KPMG

Converging Trends 2033: The long view

KPMG in Belgium

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The view from 2033

This report offers a view into the world in 2033 for the infrastructure sector.

To create this report, we asked KPMG's global infrastructure leaders to use their experience and insight to put themselves in the year 2033. We had them tell us what they saw, provide their opinions on how things might change, pick some winners and losers, and provide insights and ideas to help readers in the mid-2020s envision the world of 2033.

"Dear mid-2020s reader. We come to you from 2033 with a message of great hope. But also, with warnings of great risks. The path from where you are in 2023 to where we will be in 2033 will — at times — be terrifying. Yet, with the right choices, it will also be extraordinarily rewarding.

In some respects, the world of 2033 seems much changed. From here, we can't recall the last time we touched a keyboard, smelled the noxious fumes of petrol or physically entered a government office. But in other ways, change has been painfully slow. Even with all the innovation of the past 10 years, we still don't have a practical and achievable path to our Net Zero goals.

What has changed dramatically, however, is our mindsets. We have recognized that market forces alone will not deliver the fundamental change in urban transformation, sustainability or innovation that are required in order to solve some of humanity's most pressing challenges. Rather than attacking the problem from all sides, in 2033 we are taking a system model approach that encourages holistic thinking over uncoordinated tactical actions. We understand that profit, planet, prosperity and equality are not mutually exclusive.

We have realized that the pursuit of perfection has impeded progress. Instead of putting our hopes in silver bullet solutions, we are now focusing on encouraging optionality, flexibility and agility in infrastructure planning and development.

Multiple pathways have emerged as governments move to achieve their goals within their own particular context and culture. And the gap between the winners and losers is starting to widen."

Within the reality of today

With a view to the future, this report was written by KPMG infrastructure leaders in 2023. The idea is to explore some of the vast range of scenarios, opportunities, risks and challenges ahead. Many different evolutionary paths and many different outcomes lie before us. This report paints one such path. Yet the reality of the future will depend on what policies we formulate and decisions we take.

To make this report practical, we focused on three key, yet interdependent themes that threaded their way through every edition of *Emerging Trends in Infrastructure* over the past decade — Cities, Sustainability and Innovation. We drew upon our own predictions from that annual publication to provide important context and continuity.

We believe the trends and topics raised in this report can have a massive impact on the evolution of the infrastructure sector and its broader impact on the economy. Infrastructure will play a key role in determining the outcomes we achieve as communities, countries and globally. It is time for sector leaders to start thinking differently about the future and its role in delivering it.

We hope this report provides insights and inspiration to the sector as we reshape our collective capabilities and focus to face the trends and opportunities of the future. On behalf of KPMG's global network of Infrastructure professionals, we encourage you to contact your local KPMG member firm to discuss the ideas raised in this report or to share your view on what the world might look like in 2033 for the infrastructure sector.

Stephen C. Beatty
Global Head of Infrastructure and Head, Global Cities Center of Excellence, KPMG International Partner, KPMG in Canada

Michele Connolly
Global Head Corporate Finance and Head of Infrastructure EMA region, KPMG International Partner, KPMG in Ireland

Sharad Somani
Head of Infrastructure, ASPAC region Head, Infrastructure Advisory, KPMG International Partner, KPMG in Singapore

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Cities

A look back at the past 10 years

Things were simpler back in the early 2010s. Cities stood as bastions of economic growth and activity. Central Business Districts (CBD) hummed with productivity. Digitization was futuristic; smart cities were little more than a concept. Few truly cared about decarbonization.

In 2013, our *Emerging Trends* report encouraged governments to view urban infrastructure as a driver of economic growth. In 2015, we were talking about the need to enhance urban transit to help unlock that economic activity. The mantra guiding city infrastructure planners back in those days was build, build, build.

Yet a more holistic approach to city development was starting to emerge. Indeed, in our 2014 edition, we noted a move towards creating urban 'environments' led by themes around sustainability, mobility and quality of life. Over the next few years, the concept of 'live, work and play' started to define our forward predictions. But the idea was generally focused around bringing 'live' and 'play' into the city rather than moving the 'work' outside of the CBD.

The pandemic upturned the discussion in 2020. Big questions were asked about the future of cities — urban centers and commercial real estate in particular. It was clear that the role played by the CBD was changing rapidly. As the long-term impacts of this shift started to crystalize, expectations of a city started to broaden — some wanted to stay in the cities and keep them vibrant; others wanted to move to small towns and encourage localization.

