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The Kingdom of Saudi Arabia is investing in its future and meeting citizen needs
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The world’s first energy islands will create clean power for millions
Denmark is exploiting its strong history in wind farming to produce green energy
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Tomorrow is here today
Divining the future of infrastructure with four global Deloitte leaders
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Unleashing exponential learning for a better future
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Deloitte Global infrastructure Leaders. From left to right:
Beth McGrath
Luke Houghton
Michael Flynn
Dr. Kellie Nuttall
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ANCIENT WISDOM TO BUILD A MORE RESILIENT FUTURE
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JACK BRAINES, LEADER, DELoitte GLOBAL FINANCIAL ADVISORY
As a global society, we are in a crossroads as we bounce back from a devastating pandemic. Technological advancements, climate change and a lack of economic recovery were the key challenges that we came together to discuss in our focus on human cities.
Foreword

BY JEFF WEIRNS
LEADER, DLA Pritchard Global Financial Advisory

INFRASTRUCTURE IS ABOUT MUCH MORE THAN BRICKS AND MORTAR; IT IS ABOUT PEOPLE, IMPROVING THE QUALITY OF LIFE FOR ALL AND Raising LONG-TERM ECONOMIC GROWTH.

I’VE ALWAYS BEEN PASSIONATE ABOUT INFRASTRUCTURE AND THE VITAL ROLE IT PLAYS IN SOCIETY, GROWTH, ECONOMIC PERFORMANCE AND OUR COLLECTIVE PAST, PRESENT AND FUTURE. WHEN DONE WELL, IT SIGNIFICANTLY IMPROVES THE WAY WE LIVE OUR LIVES EVERY DAY.

Investments in roads, bridges and highways, public transit, modernisation, and broadband expansion create the kinds of economies, and social opportunities necessary for individuals and communities to thrive.

As a global society, we are at a crossroads as we look back on a devastating pandemic, fraught geopolitical uncertainty, balance sheet challenges and look to future economic recovery.

With all of these challenges comes significant opportunity for new and then new collaborations to future-proof the way we work, live and thrive. More than ever, we need to build the systems that will create a new narrative for the 21st century.

Two discussions of publication of our global infrastructure magazine contains some cutting-edge infrastructure topics with some of the best minds in the business. From Narrows’ lessons on transoceanic construction sites, to the role of indigenous knowledge in infrastructure planning, to revisiting our cities towards the future of sustainable urban development. These are complex and challenging topics. Infrastructure is about sharing unique case studies and learning practices from around the world — as well as considering views on the future of the sector to prompt new ideas, debate and instigate action and impact.

I hope you enjoy this third edition.

I would like to thank the editorial team for answering topics that you and our dieties and colleagues taxyalty for our knowledge.

THE FUTURE OF INFRASTRUCTURE

AMERICA’S NEW USES TRILLION INFRASTRUCTURE BILL: WHAT NEXT?

A few months ago, the US infrastructure investment act was passed by Congress to become the Bipartisan Infrastructure Law and aimed at rebuilding the new bill from every sector of American infrastructure — including transport, energy, broadband, water, roads, climate and natural resources. This is the largest economic stimulus in the US, rebuilding American competitiveness through nine key infrastructure “beats” of everyday Americans will also be improved.

According to the White House, the bill will”fund America’s roads, bridges and rails, expand access to clean drinking water, ensure every American has access to high-speed internet, tackle the climate crisis, advance environmental justice, and invest more in communities that have too often been left behind.”

President Joe Biden’s commitment will be boosted by over 700,000 new jobs for the next decade across sectors like construction, transportation. He says “This deals makes a tremendous investment in people who work all across the country — in cities, small towns, rural communities, and across our coasts and plains.”

AUSTRALIA’S NEW INFRASTRUCTURE PLAN EMBRACES INFINITY UNCERTAINTY

Australia’s resilience has been tested in recent years from severe bushfire to drought. As a country, we are making a recovery from the massive challenges and our communities have also been devastated by bush fires, floods, and cyclones. The $211 billion infrastructure plan launched by the Australian government is a massive task for the country. It’s a sign of how high-quality infrastructure is irreplaceable because, when cities, regions, services, and local and remote areas, where the infrastructure is robust and adaptable in the face of changing trends and potential global shocks and stresses, and where the infrastructure sector has the capacity and capability to deliver on a record investment program and continue supporting the national pandemic recovery.

The plan, topographically and community centered, will help create the nation’s economic recovery, increase the number of jobs, maintain and enhance an already reliable standard of living, and ensure the nation’s cities and regions remain world-class. It acknowledges that communities are recovering from, and preparing for, new shocks and stresses, making the infrastructure needs more complex. “Transport infrastructure is likely to look very different than today, and the way we build it needs to respond to this uncertainty” says Julianne Atwal, chief of infrastructure Australia.

Jamaica Port Trust (Jamaica Port Trust (Image: Getty Images))

Urban living is being revolutionized in the kingdom of Saudi Arabia with the establishment of the world’s most futuristic “city”

Located on the northern coast of the Red Sea, MCM will act as a center for innovation and education. Located on the shores of the Red Sea, The City of the Future will serve as a research, development, and education hub for the region. The City of the Future will act as a center for innovation and education, providing a unique environment for students and researchers from around the world.

The City of the Future will be a self-sufficient city, with its own power plant, water treatment facility, and waste management system. The City of the Future will also have its own green space, with parks and gardens, and will be designed to be eco-friendly and sustainable.

From Jakarta to Kuwait: The World’s Most Expensive Sinking City on the Move

Jakarta has been Indonesia’s capital city since 1945. More than 10 years later, and after several years of discussion, the Indonesian government has finally announced that the country’s capital will relocate from Jakarta to Nusantara on the island of Borneo.

The new capital city will be built on a patch of land with a dry season of 150 days and a population of 150,000. The city will be designed to accommodate more than 6 million people and will be home to a new parliament, president, and other government offices.

Norway is leading the way on zero-emission construction sites.

Norway has been a leader in renewable energy, with 90% of the country’s electricity coming from hydropower. The government has set targets to phase out fossil fuels and become carbon-neutral by 2030.

The government has also introduced measures to reduce emissions on construction sites, including the use of electric vehicles and the use of recycled materials.

The city of Oslo, the capital of Norway, has been a leader in green construction, with many of its buildings designed to be energy-efficient and sustainable.

Close construction works of the Virkens gate in Oslo. Norway (Image: Christoffer Taeve)

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Close construction works of the Virkens gate in Oslo. Norway (Image: Christoffer Taeve)
LISTENING BROADLY TO CREATE TRUSTED DATA TO MAKE BETTER, FASTER DECISIONS

A FIVESIDE CHAT WITH SIMON THOMAS — VP, STRATEGIC PLANNING, POTASHCorp.

In the modern era of infrastructure, data is king. Simon Thomas, VP of Strategic Planning at PotashCorp, shares insights on how data-driven decisions can drive the future of infrastructure.

**Simon Thomas: (on the importance of data)**

"Data is crucial in making informed decisions, especially in the realm of infrastructure. It allows us to anticipate problems before they arise and to make decisions that are both efficient and effective."

