



Foresight

A global infrastructure perspective

Special edition — January 2016

10 emerging trends in 2016

Trends that will change the world of infrastructure over the next 5 years

Barring a global economic meltdown or apocalyptic event, 2016 is already shaping up to be a year of growing momentum for the infrastructure sector.

The signs of this momentum are everywhere: in new sources of capital and new funding approaches that promise to unlock trillions of dollars in new equity and debt investment; in growing asset management capabilities, cyber security and public procurement, which are ushering in a real step-change in the way operators and owners manage assets; in the growing boldness of governments seeking to catalyze economic and social benefits; and in the growing alignment between the 'macro' needs of governments and the 'micro' decisions of consumers.



Over the past 4 years, KPMG International has tracked the key trends that — in our opinion — will influence the world of infrastructure over the coming years. Some of the trends that we have identified in the past persist — governments continue to struggle to unclog their pipelines; emerging markets continue to face funding gaps; the optimal relationship between the public sector, the private sector and taxpayers continues to evolve. This is to be expected; massive changes to fundamental problems do not happen overnight.

As this year's Emerging Trends in 2016 suggests, however, the industry is now standing on the cusp of

greater change. The development and interaction of many of these trends could very well transform the way governments, businesses and users interact with and invest in infrastructure. More importantly, if managed properly, they also hold the power to solve many of the biggest challenges facing our industry today.

Once again, we hope that this year's insights serve to not only highlight major trends but also to help readers see some of the less obvious long-term changes affecting the infrastructure sector. To discuss these trends and their impacts in more detail, we encourage you to contact your local KPMG infrastructure team.



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Trend | 1 Macro risk environment shifts: 'No normal' is the new normal

Last year, we noted that political and regulatory uncertainty was creating challenges for infrastructure investors. But today, political and regulatory risks are just the tip of the iceberg.

Uncertainty is everywhere: in unexpected election results and political upheaval; in rising protectionist sentiments; in disruptive and fast-moving technological advances; and in geopolitical and social upheaval. Simply put, the stable conventional wisdom that once underpinned infrastructure planning and investment seem to no longer apply.

Interestingly, it's largely the emerging and developing markets that are using this uncertainty to make big plays. China's 'One Belt, One Road' project and the Asian Infrastructure Investment Bank (AIIB) initiative will not only improve prospects for economic growth in the region, they may also enable China to assert greater regional power. Japan's significant investments into India's manufacturing and infrastructure sectors; Singapore's championing of the ASEAN community; and the Gulf States' continued investment into western assets all carry

suggestions of power politics at work and more change on the horizon.

While no investor likes uncertainty, it seems that many are currently underpricing the increased risk into their models. In part, this is likely due to the current 'oversupply' of equity in the market which has forced investors to compete more fiercely for investments. But, in time, we expect investors to start becoming much more considered about the way they assess, manage and price this type of uncertainty.

► The long view:

The reality is that 'no normal' will probably be the 'new normal' for the foreseeable future and investors will need to get comfortable with uncertainty and learn how to properly price these new and emerging risks. Geopolitical power plays could create fundamental shifts in the world order, trade and investment flows.

Trend | 2 Competition for investments heats up

With more and more equity entering the market, competition for 'investable' infrastructure projects has reached fever-pitch.

In part, increased flows are being driven by institutional investors eager to put their capital to work. But it is also being impacted by increased investment activity by multinational and sovereign sources (such as the African Development Bank Group (ADB)'s Africa50 Investment Bank for Infrastructure) which often prioritize objectives other than pure return on investment (ROI) and therefore tend to distort capital market flows and returns.

The problem is that increased equity flows are driving competition which, in turn, is pushing down the yields that investors can achieve on well-understood and low-risk infrastructure investments. Multiples have soared for regulated assets in mature markets; concerns are rising that some may have already paid too much just to capture a share of the market.

In response, a growing number of the more sophisticated and active institutional investors are starting to leverage their deep experience assessing and pricing risk, and implementing operational improvement strategies to take on a wider range of projects that offer the potential to deliver higher yields.