The past two years have brought a radical shift in the purpose of cities. Our most recent *Emerging Trends* reports talk of new cities — like NEOM in Saudi Arabia or the (as yet unnamed) city being built to replace Jakarta as the capital of Indonesia — being designed with new technologies and ideas at the core. At the same time, governments are starting to create a vision for their cities that are consistent with the norms and customs of their own society. The traditional approaches to city building are changing.

The past two years have brought a radical shift in the purpose of cities.

What does the next 10 years look like?

The late 2020s will likely be seen by future generations as the era of urban revolution. Industrial-age norms will start to fall away. Hives of vibrant, sustainable activity will grow out of the existing concrete. We will start to recognize that we are a part of — not apart from — nature. We will develop thinking and approaches to deliver whole system change. And new ideas will emerge, thrive and peacefully coexist.

The era of mass production will give way to an era of mass customization. Instead of building monolithic infrastructure assets that serve the average citizen, we will start to gravitate towards smaller infrastructure that caters to the individual citizen. Rather than forcing everyone to come to the big hospital, we'll work out how to bring tailored healthcare to the patient.

For some cities, the focus for this transformation will be the digitization and integration of city infrastructure and services. Pressure to transform will come from users looking for a better, more effective experience and from owners looking for more efficient and reliable operations. Digitization will increasingly be a key part of the solution, supported by strong data security and privacy protections.

As assets and services become more digitized, they will also become easier to integrate. Depending on the regulatory frameworks in place (and the individual's willingness to have their information digitized), it will start at the sectoral level — mobility and transit, health and social services, government records and registrations — but will rapidly coalesce into a system-of-systems view that provides unprecedented insight to planners and operators, and unprecedented experiences and value to users and residents.

At the same time, pressing challenges around climate and social risks will continue to bubble up. Demand for social equity will ferment positive disruption. Views on the 'purpose' and 'value drivers' of a city will rapidly evolve, influenced in large part by expectations around decarbonization, livability and more equitable access to services and infrastructure. What that means in practice will depend on the culture of the city — some will find their purpose in delivering top-notch infrastructure and services; others may focus on entertainment, shopping or tourism.

Rather than a monocentric city design with an economic CBD at the core, many leading cities in 2033 will transition towards a polycentric model that enables attractive place-based opportunities for citizens to live, work and play within their neighborhoods. The idea of creating a '15-minute city' will turn out to be impractical. But, instead, cities will focus on creating '15-minute nodes' that bring the services to the people instead of forcing the people to the city.

Planning and development will be based on a multifaceted view that prioritizes purpose, livability and equitable access alongside economic growth, jobs and capital expenditure. We can have it all at once; wisely considered, there is no need to choose amongst these objectives. New infrastructure investments will be designed to maximize social and community movements and the value they create — schools and affordable housing will be built over top of new stations; new lines will be created to bring satellite populations within reach of the city nodes and its services.

The path different cities take will be influenced by the age of the city. Many older cities will struggle to leave behind their existing assets and mindsets in order to plot a new course. Cities will need to think about how they will plan for and finance the upgrade of existing buildings to achieve Net Zero goals.

In some cases, the answer will be to start fresh — either by turning former villages or suburbs on the fringes of the old city into new satellite cities, or by building something completely new and unhindered by preconceived models and legacy systems. Others will work to upgrade the infrastructure and systems they already have, leveraging their existing investments and strengths to drive their transformation.

Cities will focus on creating '15-minute nodes' that bring the services to the people instead of forcing the people to the city

Who are the winners and losers?

People living in or around these cities in 2033 should see some of the tangible efforts by city officials to improve their quality of life. Interacting with city services and infrastructure may be more dynamic, intuitive, user-friendly and experience-driven. City governments, leaders and service providers have hopefully worked out how to use new technologies to listen to the weaker voices within their constituencies.

The shift to mass customization will make services much more personal, valuable and intuitive. Public transit will be more integrated, effective and efficient (in fact, in some cities, even the rich will prefer to take public transit, it's so efficient, so clean and so high quality). There will be ample opportunities to balance work and life. New jobs, investment and talent will flow into the city.

Sadly, this is not the future for every city. The vast majority of cities will struggle to escape the status quo. More often than not, the problem will be getting city leaders to square away the mismatch in timeframes between the political and the pragmatic; far too often, they will be thinking in 5-year terms rather than 100-year transformations. Many will also be overly indebted to legacy investments and mindsets to make the change. Others will simply be over indebted.