**Feature: Listening broadly to create trusted data to make better, faster decisions**

Infrastructure systems are complex and interconnected, making it essential to gather comprehensive data from various sources. Simon Thomas, VP of Strategic Planning at PotashCorp, emphasizes the importance of listening broadly to create trusted data and making informed decisions.

**Simon Thomas: (on the role of data in decision-making)**

"In the modern era of infrastructure, data is king. It allows us to make informed decisions, anticipate problems before they arise, and optimize operations."

**Feature: Accelerating insights to improve project performance**

PotashCorp, primarily comprised of potash operations, play a critical role in sustainable farming practices and improving nutrient levels in soil. A concrete compound can be used in direct application or in combination with elements to provide strength and durability. Potash enhances the water absorption rates in plants and promotes increased yield for all those involved. Therefore, it doesn’t create a build-up of negative soil residue and, although unused potash will remain in the soil, it continues to be available for future plant growth. It can play a vital role in improving crop safety and reduce crop problems across common farming areas."

**Simon Thomas: (on the integration of technology)**

"Technology plays a crucial role in the modern infrastructure landscape. Smart technologies are enabling us to monitor, track, and optimize performance in real-time."

**Feature: Intelligible major market projects**

Large infrastructure projects are becoming increasingly complex. To deliver better to modern customers, an intelligent digital solution has been utilized for projects to improve, faster, and with more certainty. Integrating data collection and real-time analytics to accelerate project delivery today.

**Simon Thomas: (on the future of infrastructure)**

"As we look to the future, we see a continued focus on sustainability and innovation. The infrastructure of tomorrow will be designed with these principles in mind, ensuring longevity and efficiency."

**Feature: The future of infrastructure**

The landscape of infrastructure is ever-evolving, driven by advancements in technology and a growing understanding of the importance of sustainability. As we navigate the future, it’s essential to remain informed, adapt to new challenges, and embrace the opportunities that come with them. The future of infrastructure is one of collaboration, innovation, and a continuous drive towards a more sustainable and resilient world.**
From livable to lovable – making cities more human

A CONVERSATION WITH
DULESHA KULASODIYI – MANAGING DIRECTOR OF DELTEC CENTER FOR THE EDGE IN ASIA PACIFIC

Cities are often ranked for their livability, sustainability or tech smarts, all of which matter. But what if they could also take concrete steps to embody elements of what makes a city lovable, helping residents feel more connected? The payoff would be happier, more resilient cities – poised to drive economic growth.

So, what drives that special pride, passion and joy in a city? Why wouldn’t New Yorkers dream of living anywhere else? And what makes Paris so magnetic to its citizens? Lima’s eclectic cultures are a drawcard, and locals love Hong Kong’s unequivocal commitment to the art of commerce ... what does it all mean?

DULESHA SAYS THERE ARE READILY IDENTIFIABLE ATTRIBUTES THAT MAKE A CITY LOVABLE

City planners and governments can shape these attributes to help cities and their citizens form an emotional, resilient bond. Given that more and more people will be living in cities every year (World Bank, Urban Development, 2020), the more closely cities resonate with their citizens, the more both will benefit.

All around the world, cities are becoming more quintessentially human, and more representative of the people. A great example is Superkilen Park in Copenhagen, Denmark. Suweda explains, “This park came about as an effort to better connect the residents of the homogenous neighborhood in a meaningful way.”

It was co-created by the multiethnic community and overlaid with 12000 artifacts from around the world – including a piano table from Armenia, a swing from Bulgaria, sheep trees from China and three sorts of palm trees from the Palestinian territories. The design features were all common typologies of their respective cities. The spaces co-created with the resident communities, therefore creating a deep sense of ownership and connection. Most importantly, it was a move to shift away from an image of a homogeneous Denmark to one that more accurately reflects a much more diverse urban population in Copenhagen,” says Suweda.

The park is just one example of the six attributes that make cities lovable: namely, a sense of connection, as shown in the diagram below. The other relevant senses are attachment (think of Christmas or last day in a blog post), stimulation (like London’s commitment to being a 24 hour city), freedom (the open joy of gay pride festivals in Sydney and San Francisco), inclusion (true creation pro-poor ownership; policy structures to include most Singaporeans in wealth creation through home ownership)

“But we’re not a sense of agency (the increasing influence from the masses, like a communal power plant clean up of Venice Beach in Mumbai to transform it to its former natural beauty).

Dulesha Kulasodiyi is based in Singapore.

IF YOU BUILD OR ADAPT CITIES TO HAVE THESE SIX ATTRIBUTES, CITIZENS WILL BE MUCH MORE ENGAGED IN SOLVING THAT CITY’S PROBLEMS, AND THIS CREATES MORE RESILIENT CITIES.

INCLUSION
Feeling included and accepted, and perceiving ourselves to be treated fairly in the city i.e. inclusiveness, equality, and/or acceptance of diversity

ATTACHMENT
Feeling familiar with, and connected to, the city i.e. place attachment, character of the city heritage and local culture

FREEDOM
Feeling that we are able to influence change in the city i.e. freedom and opportunities to pursue aspirations and interests, freedom of being and expression

AGENCY
Feeling that we are able to influence change in the city i.e. capabilities and opportunities to shape the city

CONNECTION
Feeling close to, and affiliated to, others in the city i.e. opportunities to meet and socialise with others

STIMULATION
Feeling interested in, and excited about, what the city has to offer i.e. place attractiveness, elements of discovery, variety of experiences

“This is a new conversation we should have at a global scale. I’m committed to accelerating the thinking that was first commissioned by the Design Council of Singapore for that city, and steering this further towards the edge – encouraging global debate of what makes cities the best they can be. If future policies could factor in what makes cities lovable, it would transform lives.”

DULESHA KULASODIYI

Read the Deltec Insights article, From livable to lovable – making cities more human by Dulesha Kulasodiyi.
A CONSERVATIONIST APPROACH

Ancient wisdom to build a more resilient future

“In our rush towards the future, we tend to forget about the past. We have thousands of years of ancient knowledge that we just need to listen to, allowing it to expand our thinking about designing symbiotically with nature. By listening, we’ll only become wiser and ready for those 21st century challenges that we know will endanger our people and our planet. I’ve seen it.”

WISE WORDS WITH
JULIA WATSON — CONSERVATIONIST AND LANDSCAPE DESIGNER

A young fisherman walks under a living root bridge at Moucharaung village, India. In the millennia-long process of living root bridges, the Mishing people have used the transportable roots of rubber trees to form living root bridges over rivers for centuries.
“IT’S IMPORTANT THAT WE PUT INDIGENOUS KNOWLEDGE KEEPERS, EXPERTS AND THINKERS INTO PLACES WHERE THEY HAVE AUTHORITY AND AUTHORITY ON DECISIONS BEING MADE ABOUT OUR ENVIRONMENTS. LET’S MOVE FROM GLOBALISM TOWARD A DIFFERENT FRAMEWORK OF HOW THE WORLD WILL EVOLVE BASED ON REGIONALISM.”

ANCIENT WISDOM FOR A MORE SUSTAINABLE WORLD

Technology holds one of the keys to building climate change. Not just what we do, but how our current knowledge is being applied to address the challenges of climate change.

Julia Watson is passionate about bringing this technology to help inform the way we plan for the future of infrastructure—how we will live in better sync with nature and with each other.