Some are investing into greenfield projects that naturally carry higher levels of development risk. Others are taking a broader view of infrastructure and investing in social and health assets. And some (particularly the more sophisticated Asian funds) are scouring the 'frontier markets' — emerging markets such as Myanmar and Mongolia — to identify potential investments.

Clearly, this is good news for project owners around the world. Indeed, as more equity enters the market and investors gain experience at managing risk in their investments, we expect to see access to equity start to increase and rates start to decrease in both the developed and the developing world. However,

governments and owners still need to understand that private capital will only be attracted (and sensibly priced) to markets that create a predictable and stable investment environment.

► The long view:

Over the long term, this shift will permanently alter the dynamics of who takes what risks, when they take the risks and how. Ultimately, however, we believe that this may well be the tipping point that ushers in 50 years (or more) of prosperity as capital starts to match up with projects which, in turn, will drive economic growth in the developing world and shore up retirement savings in the mature markets.



Trend | 3 Focusing on the larger benefits to unclog the pipeline

Two years ago, we predicted that governments would move to unclog the pipeline. Last year, we noted a trend towards greater government intervention in infrastructure markets. Yet, with the impact of these actions proving largely ineffectual, we expect (and hope for) 2016 to see governments move a step further by focusing on getting projects out the door rather than trying to perfect the risk balance.

The reality is that many governments are starting to recognize that — by striving to take a minimalist approach to risk or to achieve structural and contractual ‘perfection’ — they have in fact been missing the point and, in doing so, have been making projects more complicated, less attractive to investors and slower to take to market. Simply put, they have been putting too much focus on being clever rather than reaping the larger rewards (such as economic and social prosperity).

We believe that 2016 will see governments start to take stronger action to unclog the pipelines by taking the steps required to get the private markets going. Government leaders will recognize that — in many cases — establishing markets and getting projects delivered (and realizing the long-term economic and social benefits thereof) is more important than minimizing risk or perfecting other variables.

Somewhat tellingly, it has been the developed economies that have most often tended towards interventionist activities and these markets are driving procurement innovation. But over the coming year, we expect to see many developing markets start to follow in their footsteps to catalyze investment. Indeed, should this trend unfold as hoped, we could start to see a repeat of the activity catalyzed 25 years ago in certain Latin American markets which, for example, led to Chile’s highly-successful toll road concession program in the late 1990s and early 2000s.

► The long view:

Essentially, governments are starting to recognize that it is the public sector that needs to energize projects and that, to date, they have relied far too much on the private sector to achieve their economic, social and environmental objectives. The reality is that the private sector is looking for commercial returns, whereas government is seeking to achieve long-term economic benefits and other national objectives. As such, we expect to see governments start to become more active in influencing and catalyzing their infrastructure markets.

Trend | 4 Asset management gets sophisticated

As infrastructure owners shift their focus from buying new assets to maximizing the performance of the assets they already own, the need for more sophisticated asset management has risen up the agenda. Over the coming year (and more), we expect to see both public and private sector owners and operators become more sophisticated stewards of their assets.

In part, this is because owners are keen not only to achieve the full expected lifespans of their assets, but also to get more productivity out of their existing operations. The achievement of peak operational efficiency, the better management of demand and capacity, the reduction of maintenance costs and the delivery of improved customer service can enable owners to gain access to the full potential of their investments.

Advances in technology, including the use of data/analytics, are also adding to the sophistication of asset management. No longer must decisions be made on ‘rules of thumb’; today’s available technology allows asset managers to carefully monitor their assets in real time and, in doing so, improve decision making, manage capacity and maximize efficiency. And, in the longer term, the increased use of predictive data/analytics will shift the focus from reactive to proactive maintenance.

In 2016, we believe that asset management will become a key discipline for asset owners, enabled by smart technologies, more sophisticated approaches and greater insight into the actual operations and performance of their assets.

