And now, for the first time ever, we have a very detailed long-term infrastructure plan that looks out more than 20 years. The Investment Partnership Program website has a list of more than 60 different projects that are currently in different stages of preparation, analysis and prioritization. There are lots of projects in the energy sector — oil and gas in particular. Throughout, we are using global standards of economic modelling to prioritize those investments that will deliver the greatest economic growth to Brazil.

**Mauricio Endo: I believe that emerging market leaders are starting to recognize that they need to innovate on the traditional PPP model if they want to attract private investment to their programs. How has Brazil adapted and innovated?**

**Natália Marcassa:** You are right. And, across most sectors, we are always looking to create new models that combine the best aspects of our last tender with new rules and mechanisms. We are working with hybrid models that consist of higher grant values and lower toll rates. We're also exploring the use of variable grants that would be paid quarterly and as part of the base of the gross concession revenue. Our focus is on making sure the competition phase and the

administration of contracts are more robust throughout the concession period.

**Jonathas Castro:** I think a lot of lessons were learned from the recent airport auctions. The biggest lesson was that — across many sectors — we need to build scale to make investments viable. The airport auctions offered assets in ‘blocks’ and that scale has allowed investors to come forward with investment and operational plans that maximize efficiency while delivering services at scale. I think the government sees that this approach could be applied in many other sectors including the sanitation sector.

**Diogo Faria:** Similarly, I believe we are also starting to see a shift in thinking from ‘asset creation’ to ‘outcome delivery’. Ministries and investors understand that technologies are rapidly evolving and that is leading some of the more innovative sectors to start thinking about how they can start contracting for outcomes rather than for specific assets or technologies. The goal should be, for example, delivering X amount of iron ore from point A to point B. How that happens is almost a secondary point.

**Mauricio Endo: What do you think foreign investors, developers and operators need to know about Brazil today?**

**Natália Marcassa:** Brazil is a business-friendly country. Our economy is opening, we are addressing the main risks that worried investors in concession contracts, and we have a huge pipeline of projects to be developed. I’m not aware of any other country in the world that can compete with our infrastructure pipeline, our rates of return and our level of legal certainty.

**Jonathas Castro:** I would agree. And I think we have put a lot of effort into improving the overall business environment and adopting best practices across the infrastructure market. And that, in turn, has allowed us to create much more robust and transparent concession models and investment structures. I think the clear message here is that Brazil is making the changes that are needed to propel the country forward over the coming years.

**Diogo Faria:** Simply put, Brazil is back in business. ■



# Unlocking services: Taking smart cities to the next level

**A**s smart cities start to flourish in the emerging markets, many governments are exploring how they can extend their existing investments to create smarter regions and countries. Based on the experience of Singapore and West Java, the key is to focus on customer-centricity.

**Paul Kent**

Global Infrastructure Head  
of Smart Cities  
KPMG International

**Setiaji**

Head of ICT Agency  
West Java Provincial  
Government

**Dr. Limin Hee**

Director of Research  
Centre for Livable Cities in Singapore



“

The next stage of our development involves establishing strategic partnerships with companies to create smart districts where we can test new technologies and gain experience. ”

With little 'legacy' infrastructure to hold them back, many of the largest emerging market cities have been making great progress on their Smart Cities agendas. In fact, across the ASEAN region alone, there are at least 26 smart cities in development, including megacities like Jakarta, Bangkok and Manila. And while each emerging market smart city may be at a different stage of development today, the vast majority are seeing significant value start to flow from their investments.

Now, the agenda has started to shift. Rather than just focusing on enabling citizens already living in city centers, a growing number of governments are exploring how they can take digitization and smart infrastructure to a much wider population.

As a city-state, Singapore has always taken a broader view of their smart city investments. Others, like the Province of West Java in Indonesia, are now starting to also think in much broader terms about their technology enablement.

“Our focus has shifted towards ensuring that our IT investments are inclusive to all of our citizens,” noted Setiaji, Head of the ICT Agency with the Government of West Java and former Head of Jakarta’s Smart Cities program. “The majority of West Java’s population lives in rural areas and our job is to provide them with the technologies and services they need to grow in their villages.”

### Investing into new tech

For both West Java and Singapore, part of the plan involves developing and deploying new technologies that leverage existing infrastructure to meet the needs of the wider population.

In Singapore, for example, under the Smart Nation Sensor Platform, the government is converting public lamp posts into an interconnected network of wireless sensors. “This will allow agencies to collect and analyze valuable data at a very granular level in order to gain better insight into priorities for urban development,” noted Dr. Limin Hee, Director of Research with the Centre for Liveable Cities in Singapore. The sensors would provide details on things like traffic volumes, air quality and street lighting.

With large rural populations and challenging physical environments, the focus in West Java is on deploying technologies that can drive wider participation. “Of 5,312 villages in West Java, over 700 of them do not have Internet access, even through 3G

or 4G networks,” pointed out Setiaji. “Our first priority is to provide the technology these villages need in order to connect. Or, in some cases, technologies that unlock services without the need for continuous internet access.”

For example, the West Java government is promoting the use of devices containing a deep library of information that can be updated online but stored offline. This will be used to help educate school children, communicate important information or to help train adults to use new technologies.

### Partnering for public good

Both Hee and Setiaji agree that partnerships are critical to delivering on the Smart agenda. “We recognize that government can’t do everything on its own; it takes partnerships and collaboration,” added Setiaji. “That is why we are collaborating with a wide range of parties, from academia, businesses, developers, startups and the community through to other levels of government — particularly the central government and our city government bodies.”