“Sustainable infrastructure means looking at the way we design and build our cities in our way of life, and part of how we live to the localities. It’s not about the individual. It’s about the community as a whole. It’s about the whole community working together to make infrastructure work for the people.”

Another example of how indigenous cultures adapt to their environments is to use sustainable practices to improve their lives. Watson refers to the “new way of life” of the small tribes that live in the forests and mountains of the Andes in South America. “These tribes are using sustainable practices to improve their lives and to live in harmony with nature.”

Using the Andean cultures as an example, Watson emphasizes the importance of community and collaboration in building sustainable infrastructure.

NEW PLATFORMS FOR OLD VOICES

Julia Watson is a community of people who are using sustainable practices to improve their lives and to live in harmony with nature. She reminds us that we all have a role to play in creating a sustainable future, and that we need to work together to make sure that our actions are sustainable and in harmony with nature.

“Our time on earth is a major opportunity to be creating the power of global ecosystems and to achieve the goals set by the Paris Agreement. We need to work together to protect our environment and ensure that our actions are sustainable.”

Watson encourages us to take action and to be part of the solution. “By working together, we can create a sustainable future that is in harmony with nature.”

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The combined impact of commuting for work and recreational trips add up in terms of climate impact.
Infrastructure megaprojects: What does it take?

From rebuilding economies to coping with aging populations, to reducing regional inequalities, to taking climate action, societies at large are facing a number of competing, at times overwhelming, challenges. Thankfully, major infrastructure programs are increasing, becoming a key delivery vehicle to help address these challenges—and will continue to do so as we begin going over budget, over time, over and over again, in fact. Infrastructure is a natural way to build up the West, a capacity that was to be successful over the course of the entire lifetime.

Rob Scopes, partner in charge of leading major programs at Deloitte UK, says success is easier said than done. Because every program is set up and delivered differently according to its size, scope, and ambition. Furthermore, there are dynamics; a need to recognize their changing requirements as they move through the different phases from design to overall construction and use. The UK Government’s Major Projects Portfolio is made up of, demonstrating the full range and type of programs in play, each requiring varying levels of financing and external support, and is dependent on the delivery model selected to execute the program.

Projects that focus enough attention on the early stages are much more likely to achieve their intended outcomes later on and display world-class delivery standards.

For the last four years, Rob has been leading the first team of experts to work with high speed 2 (HS2 Ltd) - a Government Armed Length Body (LAB) to deliver its investment in a new high speed railway that will form the backbone of the investment in Britain’s transport network. The team’s role has been on defining and developing the LAB’s rights capabilities and operating strategy to demonstrate to the Department for Transport and the Treasury how the LAB can effectively manage multibillion-pound contracts — and effectively deliver on this £56 billion transformation required.

A start-up mentality will drive lasting change

But note, a concept specifically to deliver megaprojects is in the start-ups, but not in the start-up in itself; in a concept projects, people need to transform themselves on a number of occasions. It’s not just as ‘the transition to new ways of working, but something more dynamic, with some sort of flexibility, that’s key to delivering success. And that’s why we need to make sure that everyone is thinking in terms of their own career paths and what they’re looking to achieve in the future.'
In late 2021, Deloitte surveyed 660 global leaders working in the infrastructure space to gauge their perspectives on the sector’s future. Key survey insights have been captured here. Survey respondents mostly included senior officials working in governments (77%), followed by private companies (21%) and nonprofits (2%).

### Steps to achieve post-pandemic agendas

<table>
<thead>
<tr>
<th>Steps to achieve post-pandemic agendas</th>
<th>Global (%)</th>
<th>Asia Pacific</th>
<th>Europe</th>
<th>Latin America</th>
<th>Middle East/Africa</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest in urban public spaces for walking, cycling, socializing and eating</td>
<td>60%</td>
<td>57%</td>
<td>55%</td>
<td>53%</td>
<td>49%</td>
<td>68%</td>
</tr>
</tbody>
</table>

**“TO IMPROVE THE CITY’S AIR QUALITY AND REDUCE CONGESTION, WE ARE INVESTING IN LOCAL STREET INFRASTRUCTURE TO PROMOTE COMMUTING BY WALKING, CYCLING AND TAKING PUBLIC TRANSPORT.”**

- UK CITY OFFICIAL

### People still want to work from home

Over one-third of respondents believe more people will be working from home, and people will also make greater use of remote working. Interestingly, although remote working will continue to increase, this isn’t expected to translate to where and how people live.

### Governments can make cities more liveable

Interestingly, respondents don’t expect people to flee cities. On the contrary, they believe that there will be fewer people living in cities, and one in five believe that there will be more demand for larger residential units. The majority of respondents believed governments would achieve their post-pandemic social, environmental, and economic infrastructure agendas and most often demand for more liveable cities by investing in urban spaces and green transformation.

### Technology will shape the future of infrastructure

Most respondents said AI/machine learning, cloud computing, and cybersecurity technologies were the most likely ways to shape infrastructure development. But despite these advances in technologies, respondents believed execution challenges around starting projects would continue.

### COVID-19 will have a lasting impact

Almost every participant (99%) believed that the COVID-19 pandemic will have a significant, lasting impact on infrastructure. Interestingly, the reasons cited for this impact covered a broad range of responses, with almost half of respondents saying they thought COVID’s impact would create more demand for multimodal transportation.

### In some regions, infrastructure backlogs continue

More than one-third of respondents said their region suffered from infrastructure backlog, with the Middle East and Africa having the most respondents (32%).

### Governments are expected to take climate action

Despite the infrastructure backlogs, respondents from the Latin America, Middle East and Africa regions felt that their governments would take specific steps to achieve their post-pandemic social, environmental, and economic infrastructure agendas. Survey respondents are, in turn, hopeful.
### Efforts Are Expected to Increase

<table>
<thead>
<tr>
<th>Effort</th>
<th>Asia Pacific</th>
<th>Europe</th>
<th>Latin America</th>
<th>Middle East/Africa</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift to renewable energy, such as providing tax credits</td>
<td>42%</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>Invest in climate research</td>
<td>29%</td>
<td>29%</td>
<td>20%</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>Expand the number of electric vehicle charging stations</td>
<td>28%</td>
<td>13%</td>
<td>14%</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>Assign greater priority to integrated use of multiple transportation modes</td>
<td>23%</td>
<td>15%</td>
<td>17%</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>Incorporate environmental benefit metrics into investment selection and performance assessment</td>
<td>19%</td>
<td>12%</td>
<td>11%</td>
<td>12%</td>
<td>7%</td>
</tr>
</tbody>
</table>

### There Are Many Obstacles to Infrastructure Implementation

In a recent survey, respondents listed a wide range of reasons as to why infrastructure projects may not be implemented in the next three years. In particular, respondents cited scarce resources, budget constraints, data privacy risks, and supply chain costs as the biggest expected obstacles.