► The long view:

Given the pace of advancement in areas such as Internet of Things (IoT), robotics and data/analytics, it seems clear that technological advances will continue to drive efficiency in infrastructure operations and should lead to better productivity, longer asset lives, fewer catastrophic failures and improved safety. In this environment, owners will need an ever-more sophisticated approach that combines technology, data/analytics and asset management. They will also need to consider the impact that this shift will have on their existing labor force: operating infrastructure in the new world will almost certainly require less hands and fewer eyeballs.

Infrastructure has remained largely untouched by the technology revolution underway around the world. With the exception of the telecoms sector, there has been no fundamental change in the type of infrastructure that is built compared to 50 years ago. We still use the same assets we did 50 years ago. And we still follow the same basic assumptions we did 50 years ago.

But the reality is that the technology revolution is now upon us. And it is rapidly and fundamentally disrupting the way we plan, design, develop and operate our infrastructure.

Solar power technologies, for example, are not only redefining the way power is generated, they are also disrupting the 'centralized' generation and distribution models that underpin most of the developed world's energy investment strategies. The technology for driverless cars is developed; now the question is how they will be adopted and integrated into society. And the continued efforts to develop the Hyperloop threaten to shatter traditional transportation assumptions.

Interestingly, much of the demand for technological advancement is being driven by the consumers. In the developing markets, concerns about the affordability of conventional technologies are driving adoption of newer approaches. In the mature markets, consumer desire for more control over their infrastructure use is driving demand for more sophisticated services.

Demand for technology is also being catalyzed by a growing alignment between 'macro' infrastructure requirements (such as reducing emissions) and the 'micro' consumer decisions (such as investing in web-based home thermostats). Over the coming year, we expect to see the macro and micro come even closer into alignment as technology costs continue to fall and consumer demand rises.

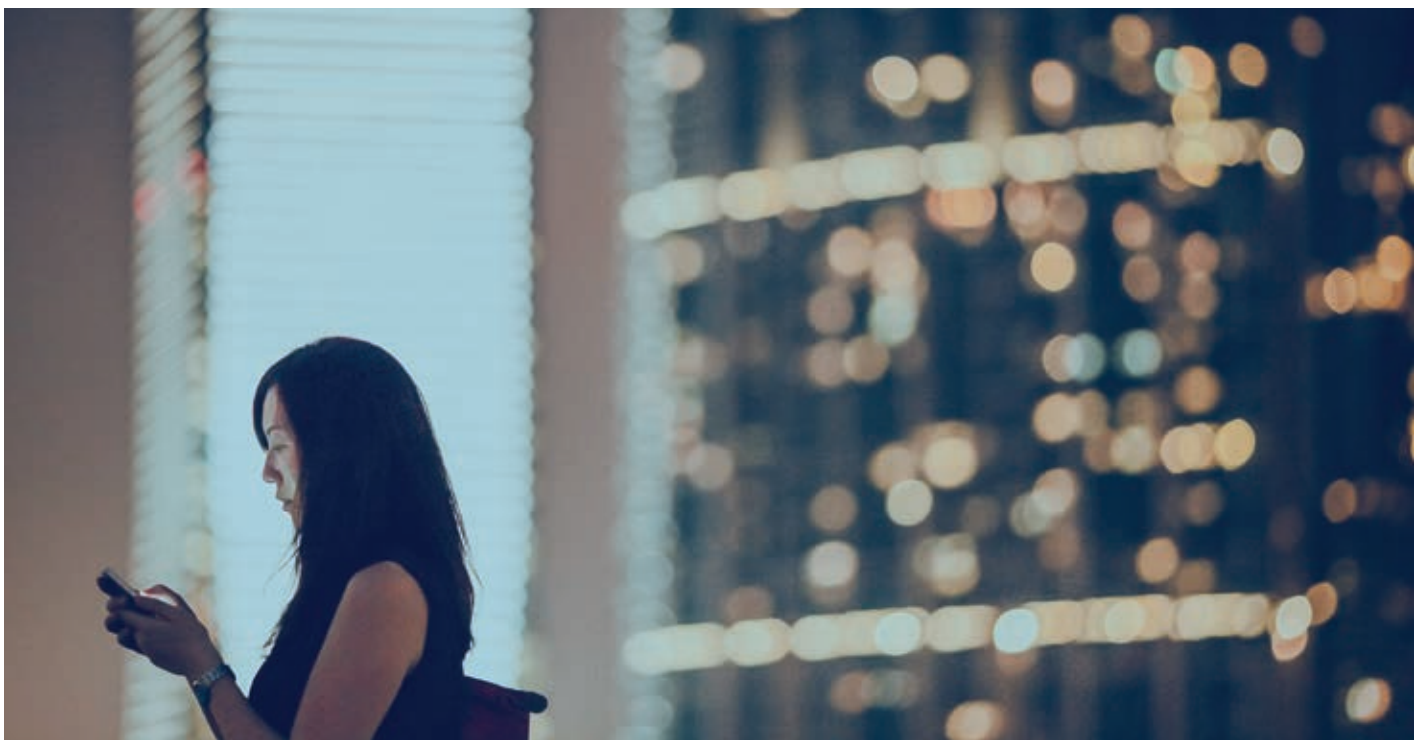
“Over the coming year, we expect to see the macro and micro come even closer into alignment as technology costs continue to fall and consumer demand rises.”