Singapore’s government is also keenly focused on collaboration and partnership. “Our plans for a Smart Nation aren’t just about how government can provide smart infrastructure, but also about how businesses and citizens can take advantage of that infrastructure to become more engaged and live better lives,” noted Hee.

Having already achieved a fairly high level of smart city sophistication, Singapore’s focus has shifted to creating regional incubators. “The next stage of our development involves establishing strategic partnerships with companies to create smart districts where we can test new technologies and gain experience,” she added.

In the Punggol Digital District, one of the three smart districts being developed in Singapore, the government has worked with academics, businesses and government agencies to create a new digital platform that can integrate a range of smart city solutions — including district cooling systems, pneumatic waste conveyance systems, car park management systems and so on — to achieve a more centralized approach to management and operations.

## Open up the data

As many governments around the world are starting to recognize, government data needs to be 'open' and integrated in order to drive innovation and enhance the results of collaboration. "We aren't building a lot of apps ourselves; we are just opening up our data — both our manual data and our systems data — to allow startups to build applications that help solve some of the big problems we have in West Java," noted Setiaji.

"West Java as a provincial government is actively seeking to enable city and regency level governments to integrate their data. The provincial government is constructing 13 command centers in the city and regency levels between 2019 to 2020 and will integrate them to the command center in the provincial level."

Hee agrees. "Creating a successful and sustainable Smart Nation isn't about delivering a massive amount of infrastructure. We also need to encourage the innovation that we want to see. Opening up our data allows the private sector and academics to take a leading role in helping make our nation more livable by developing technologies and apps that deliver on our objectives," she added.

Singapore is also taking steps to better integrate data across government departments and agencies to deliver a more seamless experience for citizens when dealing with the government. For example, the government recently launched the OneService app that allows citizens to report issues such as cracked pavements or malfunctioning lights.

"Citizens don't really care which department is responsible as long as the issue gets fixed," added Hee. The platform even provides citizens with real-time updates on how their report is being managed and (hopefully) resolved.

## Talking talent

Building a smart city or region is one thing; having the right skills to operate, maintain and improve the new services and models is another thing altogether. And it is a major focus of smart cities seeking to sustain their technology advances.

"On the one hand, we are helping people upgrade their skills so that they can reap the full rewards of the digital economy. But, at the same time, students are learning key

skills like coding," noted Hee. "We aren't just talking about systematic design, we are actually stepping up our educational programs to embed it into our way of thinking."

West Java is also investing into new skills and capability development. "We need to bring up the level of professionalism and training in our schools, including vocational schools, to prepare the next generation of students to take advantage of Industry 4.0 and everything that it brings," added Setiaji. He also hinted at the breakthrough West Java is orchestrating with the formation of the West Java Digital Service (JDS) to attract digitally-focused, young talents, comprising of software programmers, developers, data and business analysts, product managers, and designers to help transform the West Java into a digital province.

## Leave nobody behind

While new technologies, talent, collaboration and open data are all key to expanding smart city capabilities out to a broader audience, both Hee and Setiaji agree that the most important thing is to focus on what is best for citizens.

"For us, the focus is on ensuring that we are creating a more inclusive society where people outside of the cities have equal access to services they need," added Setiaji. With Digital Village Programme, his government has deployed a number of citizen-centric apps and technologies that respond to the actual needs of rural citizens. One app, for example, helps fish farmers to monitor the health and activity of their stock. Another app helps small-scale agricultural farmers improve their crops through real-time planting and irrigation support. West Java is also deploying a one-stop public service super apps, called Sapawarga (Greet the People), to over 53,000 community leaders throughout the province to help democratize public service delivery.

In Singapore, investments in smart urban technologies has always been about making a difference in people's lives. "Smart city investment can't just be about cost savings and efficiency. You need to be focused on making an impact in the day-to-day lives of the people you serve," noted Hee. "It's all about knowing your citizens better and then using that information to deliver better services. Most of all, it's about ensuring that Smart Cities remain inclusive and that nobody gets left behind," she added. ■

“Singapore is also taking steps to better integrate data across government departments and agencies to deliver a more seamless experience for citizens when dealing with the government.”

# Waste-to-energy: Green solutions for emerging markets

**Wen Bin Lim**

Director, APAC Head  
Renewable Energy  
KPMG in Singapore

**Edwin Yuen<sup>1</sup>**

Senior Infrastructure  
Finance Specialist  
Global Infrastructure Facility  
World Bank in Singapore

**Ananda Ram Bhaskar**

Deputy Chief Executive Officer  
(Environmental Protection) &  
Director-General of Environmental  
Protection Division  
The National Environment Agency

<sup>1</sup> Edwin has recently joined the Asian Infrastructure Investment Bank in Beijing as a Senior Private Sector Operations Specialist.





**G**overnments across the emerging markets are eager to tap into waste-to-energy (WTE) technologies. But many are learning that it takes more than the granting of licenses to create economically and environmentally sustainable WTE solutions. In this article, we look at a number of Southeast Asian markets to identify both new projects and barriers to adoption. We also provide several tips to help governments and planners in the successful development of their WTE initiatives.

### Municipal solid waste in Asia

Country	Waste generated per kg/version/day		Increase/decrease
	Current	2025 (projected)	
Japan	1.71	1.7	▼ 0.5%
South Korea	1.24	1.4	▲ 12.9%
<b>Singapore</b>	<b>1.49</b>	<b>1.8</b>	<b>▲ 20.8%</b>
Indonesia	0.52	0.85	▲ 63.5%
China	1.02	1.7	▲ 66.7%
Philippines	0.50	0.9	▲ 80.0%
India	0.34	0.7	▲ 105.9%

Source: <https://www.straitstimes.com/asia/se-asia/when-waste-isnt-wasted-how-a-small-indonesian-city-turned-garbage-into-electricity>

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Projects should begin with waste minimization as a public policy, followed by waste recycling and WTE incineration, and ending with the remaining ash delivered to local landfills.”