The risk is that this will lead to a notable bifurcation between the cities that are rapidly transforming and those that are struggling. The reality is that the network effect is particularly strong in cities — the more people and business activity a city attracts, the more people want to go there. As the magnets polarize towards the cities that are transforming, they weaken their pull towards those being left behind. Rising levels of inequality will challenge the city's social license. This will offer an opportunity to the nimble Tier 2 or Tier 3 cities to leapfrog those currently in the lead; Tier 1 cities will need to glance over their shoulders while deciding how best to proceed.

City governments, leaders and service providers will have worked out how to use new technologies to listen to the weaker voices within their constituencies.

How can we get there?

Our vision of the future suggests there are five key factors that may separate those cities that will lead the transformation from those that will lag.

1. **A shift in mindset.** The leading cities will be the ones that seek out new ideas and new models for service delivery. Their infrastructure planners and developers will be focused on delivering outcomes rather than inputs, measuring themselves by productivity gained instead of capital invested. They will redesign their processes to prioritize objectives that deliver on purpose, livability, sustainability and equitable access goals as well as economic and financial. They will be open to new ideas, encourage transformation and embrace change.

2. **Technology at the core.** The leaders will be the ones that recognize early that technology and digitization can help deliver massive productivity gains without having to build a massive amount of new infrastructure. They will rapidly assess and adopt new technologies. They will encourage digitization at the process, asset and system level. They will explore new models, foster new technology ecosystems and promote integration. They will put open data at the heart of their strategy and development.

Prioritize objectives that deliver on purpose, livability, sustainability and equitable access goals as well as economic and financial.

3. **Collaborate across the ecosystem.** The leading cities will take an 'ecosystem approach' to transformation, working with a broad range of private sector, academia, startups, technology companies and service providers to deliver on initiatives that promote livability, sustainability and equitable access. Perhaps more importantly, the leading cities will engage in much more collaborative interactions with residents and users to fully understand their expectations and to co-develop new ideas and service models.

4. **Taking a systems-thinking approach.** The leading cities will not transform in silos. They will take a whole of government approach, creating a holistic roadmap that brings all government departments, services and capabilities along on the journey. Process redesign will be customer-centric rather than department specific. Processes will be seamless across government departments. Infrastructure will be assessed, prioritized and procured centrally, against a range of social, environmental and economic criteria.

5. **Playing a long-term strategy.** The leading cities will be the ones that take a 100-year view of the transformation they are planning while, at the same time, embedding flexibility and multi-purpose design elements to allow future generations to adapt their infrastructure as needed. Rather than locking into expensive new technology solutions, they are setting up the enabling conditions to encourage circular economy models and working with the private sector to create more sustainable funding models. They will put pragmatism over politics to deliver for future generations.