► The long view:

While it is clear that consumers will continue to drive decision making and progress, this isn't about buying into the newest technologies and consumer demands. This is about understanding the direction, pace and impact of technological change to make informed long-term decisions around investment, business models and customer service.

Indeed, while much of today's classic micro-economic theory assumes that technology is 'fixed', this is clearly no longer the case. Put simply, the infrastructure we are going to need and use in 20 years' time is going to be very different from what we are using — and designing — today.

Over the coming years, infrastructure owners and operators will become much more comfortable with technology and technological change. In fact, some jurisdictions (such as those with high solar generation potential) will leverage new technologies to essentially 'leapfrog' more evolved economies in terms of cost and service availability.





Every government, regulator, owner and operator should be worried about the security of their infrastructure. Given the size and frequency of physical attacks, natural disasters and cyber-attacks on critical infrastructure and in public spaces over the past few years, it is clear that there is an urgent need to reduce the vulnerability of infrastructure assets and to protect citizens and users.

For some, this is about responding to a clear and present danger. Terrorism is a very real threat to infrastructure (both physically and through cyber-attack), particularly in densely populated urban areas and during major events where any action can have devastating and far-reaching consequences. For many others, it is about taking the right steps and making the right investments to protect the overall security of their people, assets and economies.

The threat of cyber-attacks on infrastructure is increasing, whether from terrorists or state-backed players bent on disrupting perceived enemies; commercial hackers looking for valuable data; or simply ne'er-do-wells and the disenfranchised seeking a new thrill or challenge.

The challenge has been compounded by the growing interconnectedness of systems. A hack on a state power grid, for example, has the potential to disrupt millions of businesses, individuals and other infrastructure systems which, in turn, will disrupt millions of other businesses and lives.

Part of the challenge is that few infrastructure executives truly understand their risk profiles and controls; fewer still fully understand the cyber element of the risk. And as

geopolitical tensions grow, the skills of cyber-attackers become more sophisticated, and technology becomes more interconnected, the threat will continue to shift and evolve.

One major challenge, however, is cost. Improving security (particularly for existing assets) will require investment across the lifecycle — from the design and planning phase right through to operations and (in the case of nuclear facilities, for example) decommissioning. But that will require authorities to prioritize their security investments and make difficult choices between security (which will largely be invisible) and investment into expansion capacity.

In 2016, we expect public and private infrastructure owners to place more emphasis and invest towards developing guiding principles, clearly defined responsibilities and major initiatives designed to enhance both physical and cyber security.