### New solutions for new imperatives

WTE technologies convert non-recyclable waste into usable forms of energy. The heat from the combustion of waste generates superheated steam in boilers, and the steam drives turbogenerators to produce electricity.

Waste management has become an imperative given that most cities are running out of landfill sites — the traditional method of disposing of waste. With increasingly limited land availability and the steady growth of cities, governments need to implement effective and sustainable waste management solutions including WTE technologies.

WTE is only one part of a comprehensive, waste management plan,” says Edwin Yuen, Senior Private Sector Operation Specialist at the Asian Infrastructure Investment Bank. “Projects should begin with waste

minimization as a public policy, followed by waste recycling and WTE incineration, and ending with the remaining ash delivered to local landfills.”

WTE systems provide a highly valued source of renewable energy, but perhaps the greatest benefit of WTE today comes from its ability to convert waste into ash, reducing by up to 90 percent the volume of waste going to landfills.<sup>2</sup> This reduction in waste can also help contain the amount of methane emissions from landfills with decomposing organic materials.<sup>3</sup> These issues are especially important in Southeast Asia, where the urban population is projected to rise to nearly 400 million by 2030,<sup>4</sup> requiring significant investments to cope with the rapid increase in garbage. In some areas such as Singapore, the relative lack of land for landfills is also a key factor in adopting WTE solutions.

<sup>2</sup> <https://www.renewableenergyworld.com/2014/01/13/an-independent-engineering-evaluation-of-waste-to-energy-technologies/#gref>

<sup>3</sup> <https://www.chinadialogue.net/article/show/single/en/11093-Waste-to-energy-A-renewable-opportunity-for-Southeast-Asia>

<sup>4</sup> <https://www.citylab.com/life/2017/01/southeast-asia-martin-prosperity-institute/511952/>

WTE is one of several imperatives for sustainable waste management. WTE systems can be an effective supplement to fossil fuel-based power sources while also reducing landfill requirements in urban environments, generating renewable energy and producing revenue for municipalities and governments.

### Proven technologies

WTE technology has been developed and implemented for decades. The most robust technology is 'moving grate, mass burn' technology featuring a moving grate that burns Municipal Solid Waste (MSW) on a grate travelling from a feed shaft to the ash pit. The moving grate technology does not require pretreatment or sorting of MSW, allowing it to accommodate large quantities and variations of waste composition and calorific value. The technology has been used for over a century, with a proven track record of operation for mixed MSW treatment.

Between 2003 and 2011, at least 106 moving grate incineration plants were built worldwide for MSW treatment.<sup>5</sup> One of the world's largest moving grate incineration plants was installed in Singapore by Mitsubishi in 2000, providing a capacity of 4,300 tons per day (tpd) of waste.<sup>6</sup>

A wide range of technology solutions for WTE — some already used in developed markets — is expected to be implemented in Southeast Asia in the years to come. 'Fluidized bed' is a cleaner and more efficient technology for converting waste to electricity, but the process needs a more uniform waste size to operate, making it more complicated and expensive compared to moving grate systems. 'Gasification' plants use plastic and organic solid waste in a chemical conversion process that creates and burns synthesis gas at high temperatures.

### The economics of WTE

The Asia-Pacific WTE market is projected to grow at an annual rate of over 15 percent and reach a value of US\$13.66 billion by 2023.<sup>7</sup> Tapping into this market is a variety of commercial banks, multilateral development banks, financial sponsors, and private equity firms. In general, financial

equity is less available in emerging markets but more common in developed markets such as Australia.

Public Private Partnerships (PPPs) are a favored development strategy in the region. In Singapore, the NEA develops WTE facilities both on its own and through private sector developers under a PPP structure, according to Ananda Ram Bhaskar, Deputy Chief Executive Officer (Environmental Protection) & Director-General of Environmental Protection Division at Singapore's National Environment Agency (NEA).

In a typical PPP structure for WTE projects, the developer undertakes the development of the project under the Design-Build-Own-Operate (DBOO) model. In the DBOO model, the developer secures its own financing and builds, owns, maintains and operates the WTE facility to meet the contracted WTE capacity over the lifespan of the facility, which is about 25–30 years. WTE facilities require significant upfront investments and developers and their financiers require assurances from the government agency commissioning the project that enables the investment to be recovered over time.

Yuen points out that any development strategy involves the basic economics of how a WTE facility makes money. Along with government incentives, WTE is based mainly on two sources of revenue. The first source is a gate fee charged when municipalities, businesses or other organizations deliver their waste to the facility for disposal. The second source is the generation of electricity that is sold to local power grids. End products of WTE incineration like ash represent a third but smaller source of revenue.

Yuen explains that the gate fee is driven by the volume of waste, and electricity sales are driven by the heat produced. This fact, in turn, can influence the business model of the WTE project. The more waste that is combustible, like plastics, paper or wood, the hotter the furnaces burn and the higher the caloric value (CV) produced. The more non-combustible waste, like bricks or glass, the lower the CV. This mix determines the facility's revenue streams.

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A wide range of technology solutions for WTE is expected to be implemented in Southeast Asia in the years to come.”

<sup>5</sup> <https://www.bioenergyconsult.com/moving-grate-incineration/>

<sup>6</sup> <https://www.mhi.com/news/story/1510261931.html>

<sup>7</sup> <https://www.prnewswire.com/news-releases/the-2018-asia-pacific-waste-to-energy-market—projected-to-grow-at-a-cagr-of-15-5-to-reach-a-value-of-13-66-billion-by-2023-300764181.html>

“

In some ways, Japan is taking a more aggressive approach than China by offering combination packages that include WTE backed by a range of services such as waste sorting, waste reduction, personnel training and recycling.”