<table>
<thead>
<tr>
<th>Obstacle</th>
<th>Percentage</th>
<th>Obstacle</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortage of talent</td>
<td>43%</td>
<td>Budgetary constraints</td>
<td>40%</td>
</tr>
<tr>
<td>Data privacy security</td>
<td>40%</td>
<td>Supply chain costs</td>
<td>39%</td>
</tr>
<tr>
<td>Unclear roadmap/ROI</td>
<td>36%</td>
<td>Cross-department coordination</td>
<td>35%</td>
</tr>
<tr>
<td>Availability of materials</td>
<td>30%</td>
<td>Complex procurement</td>
<td>28%</td>
</tr>
<tr>
<td>Complex regulations</td>
<td>26%</td>
<td>Lack of technological skills</td>
<td>24%</td>
</tr>
<tr>
<td>Environmental clearance</td>
<td>24%</td>
<td>Lack of citizen support</td>
<td>24%</td>
</tr>
<tr>
<td>Lack of political will</td>
<td>18%</td>
<td>Investments help rich, not poor</td>
<td>13%</td>
</tr>
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A more equitable transport system brings opportunity right to Louisa’s front door.

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Access our report to find out more: A journey of infrastructure trends.
The world’s first energy islands will create clean power

**Danmark has a long history of exploiting strong winds from the sea to produce electricity, starting in 1975 with the construction of the world’s first offshore wind farm. More recently, in June 2020, the majority of Danish parliament agreed on funding for another ambitious world first: developing two energy islands.**

The business case was simple—to accommodate offshore wind turbines and supply green electricity with a capacity to power as least five million households.

The Danish Energy Agency, part of the government’s Ministry of Climate, Energy, and Utilities, is in charge of monitoring and developing energy and supply sectors in Denmark. It is currently in talks with major private sector bidders for the government tenders to deliver on the islands, with bids expected to be announced in early 2023.

The first energy island will be located west of Jutland in the North Sea, but from scratch as an artificial or man-made island. It will become Denmark’s largest construction project and serve as a hub to connect and distribute the power generated by offshore wind farms. The island’s initial capacity will be 1GW—enough to cover the electricity needs of 5,000,000 European households—with the potential to expand 10GW. The estimated cost of building the new island, and 10GW of capacity, and related transmission grid will amount to 270 billion Danish kroner (583 billion euros).

Bemarnink Island in the Baltic Sea will become the second energy island. Electrical facilities on the island will serve as a hub for offshore wind farms off the coast, supplying an additional 2GW of green energy.

“By constructing the world’s first energy hub with a potential capacity of 10GW, Denmark significantly contributes to [the EU’s] ambitious offshore wind [target].”

Not only by dramatically expanding renewable energy production, but also by supplying European neighbors with an abundance of renewable energy. Only by inspiring others and developing new green solutions they also want to use, can we really do something to combat climate change.”

—Dan Jørgensen, Minister for Climate and Energy and Public Utilities, said in early 2021.

Rikke Beckmann Danielsen, partner Deloitte Denmark specializes in advising on public-private partnerships and says, “This is a really interesting, unique project to follow and a unique light for me and my team—working at the forefront of a green transition in the Nordics. The new islands will be considered as critical infrastructure, majority owned by the state, and made possible in collaboration with one of the most innovative and experienced private sector partners. The first phase will involve approximately 250 offshore wind turbines sending electricity to the hub, which will be distributed to Denmark and nearby countries via high voltage. According to the Danish Energy Agency, the new islands mark the beginning of a new era for the generation of energy from offshore wind, and aimed at creating a green energy supply for Danish and foreign electricity grids.”

Operating as a green power plant at sea, the islands are expected to play a major role in the phasing out of fossil fuel energy sources in Denmark and Europe.

Rikke Beckmann Danielsen is based in Copenhagen, Denmark.

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**Embracing ESG principles when delivering sustainable capital projects will uniquely impact climate change**

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**Denmark and Danish companies rank among the best when it comes to development, production and installation of wind turbines which today produce more than a third of Danish electricity. Export of wind turbines and technology for wind energy are essential contributors to the Danish economy, and will also ensure that Denmark will no longer be dependent on fossil fuels in 2050.**

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THE BUILT ENVIRONMENT SECTOR ALONE CONTRIBUTES 45% OF UK GREENHOUSE GAS (GHG) EMISSIONS, SO IT CAN CONTRIBUTE SIGNIFICANTLY TO ACHIEVING OUR LOCAL AND GLOBAL NET-ZERO GOALS.
“Infrastructure should exist to significantly benefit humans. To change lives. And to enable the provision of better services like healthcare, education and justice services.”

LUKE HOUGHTON

“There are risks that come with humans learning to trust machines and artificial intelligence, both on the user and designer end. If we don’t feel like we can fully embrace this technology, then we will leave a lot of potential benefits on the table.”

DR. KELLY NUTTALL

“To achieve a carbon-free global economy requires everyone to do their part – it is the ultimate team sport. Collaboration among government, industry, and the community is key to responding effectively through climate mitigation and adaptation.”

BETH MCGRATH

“New infrastructure needs to be digitally integrated, flexible enough to encompass changing mobility patterns, and be done on a climate and social basis so you can deliver what citizens are looking for.”

MICHAEL FLYNN

GLOBALLY, TRILLIONS OF PUBLIC DOLLARS HAVE BEEN PAKMARKED FOR INFRASTRUCTURE PROJECTS

Standard & Poor’s estimates that infrastructure investments deliver returns of 2½ times the initial outlay within a decade, and the projects launched today will support the livelihoods of millions in the future. But as infrastructure becomes more fundamental to our everyday lives, its nature is becoming more esoteric. Once associated primarily with roads and bridges, “infrastructure” now encompasses digital wireless networks and banks of data which are just as central to our lives as any live form of it.

Every part of the ecosystem is changing – from the way we interact with infrastructure in the post-pandemic “new normal.” In this respect, new technologies are having an asset design and operation. So, the growing emphasis on sustainability and social equity in every link of the project development chain.

Exciting potential benefits of these changes are incredible. If policymakers, governments, and financiers play their cards right and prioritize projects at the right time, we will collectively lay the foundation for a more sustainable and equitable future, a world where all humans can flourish.

Some risks remain. For example, corruption or political considerations could easily influence the sector, leading to substandard outcomes. There must be an emphasis on prioritizing the right type of investments across diverse areas like broadband, smart travel, housing, health, and energy while avoiding “shovel-ready” projects that can lead to short-term gain politically and long-term harm socially and economically.

Government must think long and think globally, realizing the counterproductive urge to stick to slower public sector investments in infrastructure projects for budgetary reasons. They must also partner with private capital to finance the projects that can provide returns at a human level, as well as a monetary one.

The environmental impacts of new projects must always be considered. According to the World Bank, infrastructure construction and operations account for 70 percent of global emissions. It is imperative that we drive down the carbon footprint of new infrastructure projects, and the “greening” of existing assets.

There is also a mainstream infrastructure gap between developed and emerging economies may widen. The impacts of the global pandemic have constrained the ability of governments in the global south to finance necessary projects while private capital looks uncertain in a low-risk, busy financial sector in the global north. Inclusiveness is good in and of itself. Concerned efforts are now being made to enhance diversity across gender, sexuality, and social lines, with representation now a clear priority for industry leaders. Much has also been realized that it is impossible to meet tomorrow’s infrastructure needs without input from a diverse range of voices who comprise the communities, cities, countries, and countries we are attempting to serve.

There is still a long way to go before the sector can be viewed as anything but “make, mark and pair,” but progress is being made, even at a time.