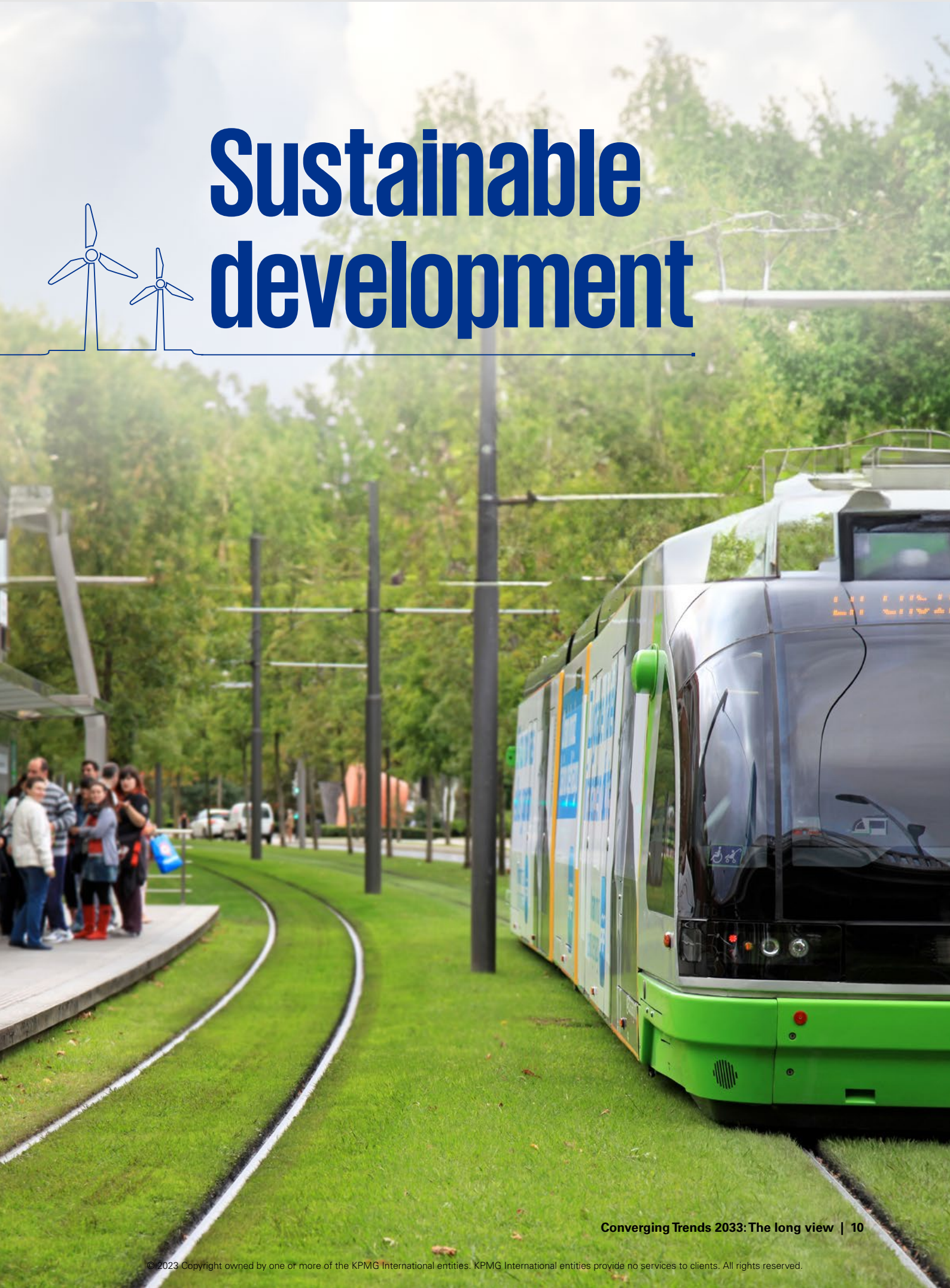
What does this all mean for infrastructure players and providers?

Our vision of 2033 suggests that our current approach to how infrastructure is prioritized, funded, designed, developed, operated and maintained will change dramatically. All players in the infrastructure sector should start thinking differently about a sustainable future.

- *Governments and infrastructure planners* will need to start thinking in terms of productivity gains and outcomes delivered rather than capital invested and concrete poured. They will need to define their strategic plan, understand their ESG ambition and set their objectives. Cities will need to be able to embed those objectives — and a range of non-financial measures — into their investment criteria for infrastructure. Data enablement, gathering, measurement and insights will be key.
- *Developers and operators* will need to focus their efforts on aligning their assets and services to the unique objectives of each city — with a particular focus on digitization, decarbonization and the environment, social value, talent, technology, access and ease of integration. Developers and operators will need to become much better at demonstrating how they can meet the new assessment criteria.
- *Investors* will also need to define their priorities — both financial and non-financial — and set their objectives and assessment criteria accordingly. Indeed, by 2033, it will be commonplace to prioritize Net Zero goals and social value alongside financial returns. That will require investors to shift the way they value assets to reflect the non-financial objectives of cities while working closely with asset managers to drive more value through technology adoption. The real magic happens where the objectives of the city intersect with the objectives of the investors.

Our current approach to how infrastructure is prioritized, funded, designed, developed, operated and maintained will change dramatically.

Sustainable development



A look back at the past 10 years

Elements of the sustainability agenda have been central to our *Emerging Trends* series every year since 2013. Though it wasn't always called that. In the early days, we were talking about it in terms of resilience and natural disasters, social stability and discontent, transparency and corruption.

But by 2017, our *Emerging Trends* report suggests real focus was starting to be placed onto sustainable development. We were warning governments that they would need to start accounting for the social and environmental impacts of investments. We encouraged investors and policy makers to start thinking about how environmental and social impacts could be measured. And by the end of the decade, we declared that sustainability had become mainstream: citizens demanded it, governments measured themselves by it, investors valued it.