► The long view:

With political unrest on the rise in many parts of the world and several high-profile, cross-border infrastructure projects underway or currently being planned, the physical and cyber security of assets will only increase in importance, particularly to individuals and users. Notwithstanding a 'breakthrough' in cyber protection, expect security to start taking up a larger portion of infrastructure budgets.

Trend | 7 The gap between public and private narrows

Ever since the rise of privatization and public-private partnership (PPP) models in the 1980s, most governments have operated under the assumption that the private sector outperforms the public sector when it comes to procuring and delivering infrastructure. But this can no longer be taken for granted.

The reality is that public sector capability and capacity has — in many places — significantly improved. Recognizing they are now being benchmarked against private sector performance measures, many have learned valuable lessons and have now incorporated private sector practices into their own organizations. While public sector appetite for investing in sufficiently skilled and appropriately compensated resources — whether it be for project management or operations — remains a significant concern, the gap between the public and the private sector is starting to narrow.

That is not to say that the private sector's role in infrastructure is diminishing — quite the opposite. In fact, the last few years have seen the rise of a phalanx of global developers and operators in key segments such as ports, airports and transportation as governments continue to leverage the specialized expertise of the private sector to drive improved results.

Ultimately, we expect to see the knowledge gap between public and private sectors continue to shrink as the cycle of interaction, experience and improvement continues.

► The long view:

While the movement towards privatization and PPP over the past few decades certainly answered some long-standing concerns about public sector capabilities, it has also proven to be a catalyst to public sector improvement. Over the long term, we expect the private and public sectors to continue to drive each other to achieve ever-higher levels of performance, regardless of the chosen implementation method. As a result, we expect to see fewer public and private decisions being made on 'ideological' rounds in the future.



Trend | 8 Innovative new ways to fund infrastructure emerging

As responsibility for investment into infrastructure starts to devolve to state and city-level governments and central/federal funding becomes increasingly constrained, many are starting to look for new ways to unlock capital.

For the vast majority, the challenge is simply about finding enough money to go around. But some are also looking for new ways to ensure that the cost of infrastructure development is borne by those that most directly benefits from it.

In 2016, we expect the trend towards user-pay, identified in previous years, to continue and grow. We also expect to see governments start to focus on bringing forward and capturing both the current 'stores' of value and the future value that they expect their projects to deliver in order to fund its development.

For some, pragmatism will lead to more boldness in the privatization of assets (or, to give it its politically correct term, 'asset monetization'). Rather than shrinking away from the political implications of privatization, governments will increasingly see privatization as a smart way to recycle capital in order to fund new services and assets.

Yet, to achieve this, a clear and compelling logic for the use of the proceeds of monetization — well articulated to the population — is an absolute prerequisite. Australia is leading the way on this but many other countries are beginning to follow, albeit on a smaller scale.

At the same time, we expect to see new innovative ways of 'value capture' emerge and public authorities will get tougher and smarter with private developers who own land surrounding projects. Others will likely leverage the value that will be gained by homeowners and businesses within proximity to the asset through land taxes and development taxes. And we will almost certainly see new taxes being developed and ring-fenced to fund future infrastructure investment.

The challenge, however, will come in localizing the approach to value capture. Much will depend on politics, local customs, expectations and norms.

► The long view:

For now, these new innovations in terms of raising funds have been largely isolated to developed markets and, as such, approaches for value capture have yet to penetrate into the developing world. Over the long term, we expect to see the more progressive emerging markets quickly adopt these methods, both at the local and at the central level, with the more risk-averse markets following up in a 'second wave' of value capture. And this, in turn, should unlock new sources of funding to bridge the developing world infrastructure gap.

Trend | 9 The institutional debt market takes off

Over the past year, we have seen a significant uptick in the volume and size of institutional debt deals. And all signs indicate that 2016 will see institutional debt markets really start to take off.