The following interviews with four of Deloitte’s most prominent infrastructure experts attempt to balance the near and exciting future. One thing is abundantly clear: infrastructure will never be the same again.
**The Future of Infrastructure**

**Luke Houghton**
Deolite Global Lead Partner, Infrastructure and Capital Projects

**Michael Flynn**
Deolite Global Lead Partner, Infrastructure, Transport and Regional Government

**Beth McGregor**
Deolite US Managing Director, Deolite Global Lead, Government & Public Services

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**Thinking About 2023 and Beyond: What Will Be Different?**

Over the short term, think infrastructure is going to continue to serve as a key driver for accelerating post-COVID economic recovery. Having said that, we still have considerable pressures on supply chains. We also see continued pressure on labor and that’s going to be exacerbated by the massive demand for infrastructure from the economic stimulus. For example, massive programs like the Inflation Reduction Act will consume resources at an unprecedented rate.

In the longer term, we see changes in construction technology and changes in design – including much broader use of design for manufacturing and assembly (DFMA), 3D printing of modules and building blocks. How will these changes impact humans, communities, cities and beyond?

The spiraling impact of infrastructure is becoming more and more critical, and that’s going to be pivotal over the next 15 to 20 years.

We also focus much more on what can we build and don’t enough on what that builds in the wider world. So think more exciting to think about infrastructure from a service delivery point of view, and not just as provision zones for roads. Otherwise, we'll just be building dead-enders.

Infrastructure should exist to significantly benefit humans. To change laws. And to enable the provision of other-health, education, environmental benefits.

**All Changes Come with Risks. What Are They? And Can We Mitigate Them?**

The biggest long-term risk with infrastructure is building the wrong project, and building it in the wrong way. Too many visionary projects can become political decisions.

One of the ways to minimize that risk is for central government and investors to have long-term strategic infrastructure plans that align with real benefits for society, which in turn create the drivers for investment. And investors and the public can see this as a win.

**What Role is Technology Playing in Changing the Future of Infrastructure?**

It’s a business imperative from a transport perspective. Technologies like artificial intelligence, cloud computing, and Internet of Things allow us to do so in a more efficient and effective way. New configurations of transport networks and new forms of behavior are proliferating far faster than ever before.

When it comes to building scenarios in 10 years, it will take us 10 to 20 years to build a system and 24 hours to tell us what scenario is in a model.

Now, with modern technology, how can we classify what we call ‘digital trends’ of an entire transport system or entire energy grid. In a few decades, we can essentially run various permutations of how conditions on that network might play out, and see which one has the potential to be the most transformative for people, for businesses, for the environment. We can see which scenario is in a model.

The effort needs to drive effective actionable information, but that is not to be underestimated. Any solution of digital and technology needs to be designed with the end user in mind. For example, making use of those decisions support business models.

The digital design of these tools should be designed to be more collaborative with users, and not just as a decision-making tool. It’s more important for technology than to make infrastructure more efficient. Infrastructure needs to support this.

**What Big Changes Are You Seeing?**

The increased focus is still moving forward into the sector as a result of COVID-19. Every government around the world seems to have an infrastructure plan in their stimulus packages, and these are central to how we work, live, and play.

Infrastructure models are somewhat different, even for the same city. We are designing and planning this way.

**Is Technology Really Exciting You?**

We have done a lot of prototyping around digital technology with few government agencies, and it’s showing great potential. America’s Navy, the nation’s traffic control, and to UPS. Nearly every digital solution is increasing the overall efficiency of the overall transportation system.

Any new infrastructure plan can be that “From infrastructure”, because it will become more like a service supported by digital models. We need new policies and regulatory tools to do that. How will we use this new policy in our infrastructure planning system.

**What Will Infrastructure Look Like in 2025?**

Digital will become more prevalent across all assets, shifting how we interact with infrastructure. Citizens won’t even realize they’re using infrastructure, as they think of it as a service. For example, we can use facial recognition to access information about buildings, and services and any congestion on the network, we can live our lives more conveniently and flexibly. This is made possible by having the latest data available on the go.

Equally, infrastructure owners can use data to make informed decisions about investments.

The world is moving towards a more efficient and effective way of using infrastructure. Infrastructure needs to be central to how we work, live, and play. It needs to be shaped and designed to serve our needs.

**How Will These Changes Impact Humans, Communities, Cities and Beyond?**

A great example is in Saudi Arabia, where the biggest cargo city is being built on the Red Sea. Known as Jeddah, it will be a logistics hub for all the traffic and trade that comes into the region. The logistics and transportation infrastructure needs to be integrated seamlessly with the population.

By embracing flexibility, digitalization and digitalization of transportation, our world can create a world with minimal congestion. This is the foundation of what we are working on, digital technology. That is the key to unlocking the potential of infrastructure.

In the coming years, the use of the citizen’s voice will continue to increase, sharing the demand for more infrastructure. We need to engage the community and citizens, and the public needs to be central to the infrastructure design. We need to engage the community and citizens.

**What Role will Modern Technologies Play in Driving These Changes?**

Technology will play a tremendous role in driving the demand for the expanded infrastructure ecosystem. 5G enablement networks connected devices deliver services and data securely and quickly. This enables increased connectivity across all sectors, from government to private and public sectors. Moreover, emerging economies will also increase, both in the developed and the developing world, and that’s not good for the world.

Another challenge we’re finding is the development of infrastructure. We need to design infrastructure that is adaptable and scalable.

How will urban living be impacted by the new regulations? And will they be enough to support the new infrastructure ecosystem.

**Infrastructure Can Be Embraced in an Integrative Approach?**

It will. But if you’re in an integrated approach, a commitment to building resilient and sustainable cities in the urban designs to achieve net-zero, and the necessary infrastructure to get us there.

**Infrastructure and the Changing Climate**

Infrastructure is a key player in the climate crisis. By 2023, 40% of global emissions come from the transport sector alone, and by 2050, that number is expected to rise to 55%.

Collaboration among government, industry and civil society is key to responding effectively through climate mitigation and adaptation.
Unleashing exponential learning for a better future

"THE FUTURE ISN’T ABOUT DOING WHAT WE’VE ALWAYS DONE MORE EFFECTIVELY. WHERE IS THE PROGRESS IN THAT? INSTEAD, IT’S ABOUT MAKING SURE WE LEARN FASTER, SO THAT WE THRIVE MORE. WHEN WE’RE ALL THRIVING, WE’LL FREE UP OUR ENERGY AND TIME TO BE EVEN MORE MOTIVATED TO CREATE EVEN MORE VALUE TO OUR STAKEHOLDERS, SOCIETY AND THE WORLD WE LIVE IN."

AN INTERVIEW WITH JOHN MAGEL III

JOHN MAGEL III IS A HIGHLY REGARDED FUTURIST, MANAGEMENT CONSULTANT, ENTREPRENEUR, SPEAKER AND AUTHOR WHO HAS SPENT OVER 40 YEARS WORKING IN SILICON VALLEY

He is driven by a desire to help individuals and institutions to increase their impact in a rapidly changing world. His eight books, The Journey Beyond Here, addresses the psychology of life and change, and how to navigate these.

It doesn’t matter what industry or sector we play in: many of us tend to focus on finding cheaper and faster ways to keep doing what we’ve always done. It’s human nature. In the case of infrastructure, the focus on the last century has generally been on increasing connectivity—finding ways to connect people faster, and more effectively. And that takes more data, and more technology. But is it enough?