The pandemic sharpened minds and broadened the agenda. Our *Emerging Trends* report in 2021 showed remarkable optimism in the midst of the pandemic. We hoped the sudden drop in productivity globally would allow people, governments and companies to envision a low-carbon world. We noted that investors were starting to draw clear lines around how the ESG agenda would influence capital flows. We warned companies with poor ESG performance that they would start to see their financing at risk. And in the heady days of the post-pandemic economic boom, we were in the camp with big hopes that the 'rebuild' would be greener and fairer.

Over the past two years, our *Emerging Trends* report suggests that attitudes and ambitions have hardened. Two years ago, we saw signs of the infrastructure sector beginning to coalesce around the actions that needed to be taken to achieve more equitable access and to decarbonize the industry (against a backdrop of climate-related and socio-economic events that brought the sustainability agenda into people's backyards). There was growing consensus that the world needed to move smarter, quicker, better and faster.

The past 10 years of *Emerging Trends* reports paint an interesting picture of how sustainable development became more mainstream. What started out as a conversation about resilience, adaptation and mitigation has now moved on to discussion about sustainability and the need for a whole systems approach.

Sustainability had become mainstream: citizens demanded it, governments measured themselves by it, investors valued it.

What does the next 10 years look like?

In 2033, we may be in the process of pulling ourselves back from the cliff edge. There won't have been any 'silver bullets'. It will have been an evolution, not a revolution — a triumph of progress over perfection. And while certain targets will have been missed, the world will likely be rapidly adapting — and embracing — a more regenerative, sustainable and equitable future.

Two things will likely come together around 2025. The first will be the stark realization in the West that we have already blown the 1.5 degree limit set in the Paris Agreements. The 2023/2024 El Nino in the Northern Hemisphere is unleashing unprecedented weather events around the world. Communities will experience localized biodiversity collapses. And new data will show unequivocally that the carbon deficit is actually growing faster than ever before. Around the middle of the decade, the world will realize that time is up on the decarbonization agenda and that a new mindset is required.

At the same time, however, new hope will be found. The second thing that will happen around 2025 is that the world (academics, regulators and governments in particular) will get much better at calculating the true value and benefits of their investments as well as the financial and carbon related costs. As mindsets shift, it will become blindingly obvious that profit, people and planet can exist together simultaneously… the renewable lightbulb will come on. Decision-making will be based on more than just financial data; environmental and social impact data will be readily available and understandable. With value clearly defined and measurable, investors and owners will start committing serious investment to meeting their sustainability goals.

Interestingly, these two trends will catalyze a significant mindset shift in the way we think about the problem and the solutions. Instead of thinking in terms of a carbon economy based on scarcity, we will start thinking in terms of a renewable economy based on abundance. By way of example, shifting away from oil (a scarce resource that is priced according to scarcity) to solar and wind (abundant resources that are essentially free), will suddenly become an obvious choice . There could be interesting downstream implications for a global economy and power structure that has historically been dominated by access to resources.

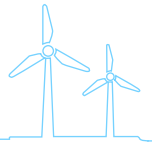
In differing ways and with varying levels of commitment, infrastructure will lead the way in government strategies. Governments and the public at large will recognize that infrastructure construction and use is linked to the vast majority of society's carbon emissions; the solutions must be found there as well. And societies will take it upon themselves to use their procurement of infrastructure to drive increased value and lower carbon intensity for their investments. New construction techniques and approaches will be part of the solution; getting more value/productivity out of existing infrastructure will also be key.

In the medium term, academia, policy leaders and governments will take the lead by encouraging a Whole Systems Approach that considers biodiversity, resilience and adaptation, carbon and the environment, and social value at all stages of decision making and reporting. They will find ways to align the macro climate motivations of society with the micro motivations of citizens. They will build up InfraTech ecosystems focused on delivering the value of sustainability. They will provide clear guidance and policies around their expectations and goals for a sustainable transformation. They will set the groundwork for the private sector to invest.

While progress will start slow — as is often the case with evolutionary changes — it will quickly pick up speed. By 2030, we will have a better understanding of our role in the planet's diverse and complex systems and a more plausible path to Net Zero by 2050. But we will also have realized that externalities matter more than we had anticipated.