Much will depend on how the multilateral banks choose to use their capital. Many have now recognized that their current lending models are insufficient to drive the scale of change required. Most now believe that their capital would be better put to work by leveraging multiples of private sector capital through financial instruments that enhance the credit of the senior debt portion of the financing and, in doing so, give access to the full extent of the capital markets.

The result should be a massive injection of institutional debt over the coming years. The newly minted Asian Infrastructure Investment Bank (AIIB), for example, has clearly stated that it will use some of its US\$100 billion to catalyze private sector investment. The EU's Juncker Plan aims to turn EUR21 billion of public money into EUR315 billion of private investments. Others are now shifting their models in the same direction.

That being said, changes in policy often take some time to translate into action so there may be some delay before the acceleration in investment takes hold. The risk in the short term is that limited deal flows will see new public sector capital crowd out private sector debt. This is acceptable for a short period, but only if it acts as a catalyst for a new and greatly expanded institutional debt market.

► The long view:

The big question is whether the multilaterals will be able to take the right steps at the right time to truly unlock private investment. If they are able to get it right, the world should enjoy the massive benefits that will flow from a more-liquid debt market. But the long-term prize must stay clearly in view; the goal here is not to invest billions over the next 2 years but rather to catalyze some US\$70 trillion in investment over the next 30 years.

Trend | 10 China and India have arrived

Over the past year, it has becoming increasingly clear that China and India are successfully making the leap from 'emerging' markets to 'developed' markets.

China is showing signs of opening its domestic market to international investors and has published a pipeline of more than 2,000 public-private partnership (PPP) projects. And internationally, China is shifting from bilateral (government-to-government) deals to instead start competing in open market tenders. Chinese companies are becoming more acquisitive as they seek to compete in international markets and Chinese technology is gaining traction and meeting quality thresholds. The Asian Infrastructure Investment Bank and the "One Belt, One Road" project have the potential to be game changers.

India, following the election of Modi, is also becoming a force to be reckoned with in the global infrastructure market. Yet while India is the fastest growing large economy in the world, it is also 142nd in terms of 'ease of doing business'.¹ Positive change in this measure would be transformative, particularly because, by 2025, a quarter of the world's working age population will be located in India and this workforce is well educated, multilingual, highly skilled and lower cost. Already, India is proving to drive innovation on a world-scale.

Interestingly, China's shift towards a developed economy is largely being driven by the country's corporate sector: China's companies (both state-owned and private) have rapidly adopted the technologies and approaches of others to quickly build their capabilities. In India, however, the shift is being driven by entrepreneurs: no longer mere subcontractors to 'western' services firms, the country's entrepreneurs increasingly play the

role of principal. In particular, we expect growing influence from India in the provision of professional services, leveraging its low cost base and access to skilled people.