We are speaking to John to explore what infrastructure, climate and society—should we approach the problem of... or are we really trying to accomplish faster and cheaper efficiency? More flexibility?

He says that the key is to reframe the question and think about how we can redefine our infrastructure from the ground up.

When reflecting on the future, John’s extensive research shows that different institutional models in the global economy and society will evolve to shift from scalable efficiency to scalable learning. He says, “In a more rapidly changing world, the key innovation for all of us is to learn faster, so we can keep up with—and ideally ahead of—all the changes that are happening concurrently.”

Scalable learning isn’t just training modules or syllabuses, which focus on sharing existing knowledge more broadly. Rather, scalable learning is about finding new ways to help everyone learn faster, creating new knowledge that never existed before. This requires people to come together to connect with each other to explore efficient scenarios, ideas, learn together—have more and more impact. It’s all about coming together with others between and across ecosystems to co-create a new knowledge and ideas.

Offices and open spaces play a key role in bringing people together. While the past few years of the COVID-19 pandemic and the subsequent shift to working from home has shown us the potential of technology, it won’t replace the value of a physical environment, according to John, enriching the potential for learning.

"One of the great things about physical communities is that they encourage serendipity—those unexpected encounters with others who challenge our beliefs and comfort zones with different views and perspectives. This brings new ideas and insights to the problems we’re wrestling with. As a wonderful consequence, people see that opportunity to become better at what they do,” says John.

Technology can also do more to stimulate new ways of thinking. Rather than just suggesting “more of the same” content or space for people to consume based on their preferences and history, it can be the opposite, with us out of our comfort zones. John says, “To think, we need people with certain interests to be exposed to people with different interests—so then they evolve, and then other people ask questions they’ve never thought of and learn something new. In the future, algorithms can do a better job of matching shared and polar perspectives, so people can challenge each other to learn new things faster.”

Another enabler of a thriving future is ecosystems, especially dynamic ones. We know that collaboration is key to share perspectives, capabilities and knowledge. So rather than competing with each other for short-term transactions to access existing resources and knowledge, we can create dynamic ecosystems that enable people to come together and build deeper, healthier and broader—beyond just a few more transactions. That way, we all learn faster, accelerate our performance improvements and decide as individual participants as well as the local dynamics ecosystem network.

Unfortunately, there are few examples of dynamic ecosystems where the primary goal is to help people learn to learn faster by acting together. One early example was the ecosystem created by Silicon Valley start-up, PortalPlayer. This foundation of PortalPlayer was the potential for developing mass market consumer digital music players. In 1999, the company orchestrated a global ecosystem of hardware and technology players to innovate in all the technology components required for these devices. The idea of innovation and learning was so rapid that, two years later, when Apple introduced the iPod, it was built around the PortalPlayer technology platform.

With the wave of new thinking, learning and ways—enabled by technology and dynamic ecosystems—comes disruption. It also brings the question: Are members infrastructure providers vulnerable to new entrants? If infrastructure is local, it is safeguarding, and emerging needs aren’t being met by that existing infrastructure, this will encourage new entrants. To counter that, infrastructure developers could introduce a new model and become more decentralized. For example, by focusing on a local area, infrastructure could demonstrate its power to offer learning, then scale it over time in larger areas.

Imagine what we could accomplish if we could create infrastructure in education, providing more value to society. In other words, they could bring more value to the community? Imagine how exciting that would be if everyone was flourishing and prospering, and making more impact! What an amazing world that would be! We don’t need to be driven by fear or be scared of the unknown, we need to welcome the opportunity to realize a better future,” says John.

As an optimist, John is passionate about inspiring others to make small, smart moves—all of which can lead to big things in motion. And it’s not about changing everything all at once. It’s about taking a specific, small infrastructure asset as a time, a community of practitioners, and exploring what its impact could be. It’s all about learning how to provide even more infrastructure over time to make more value. Imagine what a thriving future that would be,” concludes John.
One ministry’s ambition to improve over 71,064 km of roads and highways

**Kingdom of Saudi Arabia**

**IN LINE WITH THE KINGDOM’S VISION 2030 AND WITH THE FAST TRANSFORMATION THAT THE KINGDOM IS GOING THROUGH, THE MINISTRY OF TRANSPORT & LOGISTICS SERVICES IS REORGANIZING ITSELF TO RESTRUCTURE AND REGULATE THE TRANSPORT SECTOR.**

TAREK ALSHAMI, DEPUTY MINISTER, MARCH 2022

**WITH A YOUNG, FAST GROWING POPULATION OF OVER 32 MILLION, THE KINGDOM OF SAUDI ARABIA IS THE THIRD LARGEST COUNTRY ENTIRELY IN ASIA, THE SECOND LARGEST IN THE ARAB WORLD, AND THE LARGEST IN WESTERN ASIA.**

Its capital city, Riyadh, is home to about 8.5 million inhabitants and the Kingdom’s various government departments — including the Ministry of Transport & Logistics Services.

In 2013, the Kingdom launched an ambitious Saudi Vision 2030 built around three key themes — a vibrant society, a thriving economy and an ambitious nation. Focusing wide-ranging government services which effectively and efficiently meet citizens’ needs is a fundamental piece of the puzzle, and the ministry plays a key role in making this happen. Firstly, by creating an efficient, modern transport system. Secondly, by delivering sustainable economic development, underpinned by healthy competition. And thirdly, by promoting the safe and efficient movement of goods and people, both for the Kingdom and for the wider Middle East, Africa and Europe.

**The Ministry of Transport & Logistics Services’ role is to ensure the efficient and effective movement of goods and people** in the Kingdom, with a focus on road, rail, air and maritime transport, by maintaining a safe, efficient and effective transport network.

Tarek Nahle, Deputy minister in charge of the Ministry’s client relationship, notes how the Kingdom is leading the transformation of the sector across all transport modes, while directing the development and the maintenance of the integrity road network. He says: “The Kingdom’s transport network measures 4,905 km of dual carriageways and more than 5,000 km of highways. It’s also responsible for 4,296 bridges, 12 airports and the Kingdom’s 28 ports.”

He adds: “The Kingdom’s high-speed train, the Haramain, is the backbone of the network connecting the Kingdom’s major cities. It’s a symbol of the Kingdom’s rapid development and its commitment to providing efficient and reliable transport services.”

The Kingdom’s transport network is a vital part of the Kingdom’s transformation, acting as a catalyst for economic growth and social development. It plays a key role in connecting the Kingdom with the rest of the world, facilitating the movement of people, goods and ideas, and contributing to the Kingdom’s vision for a modern, sustainable and inclusive future.

**The new operating model will help both deputyships adjust and develop their organisational capabilities — not only to respond to current challenges, but also to upgrade the quality and safety of the transport network while improving the financial sustainability of any construction and maintenance.**

**This work is not just about enhancing the effectiveness and efficiency of maintaining the thousands of kilometers of roads and highways, but also about reducing fatalities and improving citizens’ experience of the Kingdom’s vast road networks. Better roads will keep citizens safe, attract tourism and help the Kingdom become the core logistics hub for the region,** says Karim Zantout.

The Ministry is also looking into innovative financial models to fund and finance future road construction and maintenance, and will establish new road connectors with responsibility for the road assets – from ownership to operations. With these improvements, the ministry is on the right track to achieve its objectives as part of the wider Saudi Vision 2030 and boasts the Kingdom of Saudi Arabia.