In addition, safety regulations require that the facility is designed for a certain thermal capacity. If the percentage of combustible waste is too high, the CV value will be above the designated level, and the operator will have to reduce the amount of waste going through the facility. This reduces gate fees. However, if the CV is too low, the facility generates less electricity that it can sell.

“The single biggest challenge for WTE,” says Yuen, “is to balance the right CV and quality of the waste to optimize both waste volumes and electric sales.”

#### Developments across Southeast Asia

Currently, there are 10 waste-to-power plants or trial projects across the 10 member states of the Association of Southeast Asian Nations, including developments in Singapore, Thailand, Indonesia and Vietnam.<sup>8</sup>

Not surprisingly, China is a major player in the region, marketing waste-to-energy technology developed over the years for its domestic WTE plants. China had 73 gigawatts of energy production across 339 power plants in 2017.<sup>9</sup> This is expected to grow to 10 gigawatts and 600 plants by 2020.

However, Japan runs a close second in exporting its expertise and technology. The country has 380 waste-to-energy plants nationwide, and almost a third of the country’s refuse-incineration facilities turn garbage into electric power.<sup>10</sup> In some ways, Japan is taking a more aggressive approach than China by offering combination packages that include WTE backed by a range of services such as waste sorting, waste reduction, personnel training and recycling. Hitachi Zosen, JFE Engineering, Mitsubishi Heavy Industries and other Japanese exporters are expected to join consortia to bid for plant orders in Southeast Asia. As of mid-2019, Japan has pursued agreements with Vietnam, Indonesia and the Philippines,<sup>11</sup> and the Japanese ministry has set aside 2 billion yen (US\$18.49 million) in its fiscal 2019 budget to support field surveys and other pre-bid activities.

To give a sense of the range and volume of WTE activity in Southeast Asia, we can note the following projects and initiatives now in play:

**Singapore** has long been a regional leader in WTE development. Bhaskar shares that Singapore aims to reduce the average daily amount of waste sent to Semakau Landfill by 30 percent, or from 0.36 kg/capita in 2018 to 0.25 kg/capita by 2030. Currently, the country’s solid waste disposal infrastructure consists of four WTE plants: Tuas, Senoko, Tuas South and Keppel Seghers Tuas Plant (KSTP), in addition to the Semakau Landfill. In the country’s upcoming WTE-based Integrated Waste Management Facility (IWMF), treatment facilities for multiple waste streams will be catered for. To be developed in phases, the first phase of the IWMF will be capable of handling 2,900 tpd of incinerable waste; 250 tpd of household recyclables, 400 tpd of source segregated food waste and 800 tpd of dewatered sludge from the future Tuas Water Reclamation Plant (TWRP), which will be integrated with the IWMF to form the Tuas Nexus.<sup>12</sup> The Tuas Nexus allows synergies to be derived from the water-energy-waste nexus and improve energy and resource recovery efficiencies and enhance land use optimization for Singapore.<sup>13</sup>

**Indonesia** is moving forward on plans for 12 WTE plants, starting with auctions for three WTE projects in 2019/20 — one in the West Java capital of Bandung and two more in Banten — Tangerang and South Tangerang.<sup>14</sup> Similar plants are set to be developed in Jakarta, in the South Sumatra capital of Palembang, the West Java city of Bekasi, the Central Java cities of Semarang and Surakarta, Bali’s capital city of Denpasar, East Java’s capital of Surabaya, South Sulawesi’s capital of Makassar and North Sulawesi’s capital city of Manado. All 12 waste-to-energy plants are expected to be completed in 2022 and produce 234 MW of electricity.

**Thailand** has established subsidies and tax incentives for various WTE plants that include incineration, gasification,

<sup>8</sup> <https://qz.com/1650893/japan-wants-to-become-southeast-asias-trash-manager/>

<sup>9</sup> <https://www.eco-business.com/news/waste-to-energy-a-renewable-opportunity-for-southeast-asia/>

<sup>10</sup> <https://asia.nikkei.com/Spotlight/Environment/Southeast-Asia-s-trash-Japan-Inc.-s-power-generating-treasure>

<sup>11</sup> [https://www.upi.com/Top\\_News/World-News/2019/06/25/Countries-see-Japans-trash-to-energy-plants-as-solution-to-garbage-woes/5561561481250/](https://www.upi.com/Top_News/World-News/2019/06/25/Countries-see-Japans-trash-to-energy-plants-as-solution-to-garbage-woes/5561561481250/)

<sup>12</sup> <https://www.aecom.com/sg/projects/integrated-waste-management-facility/>

<sup>13</sup> <https://stateofgreen.com/en/partners/ramboll/solutions/combining-waste-and-used-water-in-a-singaporean-mega-project/>

<sup>14</sup> <https://asian-power.com/project/news/indonesia-looks-auction-three-waste-energy-projects-in-2019>

fermentation and landfill gas capture.<sup>15</sup> The country has also set 500 MW as the target for WTE in the new Power Development Plan 2018–37, which represents 30 percent of total renewable energy resources by 2037.<sup>16</sup> The tentative feed-in tariff given for the WTE plants is THB3.66/kWh.

**Vietnam** is attracting investor interest from China, Japan and other countries. Several municipal authorities have accepted WTE plant projects and called for investment from different economic sectors. Ho Chi Minh City Municipality has released a set of criteria for investing in WTE projects that can process domestic waste up to 9,300 tpd. The government has set a high electricity purchasing price for WTE up to US10.05 cents/kWh, which is even higher than prices for wind and solar power.