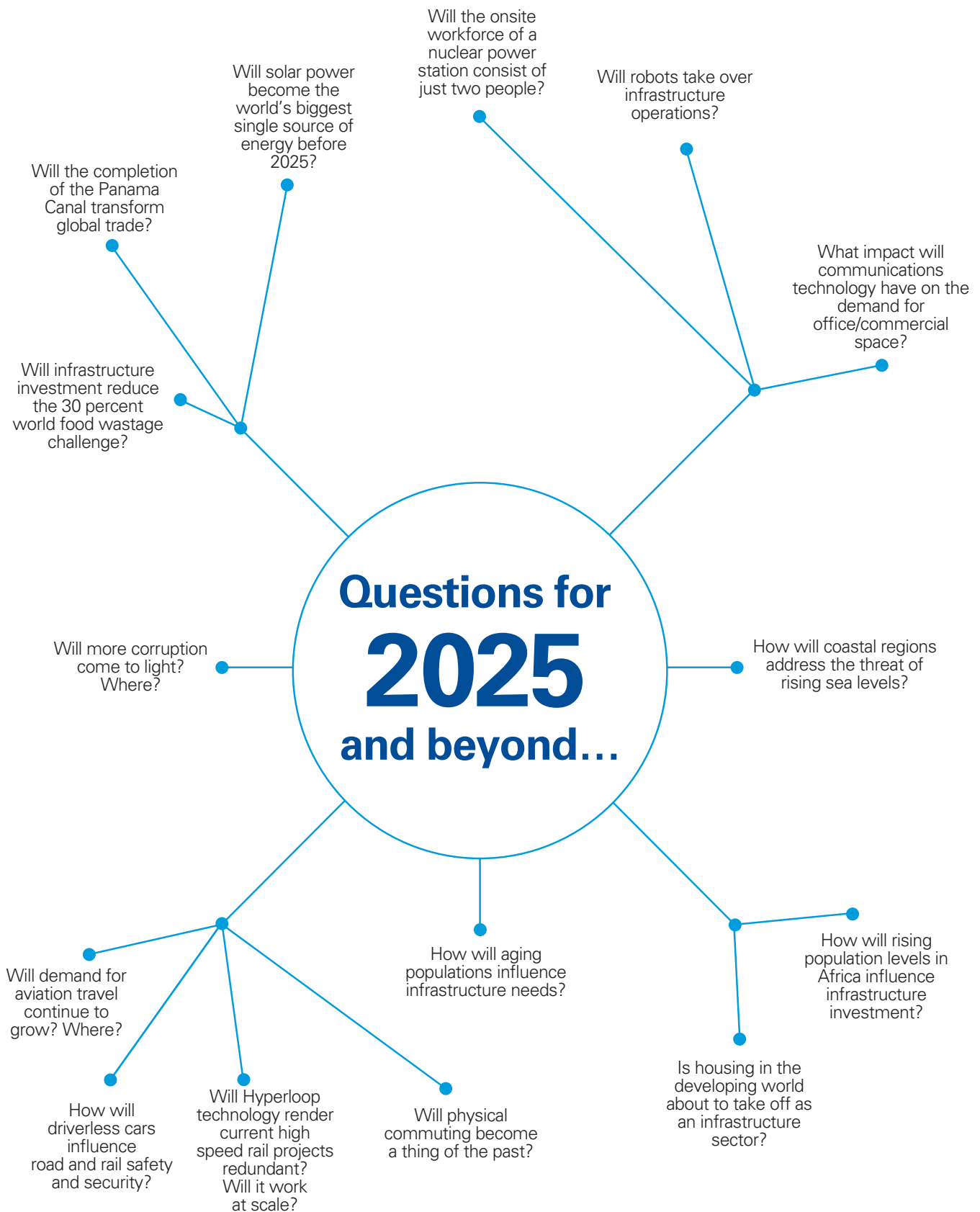
► The long view:

While this story is only just formulating, it seems clear that the center of gravity in the global infrastructure market is fundamentally shifting towards the East. Today, companies from India and China successfully compete on par with Western competitors and both markets are generating new ideas, products and value at an unprecedented pace. Over the long term, expect more and increasingly sophisticated competition from these markets.



¹ <http://www.newindianexpress.com/nation/India-Ranks-142-in-Ease-of-Doing-Business-Among-189-Economies-World-Bank/2015/09/15/article3028226.ece>

Questions for 2025 and beyond...



Bookshelf

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Insight

The Global Infrastructure Magazine



Issue No. 7 — Who controls our infrastructure?

In this edition of Insight, we sat down with the world's operators, owners, investors and regulators to explore some of the big challenges and trends influencing the debate around infrastructure control. It also includes a Special Report on Rail.



Issue No. 6 — Population

This edition of Insight takes a closer look at the link between unprecedented population changes and demographic shifts currently underway and the infrastructure needed to meet these challenges. It also includes a Special Report on Asia Pacific's infrastructure market.

KPMG Global Infrastructure publications and reports



Infrastructure 100: World Markets Report

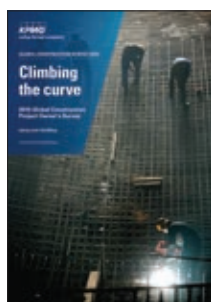
In the third Infrastructure 100, KPMG highlights key trends driving infrastructure investment around the world and a global panel of independent industry experts identify 100 of the world's most innovative, impactful infrastructure projects.