**Tarek Nahle and Karim Zantout are both currently working in Riyadh in the Kingdom of Saudi Arabia.**
COP26

Futures we want: Listening to inform built environments in 2050

AS PART OF COP26, WHICH WAS HELD IN GLASGOW IN LATE 2021, WE ASKED EXPERTS AND CITIZENS FROM SIX REGIONS – THE ARABIAN PENINSULA, BRAZIL, JAMAICA, KENYA, INDIA AND THE UNITED KINGDOM – TO IMAGINE A GLOBALLY NET-ZERO, CLIMATE-RESILIENT FUTURE. THE PROJECT WAS DELIVERED FOR THE UK DEPARTMENT FOR BUSINESS ENERGY AND INDUSTRIAL STRATEGY BY A CONSORTIUM LED BY DELOITE AND INCLUDING AECOM, THE UNIVERSITY OF CAMBRIDGE, ONE YOUNG WORLD AND RADLEY YELDAR.

“We need a more energy-efficient way to improve cooling capacity and withstand heat stress.”
— WORKSHOP PARTICIPANT, JAMAICA

BUILDING OUT A PICTURE OF THE FUTURE

We asked before Koff, risk advisory manager at Deloitte UK, what the team focused on for this research project with global citizens.

“Specifically, we asked to focus on building out four themes: water, energy, food and land and the built environment. As part of this, we wanted to develop a picture of built environments in 2050, based on what was desirable and feasible, from all walks of life shared their hopes and desires for what their homes and buildings will be like, and reflected on the critical role homes, buildings and cities will play in protecting people globally from the effects of climate change. We also looked at how technology, design and urban planning can reduce greenhouse gas emissions and change the way we live in the future.”

The team found that the built environment is intrinsically linked to the climate footprint: it’s ability to withstand more challenging and unpredictable weather, and its ability to help people lead low-carbon lifestyles. It also plays a crucial role in delivering a climate resilient 2050.

Workshops for the project showed that people want to see the benefits of a better built environment – from new economic opportunities to enhanced biodiversity.

There is a desire to make sure that developing countries and marginalized communities can engage with the transition in an equitable way.

As temperatures rise, both old and new technologies can help keep buildings comfortable. In the Arabian Peninsula and Africa, traditional architecture designs, including cooling wind towers, can provide an alternative, or a supplement, to active cooling, helping to protect against the intense heat. In长江 ity, air conditioning systems will be powered by local renewable energy sources such as rooftop solar. In places like India and India, where rural populations and those living in informal settlements currently have limited access to power grids, this may be essential for viability by 2050 as global warming increases.

“People from all walks of life shared their hopes and desires for what their homes and buildings will be like, and reflected on the critical role homes, buildings and cities will play in protecting people globally from the effects of climate change. We also looked at how technology, design and urban planning can reduce greenhouse gas emissions and change the way we live.”
— LISIMORE KOLAY

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RESILIENCE AGAINST WEATHER

By 2050, homes will need to provide resilient and sustainable protection against tropical storms, floods, droughts, and other interior weather events. For example, Australia has a greater chance of floodwaters, and other severe storms (especially cyclones) will cause more damage to infrastructure and livelihoods, and other interior subterranean intrusions in storm surges.

“BY 2050 I EXPECT TO HAVE INSTALLED LOTS OF NEW LOW-CARBON TECHNOLOGIES INTO MY HOME.”

— WORKSHOP PARTICIPANT, UK

NEW TECHNOLOGIES, NEW MATERIALS

The built environment is responsible for a big percentage of direct and indirect greenhouse gas emissions in many regions — 12% for the UK, for instance — and therefore holds significant potential for contributing to the resilience transition. Smart, energy-saving technologies in our homes are likely to become increasingly important as we approach 2050.

The choice of materials and methods used in home construction and the built environment more broadly also need to be reinvented. Technologies to decarbonize the manufacture of construction material are needed, which underpin much of the world’s built environment and are responsible for 15% of global emissions; these must be scaled up and used more widely. By 2050, in tandem, resilient, sustainable, and recycled materials will also play an important role.

Some nations will need to review or replace large portions of their built environment — for example, in informal settlements, which may become increasingly vulnerable in a changing climate. The energy efficiency and embodied carbon of any replacement stock must be considered from the outset; new buildings will need to be compatible with a globally net-zero, climate-resilient future.

“I HOPE THAT MORE GREEN SPACES WILL HELP MAKE LIFE HEALTHIER, COOLER AND MORE PLEASENT IN THE U.K.”

— WORKSHOP PARTICIPANT, UK

GREEN INFRASTRUCTURE IS PART OF CITY PLANNING TO HELP PURIFY THE AIR AND PROTECT FROM HEAT WAVE AND FLOODING.”

— WORKSHOP PARTICIPANT, INDIA

IN A WORLD OF INFINITE RESOURCES, TODAY’S “TAKE-MAKE-WASTE” APPROACH TO PRODUCTION IS NO LONGER AN OPTION. TO CHALLENGE THIS, WE NEED A TOTAL RETHINK OF HOW WE LIVE — AND IT STARTS IN OUR CITIES.

Look to the outskirts of Sydney’s West and you’ll see the familiar sight of construction — Sydney swells and residents struggle to keep up and afford — a slice of Australia as our true self, the city’s housing is increasingly pushing out its fringes.

The access opportunities to a lot of Sydney’s suburbs — but not for Quinney Banks, developer partner, it’s a very particular reason. “There’s about to build a world’s new city,” he says. “It makes sense to build it, using best practice — it’s more sustainable, more resilient. We have the technology — it doesn’t need to be invented — it needs to be adopted. That’s the opportunity to build a better practice and bring it together in a project.”

While Australia’s west coast will have a very different climate change impacts, Western Sydney will have its own challenges. The area already experiences fleeting hot weather, and the hots and arid climate north of it, while it’s cooler, can give rise to the heat island effect.

But addressing it will take more than just technology. It requires a new way to think about resilience and a new way to think about waste. For Quinney partner Georgie Rodenmey, the answer is obvious, a more “virtual economy.”

In a virtual system, the purpose of new technology is to move the city towards the future and back to the past, where it is possible.

“I'D LIKE TO SEE GREEN CITIES, WITH MORE USE OF RENEWABLE RESOURCES — ESPECIALLY IN THE TRANSPORT INDUSTRY.”

— WORKSHOP PARTICIPANT, INDIA

BATTERY A NEW TRANSITION

A globally prosperous and sustainable environment is, in a very real sense, a resilient environment, providing balanced economic, social, and environmental benefits. The enormous and immediate opportunities are immense and require a global and collaborative approach to achieve.

In a world where the environmental footprint of our current economic practices is becoming clearer by the day, the transition to a ‘green economy’ will not only be clean but also sustainable, says Georgie.

The vision of a circular economy is exciting — businesses can create value and jobs by using sustainable materials, reducing waste, and improving their business practices, which is why we need to make it happen.

“SYSTEMATIC APPROACH”

But what does this mean for our cities? Georgie says there’s a lot that needs to be done. First, we need to understand how to build a resilient city, and how to make it happen.