Sadly, we will have already broken our 1.5 degree temperature rise limit. We may not have solved the green concrete or green hydrogen riddles, but we will be putting lots of investment into R&D and the commercialization of new ideas. Simply put, we won't be where we wanted to be. But we will finally be on the right path. The mindset shift should have taken hold.

Instead of thinking in terms of a carbon economy based on scarcity, we will start thinking in terms of a renewable economy based on abundance.



Who are the winners and losers?

Sustainability is a broad bucket and different aspects hold varying degrees of importance to different populations and cultures. Not surprisingly, there will also be many different evolutionary paths to sustainability. Some will prioritize environmental, social and governance differently. And there will be a vast range of models and ideas that will be advanced, tested and adopted.

While the debate in the early part of the decade continues to swirl around who should carry the cost and burden of sustainable investments, the quantification of benefits by mid-decade will turn the equation around. Our view suggests that developing markets will likely have the upper hand. With value correlated to need and impact, the developing markets will attract outsized investment flows (assuming they can turn their project ideas into investable assets , while also managing the Governance and Social aspects of the ESG agenda). Many developing markets also sit on an abundance of renewable energy, allowing them to unshackle themselves from energy dependence and variable energy import costs.

The transition will be more of a challenge for developed markets, which are often hampered by legacy infrastructure, sunk cost mindsets and entrenched interest groups. Yet here, too, the value of sustainable development will rapidly turn historic equations on their head. Indeed, as the true value of sustainable development becomes clear, we will see innovative and nimble specialist investors snapping up many of the dirtiest assets knowing that cleaning them can hold great sources of value. Sunken investments will be shifted off the books and capital recycled into newer and cleaner assets.

With value correlated to need and impact, the developing markets will attract outsized investment flows.

How can we get there?

Looking ahead, we see five evolutionary changes that can set markets on a new trajectory towards achieving their sustainability and regeneration goals.

1. **A system model mindset.** This is about taking a whole system approach to our activities, our organizations and our decision-making. It requires decision-makers to think about not just scope, cost, risk and time, but also environmental impact, social value, resilience and biodiversity in every decision they make. In doing so, leaders will be much better prepared to align their ambitions, actions, accountability and reporting across all eight elements. A system model mindset also ensures that the whole system is speaking the same language and aligned on outcomes.

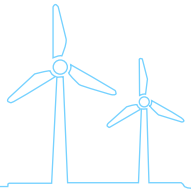
2. **Measured benefits.** The most powerful driver of long-term investment will be the quantification of the specific and measurable benefits of sustainability. Governments will start to require departments to accurately measure the value they generate from their investments. Investors will create their investment plans based on clear value drivers (and clear government policy). Decision-makers in both public and private sectors will be able to compare their options and make better long-term decisions for all their stakeholders. Investment will start to flow to the worthiest projects.

This is about taking a whole system approach to our activities, our organizations and our decision-making.

3. **Starting with infrastructure.** By some measures, infrastructure construction and use accounts for upwards of 80 percent of greenhouse gas emissions, meaning that most of the significant early wins can be delivered by the infrastructure sector. Since government is most often the ultimate owner of the assets, they can play a major role in driving forward the agenda by focusing on decarbonizing the infrastructure and construction sectors. This, in turn, should help establish the right markets and technologies to drive public sector action at a larger scale.

4. **Unlocking abundance.** This shift will be particularly gradual. But, over time, public and private market leaders will increasingly see the renewable economy as a source of abundance and potential value creation. Instead of asking how we will reduce our reliance on oil, we will be asking how we can increase our share of solar and wind and maximize its economic and environmental value across the supply chain. It's a subtle but powerful difference that prioritizes opportunity and growth over rationing and scarcity. And that will change the way stakeholders think about investments.

5. **Clear policy and regulation.** As governments and policymakers come to recognize the value that a whole systems approach can deliver, and more effort and investment is placed into building up a supportive ecosystem and driving transformation through infrastructure, many will begin to realize the importance of renewing the social license through clear policy and regulation. Particularly over the next three to five years, we expect to see significant jockeying as governments use policy and regulation to attract sustainability-related talent, ideas and investment to their markets. For the developing markets in particular, this will be key to unlocking inbound investment.



What does this all mean for infrastructure players and providers?