**Malaysia** will have its first WTE plant in operation in June this year.<sup>17</sup> Located in Tanah Merah, Negeri Sembilan, the project is planned to handle 1,000 metric tons of solid waste daily and to produce 20 to 25 MW of electricity to power 25,000 households.

**Australia** now has its first WTE project, the 400-ktpa Kwinana facility currently under construction. More than 30 proposed WTE projects are also under consideration, including a AUD300 million facility in Ballarat and a AUD400 million facility at Swanbank west of Brisbane.<sup>18</sup>

### Key issues affecting development

Southeast Asian countries have a number of public policies to encourage and support WTE projects. For example,

the Indonesian government has declared WTE plant projects as national strategic projects. To achieve a viable risk structure for WTE projects, however, initiatives will require close coordination and cooperation among multiple government stakeholders, including the state utility as an off-taker of electricity, municipalities for a supply of waste, and land sites to achieve a bankable PPP structure that ensures stable, predictable cash flow for the WTE plants.

Consistency and quality of waste is also a key risk factor to lenders and investors. Many emerging economies have limited waste-sorting processes and regulatory requirements to separate different types of waste. Furthermore, Southeast Asian waste can have a significant amount of 'wet' waste that includes food waste, which is harder to burn, provides a lower caloric value, and can vary in waste type and quality from year to year. For incineration plants, this means a fluctuation in electricity output and revenue uncertainty.

In addition, WTE plants produce ash that needs to be disposed of safely, usually in landfills that are lined with barriers to prevent ground water contamination.

Whether incineration, and waste to energy, is a net positive, can depend on the efficiency of the process, and the energy mix that waste to energy is replacing. The newest incineration plants have far better pollution and dioxin filters to protect the environment and human health. That technology will require

governments in emerging markets to make additional investments for products and resources.

### Steps to consider

Yuen suggests a number of key steps to consider when launching a WTE initiative. Project planners should gauge how much WTE capacity is needed and then plan a pipeline of projects to support this capacity. This support should include waste collection logistics and quality in the way that waste is collected and processed. Economic feasibility should be based on affordable gate fees and electricity feed-in tariffs if applicable.

At every stage, the project should be marketed and explained to the general public, including a full description of the challenges and benefits of WTE technology. Finally, planners should incur full buy-in by the local municipal and national governments to help ensure the long-term support and viability of the project.

Municipal governments can leverage skill sets from the private sector in implementing WTE projects with state-of-the-art technology. Financing is available, along with long-term, predictable-quality waste contracts that help ensure reasonable tipping fees. Power-offtake contracts can include tariff levels that support the commercial viability of WTE projects. Singapore and other countries in the region are setting the right benchmark in this regard. Successful projects can serve as a template for other countries in the region. ■

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Southeast Asian countries have a number of public policies to encourage and support WTE projects. ”

<sup>15</sup> <https://www.eco-business.com/news/waste-to-energy-a-renewable-opportunity-for-southeast-asia/>

<sup>16</sup> <https://www.bangkokpost.com/thailand/special-reports/1646556/wasting-away-to-make-energy>

<sup>17</sup> <https://www.malaysiakini.com/news/468287>

<sup>18</sup> <https://www.abc.net.au/news/2019-01-25/potential-of-waste-to-energy-but-caution-urged/10734868>

# Regional outlook

**K** PMG professionals from different emerging markets offer their views on the most pressing issues and most valuable opportunities in their respective markets.

## Angola



**Fernando Mascarenhas**  
Partner  
Advisory  
KPMG in Angola

### Snapshot<sup>1</sup>

- **GDP:** US\$105.8B
- **Population:** 30.8M
- **GDP per capita:** US\$3,432

### Outlook:

“The contraction of international oil prices continues to put pressure on Angola’s economy. Diversifying the economy will require a significant level of financial and human resources as well as a new approach to infrastructure investment. Despite these urgent requirements, Angola is undergoing a public spend rationalization program (supported by the IMF), which is limiting public funding and shifting focus towards attracting private investment.”

### Opportunity:

“Oil and gas projects will continue to dominate Angola’s infrastructure pipeline for the medium term. But focus will also be on other sectors with potential to help diversify the economy. The recently published Presidential Decree 250/19 also sets out an ambitious plan for the privatization of infrastructure-related assets.”

### Insight:

“Despite recent economic and financial challenges, Angola has implemented sound measures to reduce the country’s dependency on oil and gas. Angola is an excellent opportunity to establish a footprint in Southern Africa.”

## Argentina



**Martín Lopardo**  
Director  
Infrastructure Advisory  
KPMG in Argentina

### Snapshot<sup>1</sup>

- **GDP:** US\$518.5B
- **Population:** 44.5M
- **GDP per capita:** US\$11,653

### Outlook:

“Argentina’s current infrastructure funding gap is estimated at US\$26 billion and will rise to more than US\$350 billion by 2040. Left unbridged, this could lead to a negative spiral for the country’s economy and citizens. Long-term financing for big infrastructure projects at affordable costs remains scarce.”

### Opportunity:

“Following two decades of consistent under-investment into Argentina’s infrastructure, we see significant opportunities and need across multiple sectors. International players may find higher margins in Argentina than in other markets in the region due to lower levels of competition and reduced financing capabilities.”

### Insight:

“Argentina’s rapidly changing demographics will require significant focus and investment towards social infrastructure projects and services.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.