KPMG Toll Benchmarking Study 2015: An evolution in tolling

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Global Construction Survey series



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In the ninth edition, we focus on the challenges facing owners as they strive for a balance between power, responsibility and control. This report gauges the views of over 100 senior executives of leading private and public organizations from around the world.



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Foresight

A global infrastructure perspective



New mine expansion could kick-start the Mongolian economy

Mark Eberst discusses how Rio Tinto's Oyu Tolgoi mine development could catapult Mongolia into the global minerals Premier League and give a much-needed kick-start to its economy.

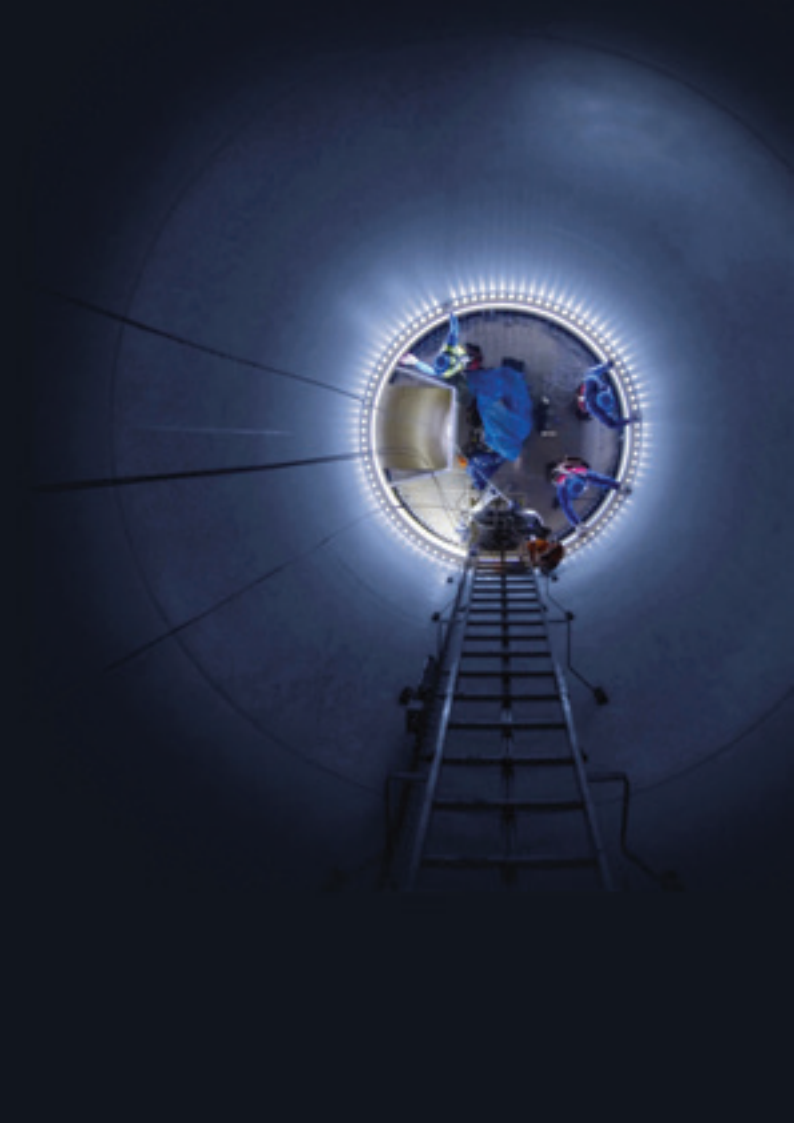


Argentina's election result spells optimism for infrastructure investment

Mariano Sanchez and Martin Lopardo think Argentina's newly elected President Mauricio Macri is sending out a message to foreign infrastructure players — his resource-rich country is very much open for business.



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

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

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