We believe that all participants in the infrastructure sector will need to start thinking very differently about the value and benefits that a whole systems approach can deliver to stakeholders and citizens. In particular:

- *Governments and regulators* will need to start using infrastructure as a way to drive outcomes and actions, regulation to encourage investment and stability, and policy to set clear objectives and targets that increasingly focuses on livability, equitable access and the environment.
- *Developers and operators* will need to understand how they fit into the system model and what levers they can pull to help deliver on their own goals and objectives, as well as those of the markets and communities they support.
- *Investors* will need to consider how they might adapt their investment criteria to reflect the sustainability factors aligned with the public's desired outcomes.
- *Infrastructure planners and authorities* will need to start thinking about how they tap into long-term abundance rather than focus on preserving scarce resources and status quo models.
- *Individuals* — every one of us — must strive to combine greater access to information with increased confidence and innovative technologies to do our own part as individuals to contribute to the SDGs.

Innovation

A look back at the past 10 years

Technology and innovation have played a leading role in our *Emerging Trends* report in each of the past ten years. In 2013, we forecasted that a growing number of infrastructure planners and owners would be starting to take a longer-term view of how technology could be integrated into their assets. In 2016, we suggested that technology would rapidly and fundamentally disrupt the way we plan, design, develop and operate our infrastructure. More recently, we've been predicting the rise of AI and automation in infrastructure delivery.

Through the years, we've also noted a range of massive challenges. From the very start, our reports have raised concerns about technology obsolescence and the risk of sunken assets. In the early years — 2016 and 2017 in particular — the focus was on using big data to better understand consumer and technology trends. As maturity grew, we shifted focus to thinking about how to use sophisticated analytics to deliver operational efficiency, drive customer outcomes and enhance service levels.

Data has also been a recurring theme. In 2013, our *Emerging Trends* report encouraged infrastructure authorities and operators to use their data to improve strategic decision-making. By the 2020s, we were extolling the value of data integration and digital service delivery. Later editions of our *Emerging Trends* reports have been talking about the benefits and risks of data being used to drive automation, AI and IoT — and the integration, visualization and ownership questions that come with that.

The other emerging theme coming from the past decade is one of global technology competition. We have noted on many occasions that the emerging markets could take a strong competitive lead in infrastructure innovation. And we have noted the growing protectionism around key technology sectors and components. If anything, the past few years have seen an unwelcome acceleration in that sphere.

More recently, we've been predicting the rise of AI and automation in infrastructure delivery.

What does the next 10 years look like?

The world in 2033 will likely not be the jetpack lifestyle that we may have anticipated in 2023. As is always the case with technology innovation, change may occur in incrementally innovative steps rather than through 'big bang' inventions. In many ways, the world in 2033 looks a lot like it does today. People still work, they still drive on roads and they still need electricity.

What has changed is the focus. Whereas in the past, infrastructure innovation was often poorly funded, weakly adopted and scattered in its use cases, by 2033, innovation in the infrastructure sector is tightly aligned to a small number of very important priorities. There are many to choose from — climate adaptation, regeneration, equitable access, delivery of the SDG goals, affordability, operational efficiency, productivity and more. That has given focus to planners, investors and owners as they consider how to move forward.

Sharper focus has also allowed decision-makers to explore different options and opportunities. When the focus shifts to outcomes instead of technologies or inputs, it allows new ideas to be explored and adopted. Much greater levels of optionality will be baked into infrastructure planning and development. For example, instead of adding more lanes to alleviate traffic (the traditional approach), planners are exploring a range of new technologies and models — like demand planning to promote active travel, HOV lanes, smart motorways and automation technologies — that enable greater utilization of existing assets.

New technologies will also allow planners, designers, developers and operators to be more efficient and effective as they take on their city's infrastructure challenges. Generative AI will frequently be used to develop 'first draft' designs based on data collected from similar infrastructure around the world. New construction methods, skills and materials will help reduce waste and carbon emissions while adapting to climate change. Material science will have helped improve resilience and reduce the base requirements for asset development. Legions of new solutions will integrate to allow infrastructure owners and users to access and manage assets more effectively.

Perhaps the most important change that may occur over the next decade is in government's ability to encourage and accelerate adoption out to the masses. The reality is that innovation releases the greatest value (financial or otherwise) when it gets to the point of mass adoption. Throughout the late 2020s, governments and investors will find ways to speed up the adoption of worthwhile technologies and ideas — not just across lines of governments and within markets, but also between markets and across public and private sectors.