# Chile



**Cristian Tapia**  
Managing Director  
Deal Advisory  
KPMG in Chile

## Snapshot<sup>1</sup>

- **GDP:** US\$298.2B
- **Population:** 18.7M
- **GDP per capita:** US\$15,923

## Outlook:

“As a small and open economy, Chile is somewhat exposed to international trade and economic turmoil. Chile’s government recently announced a US\$15 billion plan for infrastructure investment over the next five years and is creating a number of incentives to encourage private finance and investment into its pipeline of projects.”

## Opportunity:

“The announcement of the US\$5 billion Quebrada Blanca 2 copper development suggests that related infrastructure will see a significant increase in investment. And with local government elections planned for 2020, we also expect to see an uptick in investment and development in social infrastructure such as housing and hospitals.”

## Insight:

“Some of the foreign institutional investors who participated in Chile’s earlier rounds of infrastructure investment are now looking to exit and re-invest, which is creating valuable brownfield opportunities for a new crop of investors.”

# China



**Julian Vella**  
Head of Asia Pacific  
Infrastructure Practice  
KPMG International

## Snapshot<sup>1</sup>

- **GDP:** US\$13.6T
- **Population:** 1.4B
- **GDP per capita:** US\$9,771

## Outlook:

“To support growth objectives and drive competitiveness in foreign markets, China’s developers and investors are placing significant focus and effort into understanding (and complying with) international business standards and practices. The focus is on delivering internationally-accepted, high-quality, sustainable and investable infrastructure.”

## Opportunity:

“As China and its partners move forward with executing on the Belt and Road Initiative, Chinese firms are playing a critical role in delivering the infrastructure that is required across the region. Chinese firms bring several important advantages to projects in BRI countries including: technical expertise, scale, presence in many markets, speed of project delivery, access to China’s broader industrial, manufacturing, and technological capacity and strengths, and access to Chinese finance.”

## Insight:

“China’s firms are increasingly adopting business practices and approaches that go beyond complying with the minimum legal and regulatory requirements in BRI markets in order to comply with internationally accepted legal, regulatory and market based standards.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.

# Colombia



**David Villalba Escobar**

Partner  
Deal Advisory  
KPMG in Colombia

## Snapshot<sup>1</sup>

- **GDP:** US\$330.2B
- **Population:** 49.6M
- **GDP per capita:** US\$6,651

## Outlook:

“Colombia’s Fourth Generation of road concessions marked a milestone for private investment into infrastructure in Colombia. Lessons learned from the road concession program are rapidly being adopted in other sectors. Now, we are starting to see a shift towards project development within cities, prioritizing mobility, social infrastructure, sustainability and connectivity.”

## Opportunity:

“As assets — including those in the new roads program — more through the project lifecycle, new opportunities will emerge for those looking within the secondary markets. EPC companies and others in Colombia are looking to partner with institutional investors such as pension funds, private funds and international banking interests who can help them bring projects to market.”

## Insight:

“Colombia has put a lot of focus on improving urban planning in regards to healthcare, housing, mobility, education and utilities and this is critically important for a region that is still rapidly urbanizing.”

# Indonesia



**David Ng**

Principal  
Global Infrastructure  
Advisory  
KPMG in Indonesia

## Snapshot<sup>1</sup>

- **GDP:** US\$1.0T
- **Population:** 267.7M
- **GDP per capita:** US\$3,893

## Outlook:

“Governments across the region continue to struggle to properly prepare and structure projects for foreign and private investment. However, with a growing need to attract foreign capital, we are seeing an increasing focus on achieving ‘international best practice’ standards. Indonesia’s recent election also showed that there is considerable political appetite for increasing infrastructure investment.”

## Opportunity:

“From a volume perspective, we are seeing significant activity in the renewables space and in transportation (particularly aviation and urban rail). Recent efforts to try to pivot the economy away from fossil fuels is also creating opportunities for foreign investors and developers. At the same time, municipalities are looking for ways to enhance economic growth and livability.”

## Insight:

“PPP should be an acronym for Proper Project Planning. That’s the only way to capture the private investment needed to achieve Indonesia’s economic and infrastructure goals.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.



# Kenya



## James Woodward

Head of Transport & Infrastructure,  
East Africa  
KPMG in Kenya

### Snapshot<sup>1</sup>

- **GDP:** US\$87.9B
- **Population:** 51.4M
- **GDP per capita:** US\$1,710.5

### Outlook:

“The streamlining of PPP legislation will have a big impact on the speed of development in Kenya. All eyes will be on the anticipated Energy Act 2019 regulations to see whether Kenya will remain a top investment destination for energy developers. But Kenya’s debt is now rapidly approaching the theoretical debt to GDP ceiling of 60 percent. so new sources of funding and foreign participation will be crucial.”

### Opportunity:

“Kenya’s plan to develop 500,000 affordable housing units over the next five years will create significant opportunities for developers and financiers. GDP across the region is growing quickly and Kenya boasts one of the most advanced pipelines of projects.”

### Insight:

“It took governments in the region a bit longer to get their heads around the practicalities of private investment. But momentum is picking up. It may be time for another look at East Africa.”

# Poland



## Michal Skorupski

Director  
Management Consulting  
KPMG in Poland

### Snapshot<sup>1</sup>

- **GDP:** US\$585.8B
- **Population:** 38M
- **GDP per capita:** US\$15,424

### Outlook:

“Falling fertility rates and rising wages are eroding Poland’s traditional labor advantages. That, and the rising cost of imports, will force both government and private sector to start investing into environmentally-efficient, power-efficient and labor-efficient industry and services. At the same time, continued demographic shifts are creating challenges for planners, particularly in the social infrastructure sector.”

### Opportunity:

“The water sector will need to become a key focus for Poland’s government as, currently, there is not enough water in the system. Low water levels in rivers is reducing generation capacity at some power plants and this, in turn, could encourage new investments into nuclear and other generation sources. Transport projects will continue to be politically popular.”