Once again, we see different paths of evolution and different rates of progress around the world. In part, this has been influenced by cultural norms, expectations and preferences. Mobile-savvy markets in the developing world, for example, are already moving at a considerable pace towards mobile apps, payments and services. Cities with older populations may move slower. Those with a strong history of technology adoption — like Singapore — will move faster.

Clearly, a market's attachment to their existing infrastructure will also influence the pace and direction of change. Those with little existing infrastructure will be free to focus their attention on greenfield applications and ideas. Those with entrenched infrastructure will likely place more focus on innovations that enable retrofitting and use adaptation.

We may not be flying around with jetpacks by 2033. But we may certainly be on track to achieve continuous and incremental innovation in the way we design, deliver, operate and use infrastructure.

Generative AI will frequently be used to develop 'first draft' designs based on data collected from similar infrastructure around the world.

Who are the winners and losers?

History suggests that technological innovation always creates winners and losers. The worry is that the drive towards infrastructure innovation will sharpen a 'digital divide' that will fuel further inequality at a global, national and individual level. Those markets that innovate faster will likely be more productive, thereby attracting more investment and more innovation. Those that face challenges kicking off the flywheel of innovation will quickly find themselves further and further behind.

On the other hand, innovation in infrastructure will also help many markets solve some of their greatest growth barriers and development problems. Virtual education, for instance, can help upskill the local population and bring greater diversity to the workforce. Better digital infrastructure can improve access to government services and enhance social stability. Improved connectivity can help citizens better anticipate, mitigate and respond to climate events. New water technologies can open up new opportunities for safe and healthy development. There will likely be more winners than losers.

Indeed, it will not always be easy to pick the winners and the losers. Some may make big bets on technologies that fail. Others may get the technology right but ignore the cultural nuances that drive adoption. And there will be many technologies and markets that will struggle at first, only to pull through in the long run. The challenge facing governments and infrastructure owners, therefore, is to be adaptable in the face of change.

Those markets that innovate faster will be more productive, thereby attracting more investment and more innovation.

How can we get there?

As we look ahead to 2033, we see five ways that governments and infrastructure authorities can help accelerate the value of infrastructure innovation.

1. **Focus on outcomes.** Prioritize key use cases and outcomes that help renew the social license rather than focusing purely on the amount of concrete poured or the quantum of capital invested. This gives direction to private market participants and encourages planners and decision-makers to keep an open mind to various solution sets and technologies.

2. **Drive adoption.** Innovation isn't just about cutting-edge invention and commercialization. The real value comes from widespread adoption and utilization. There are a wide range of levers that can be pulled to drive adoption. Understanding the needs and barriers facing customers and users will be key.

3. **Create a supportive environment.** Driving and maintaining innovation requires a vibrant and robust ecosystem of people, capabilities and capacity. Governments and policymakers can play an important role in helping shape the infrastructure technology environment through policy, regulation, investment and partnership.

4. **Prioritize adaptability.** Leverage open data approaches and frameworks to help drive adoption and to encourage innovation. Think about ways that infrastructure can be designed and developed to allow for use adaptation as demand and technologies shift. Continuously assess whether your investments and activities are building a platform for future generations.

5. **Encourage integration.** Exponential value comes from incremental integration. Look for opportunities to encourage integration of technologies, data, processes, systems and outcomes to create greater value for citizens and greater alignment around goals and objectives. However, while integration is important, priority must be given to security and privacy.

Prioritize key use cases and outcomes that help renew the social license rather than focusing purely on the amount of concrete poured or the quantum of capital invested.

What may this all mean for infrastructure players and providers?

The development and adoption of infrastructure innovations will likely have a massive impact on stakeholders across the infrastructure sector. For example:

- *Developers and designers* will need to think more broadly about how technology and innovation can help deliver on their chosen sustainable development priorities with flexible and adaptable designs and development. The winners will likely be those that find a route that shortens the development time for new technologies.
- *Government and policymakers* will need to focus on sustainable outcomes and creating a supportive environment that encourages an innovation ecosystem and talent pool to develop and thrive. Procurement approaches that reward innovation can play a catalyzing role.
- *Investors* will need to find ways to align the timelines of InfraTech with the long-term needs of society to create positive outcomes through innovation.
- *Owners and operators* will need to explore new and emerging technologies and innovations to assess their value and applicability today and in the long term.

Contact

Veerle Coussée
Partner, Head of Real Estate, Building & Construction | Tax, Legal & Accountancy
KPMG in Belgium
E: vcoussee@kpmg.com

kpmg.com

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