### Insight:

“While much work still needs to be done to improve Poland’s land use regulations, we see valuable opportunities for foreign water, waste management, energy and social infrastructure players in Poland.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.

# Romania



## Victor Iancu

Director  
Management Consulting  
KPMG in Romania

### Snapshot<sup>1</sup>

- **GDP:** US\$239.5B
- **Population:** 19.5M
- **GDP per capita:** US\$12,301

### Outlook:

“With virtually no public investment into infrastructure over the past three years (and little prospect for any over the next year or so), Romania’s greatest challenge is to attract serious and competent private investors willing to venture into an otherwise-underdeveloped infrastructure market. However, Romania’s economic convergence with the rest of the EU is high on the agenda in Brussels and this should drive investment into infrastructure over the long term.”

### Opportunity:

“Priority is being given to road and highway infrastructure in an effort to close the gap between Romania and the rest of the EU. The government also recently announced a series of critical PPP projects in a range of sectors including healthcare, rail and tourism. Cities are also seeing increased investment, particularly in terms of affordable housing and smart city solutions.”

### Insight:

“If Romania wants to become competitive with other markets in the EU, it will need to start unlocking significant amounts of investment for infrastructure projects.”

# Russia



## Alexei Romanenko

Partner  
Head of Transport and  
Infrastructure  
KPMG in Russia and CIS

### Snapshot<sup>1</sup>

- **GDP:** US\$1.65T
- **Population:** 144.5M
- **GDP per capita:** US\$11,289

### Outlook:

“A number of new construction and infrastructure projects have been launched recently. However, we expect this growth in demand to create shortages of skilled resources. Sourcing the right financing and project management skills to execute on the agenda may be an issue in the near future.”

### Opportunity:

“Aging infrastructure across the country and region requires renewal. At the same time, new infrastructure requirements, in part driven by China’s Belt and Road Initiative, are driving new areas of opportunity for investors and developers.”

### Insight:

“As markets become more segmented and disconnected, several ‘points of influence’ are emerging.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.

# South Africa



## Shivanan Naidu

Associate Director  
Management  
Consulting  
KPMG in South Africa

### Snapshot<sup>1</sup>

- **GDP:** US\$368.3B
- **Population:** 57.8M
- **GDP per capita:** US\$6,374

### Outlook:

“ Sluggish growth — in part caused by severe power constraints — has had a significant impact on the construction and infrastructure industries. Following South Africa’s recent election, the government established an Infrastructure Fund to help attract public and private investment into ‘shovel ready’ projects.”

### Opportunity:

“ Power, water and rail should receive significant focus from this government. South Africa ranks as one of the most water-scarce countries in the world and wastewater assets are in need of renewal. Rail also remains a strong growth sector. At the same time, the new Infrastructure Fund should provide investors and service providers with a strong pipeline of projects going forward.”

### Insight:

“ South Africa is keen to entertain new PPP models and approaches. The water and power sectors, in particular, are prime candidates for sustainable PPPs.”

# Taiwan



## Steven Chen

Partner  
Head of Infrastructure  
KPMG in Taiwan

### Snapshot<sup>1</sup>

- **GDP:** US\$589.4M
- **Population:** 23.5M
- **GDP per capita:** US\$25,005

### Outlook:

“ Concerns about trade instability, the impact of climate change and aging populations continue to worry all markets in the region. Taiwan is taking the lead in driving the move towards greater energy independence and is rapidly becoming Asia’s leading hub for green energy. This, in turn, is expected to drive innovation and development across the island.”

### Opportunity:

“ Taiwan’s goal is to become nuclear-free by 2025 and it boasts an abundance of renewable energy resources including solar, onshore and offshore wind, tidal and wave energy, biomass resource and geothermal energy. Policy setting and resources are well-developed for encouraging an island-based, export-driven economy for global green energy developers.”

### Insight:

“ Other markets also have strong capabilities in the green energy sector. But none are as advanced or as experienced as Taiwan.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.

# Turkey



## Ümit Bilirgen

Partner  
Deal Advisory Services  
KPMG in Turkey

### Snapshot<sup>1</sup>

- **GDP:** US\$766.5B
- **Population:** 82.3M
- **GDP per capita:** US\$9,331

### Outlook:

“Expect investment to slow across most infrastructure sectors as Turkey takes steps to reduce its current account deficit, which reached US\$70 billion in 2018. Export-oriented manufacturing and tourism will continue to drive the economy. However, continued tensions with the US and regional conflicts (particularly in Syria) remain significant concerns.”

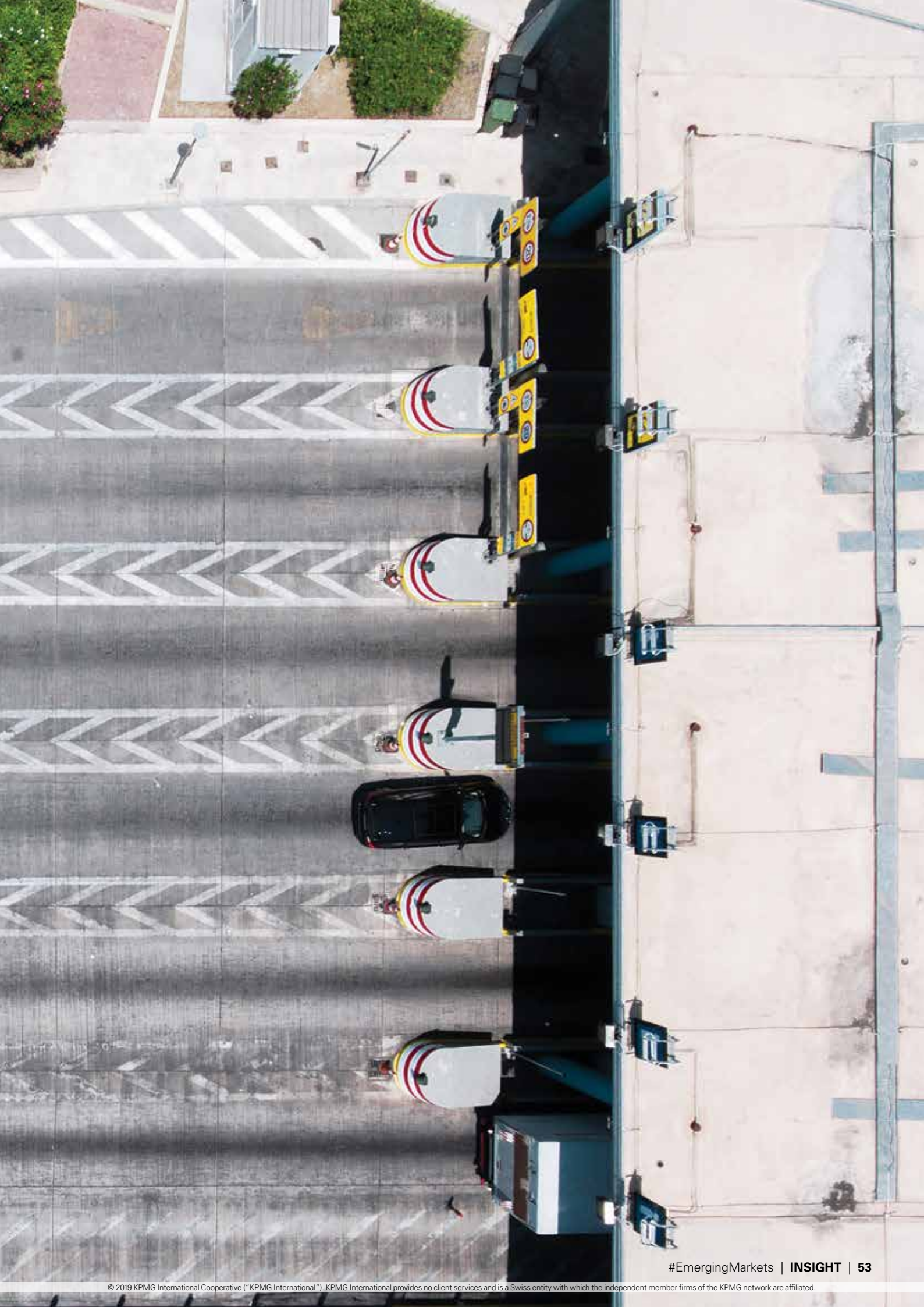
### Opportunity:

“Partly in response to increasing liquidity challenges in the Turkish economy, a growing number of infrastructure owners in Turkey are now looking for international partners seeking brownfield opportunities. The opportunities include a hospital, a railroad, airports, ports, mines and electricity and gas distribution assets.”

### Insight:

“Turkey’s economy will recover over the next year. Brownfield assets, particularly in the energy sector, offer great value to international investors willing to take a longer-term view.”

<sup>1</sup> All numbers sourced from World Bank Group 2018 report.



# Bookshelf.

To access the publications listed, visit: [home.kpmg/infrastructure](http://home.kpmg/infrastructure) or email us at: [infrastructure@kpmg.com](mailto: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 infrastructure industry.



### Issue No. 11 — Connections

This edition discusses the value of connections we make in a world where traditional infrastructure is no more.



### Issue No. 9 — Globalization

This edition offers our perspective on the impact of globalization on the infrastructure sector.



### Issue No. 10 — #Infratech is here

This edition considers the impacts and opportunities of technology on the infrastructure sector.



### Issue No. 8 — Infrastructure Morality

This edition focuses on hard issues such as migration, corruption, social equality and affordability — and asks the difficult questions of infrastructure leaders at the forefront of the morality debate. It also includes a special report on asset delivery.

## Foresight blog: A global infrastructure perspective

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### Brazil's latest privatization drive should prove attractive to investors

Brazil's government has announced a sweeping privatization drive that potential investors will no doubt be turning their attention to.



### Embracing drones: Making the most of the third dimension

What cities can expect over the next few years.



### Investment raises Chile's infrastructure

Chile launches ambitious infrastructure plan to improve vital services and drive the economy



### Smart devices, smarter airports

Mobile technologies are creating valuable opportunities for the airport sector. But it will take more than slick new apps and devices to unlock the benefits of new technology.



### Unlocking urban transit with Land Value Capture

As demand for new urban transit rises, cities are drawing on future land value expectations to fund development today. And it's working.

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The Global Construction Survey monitors engineering and construction issues to provide timely insights that help clients make informed decisions.



### Future-Ready Index

The 2019 report benchmarks how prepared companies are for a highly competitive and unpredictable future, and segments the industry's players into three percentiles.



### Make it, or break it

The 2017 Global Construction Survey focuses on reimagining governance, people and technology.



### Building a technology advantage

The 2016 Global Construction Survey reviews how the industry can harness the potential of technology to improve the performance of major projects.

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# Yesterday's alternatives are today's essentials. It's decision time.

Infrastructure investment demand in emerging markets is soaring. With a focus on asset diversification and growth, it's expected that more infrastructure investors will focus on building up capabilities and experience to ensure their assets are delivering the rates of return they anticipated and the intended benefits. Selecting the right business advisors to work with in this ever growing infrastructure industry will be critical to success. We can make better decisions together.

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