“IT’S NOT GOOD FOR THE PLANET AND GOOD FOR BUSINESS. NOT ONLY WOULD THESE MEASURES FURTHER REDUCE THE IMPACT OF HUMAN ACTIVITY ON THE PLANET; THEY WOULD ALSO INCREASE CHANCE OF WE Tigually,” says Georgie.

For example, in order to become a global leader in circular economy by 2050 while the impacts being understood by the country range from urban floodwaters to food waste, production, and other pressures, for a project, the City of Byron’s new project, which it is now using as part of its apartments.

For Quinney, the COVID-19 pandemic represents a moment in time when we can embark on these projects in an unprecedented way.

“I'D LIKE TO SEE AN ECONOMY THAT IS ECOFAIR AND MORE ENSURING SUSTAINABLY.”

— WORKSHOP PARTICIPANT, BRAZIL

BUILDING CIRCULARITIES

Importantly, Georgie stresses, circular, products are on the move of science, as well as people. Many are available today. For Georgie, the technology is ready, more sustainable, circular practice, which is the example of being an expert in waste reduction and food production, a large portion, which he has been focused on construction and urban planning. This includes projects to enhance green construction technologies such as using recycled materials for the renovation of the city’s oldest hospital and a building in a town which is not used as part of its apartments.

RETHINKING WASTE

Goodbye waste, hello opportunity.

RETHINKING WASTE WITH DELICTIE AUSTRALIA PARTNERS: DANNY REZEK, GEORGIN RODENMAY AND PHIL DAVIES

Infinity symbol with creative ideas. (Image: Getty Images)

A constantly growing urban community in a global context, this is creating the foundation of a small city. In the meantime, we’re much more aware of the opportunities of the impact we make as individuals in our local communities and how to make a lasting difference.”

MAKING A CITY MORE CIRCULAR TAKES:

• Increased utilization — better use of the shared space that’s already out of use in the buildings we have

• Standardized materials — using recycled materials and improved design that minimize material usage

• Elimination waste — pre-labour, material design, 3D printing and better planning for eliminating construction waste

• Extended asset lifetimes — refurbishing and repurposing existing buildings

• Improved urban planning — allowing effective use of new, collection and mobilization of resources.

Danny Rezek and Phil Davies are based in Western Sydney and Georgie Rodenmey is based in Melbourne, Australia.
A continental soup of smart cities

In the spirit of celebrating some cities that are pushing the envelope in sustainability and livability, we took a whistle-stop tour of our seven continents to create a unique “continental soup”.

1. **A BASH OF EUROPE...**
   **ZURICH, SWITZERLAND**
   **FOUNDED: 1218**
   The Swiss city started its smart city program with a streetsight project that focused on using sensors to respond to traffic levels with varying levels of brightness. It is also home to the “Smart Zurich City” initiative.

2. **A PINCH OF NORTH AMERICA...**
   **NEW YORK CITY**
   **FOUNDED: 1624**
   The “Big Apple” is one of the world’s most densely populated and smartest cities. It is home to several smart technologies, such as the “Street View” initiative.

3. **A HINT OF SOUTH AMERICA...**
   **BUENOS AIRES, ARGENTINA**
   **FOUNDED: 1580**
   The “City of the Seven Mountains” is known for its “Intelligent Metro” project.

4. **A SPINKLING OF AFRICA...**
   **CAPE TOWN, SOUTH AFRICA**
   **FOUNDED: 1652**
   Cape Town is South Africa’s second-largest city and one of the most successful models of sustainable urban development.

5. **A BOWL FROM ASIA...**
   **SINGAPORE, REPUBLIC OF SINGAPORE**
   **FOUNDED: 1819**
   The “City of Gardens” is home to “The Internet of Things” initiative.

6. **ANOTHER SPODNZU FROM ASIA...**
   **SEUL, KOREA**
   **FOUNDED: 1394**
   Seoul is known for its “Green City” initiative and its “Green Technology” development.

7. **AND SOME SPODNZUS FROM AUSTRALIA...**
   **ADELAIDE, SOUTH AUSTRALIA**
   **FOUNDED: 1836**
   Adelaide is known for its “Solar City” initiative.

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When you search “smart cities” on Google, a plethora of results come up for your attention. But the various blogs, reports, criteria, and rankings are all a little different and change each year (a good sign, because cities constantly evolve). But it’s also confusing – because no one list appears to be definitive.

There are some hard facts, though. According to UN data, cities consume 70% of the world’s energy and produce more than 80% of global greenhouse gas emissions – and they account for less than two percent of the Earth’s surface. City populations are only set to soar making these figures more important than ever that cities continue to improve.

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**THE FUTURE OF INFRASTRUCTURE**

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The Great White North: Canada’s 8 transport infrastructure priorities

With ten provinces and three territories that extend from the Atlantic to the Pacific and northward into the Arctic Ocean, Canada covers 9.98 million square kilometers, making it the world’s second-largest country—and home to over 38 million citizens. It’s been coined the “Great White North” given its great size, while Arctic frozen tundra and snow, and being north of the US.

ENCOURAGING PEOPLE TO START TAKING PUBLIC TRANSIT AGAIN

Transit in Vancouver recently asked Deloitte to better articulate the mindset and motivations of public transit riders. We deliberately chose not to describe commuters based on a persona or identity, but instead focused on what unique driving factors inspired a person to choose public transit over other modes. This included looking at commuters’ different motivations for any particular trip. The work has helped TransLink’s Customer and Marketing team think more strategically about how to target both marketing and employer programs to increase ridership, while also working with our team for recommendations on incentives to stimulate ridership on the city and bus network, including conducting “return to work” employee workshops and encouraging corporates to redirect employee parking arrangements.

IMPROVING CONNECTIONS TO VANCOUVER’S CORE TRANSIT SYSTEM

Metro Vancouver has a high concentration of traffic from homeless and vulnerable members – including childcare workers, and workers engaged in industrial and distribution centers. We’re looking at ways to tailor transit programs and services, like shuttles, to provide better service and connectivity to the core transit system.

MAKING CANADA’S TRANSPORT NETWORK MORE EQUITABLE AND ACCESSIBLE

The future of mobility extends well beyond the major urban centers, and needs to be relevant to all communities across Canada. Infrastructure enhancements need to accommodate a wide range of needs and preferences. We collaborated with the Toronto Regional Board of Trade to produce a report on what must be true to build universal transit access. Scan the QR code to view the full report.

MOVING TOWARDS MORE COLLABORATIVE CONTRACTING MODELS

When it comes to procurement of construction projects, industry participants are moving away from public-private partnerships to more collaborative contracting models, including alliance models or Progressive Design-Build delivery models. While these new contracting methods are already playing out in the private sector, government bodies are also following suit.

TAKING CLIMATE ACTION IS A NATIONAL IMPERATIVE

To help fight the climate crisis, Deloitte is developing a Canadian roadmap for sustainable aviation fuel production and is in early discussions with carriers and industry partners about the potential of biofuel and synthetic fuel.

CONTINUING TO EMBRACE TECHNOLOGY TO TRANSFORM TRANSPORTATION

Increasingly, modern technology is being used to improve data transparency and inform better decisions. For example, we’re helping Air Canada to develop a digital twin to better forecast and manage air traffic control personnel. Additionally, we’re working in partnership with AWS to help the Port of Vancouver utilize computer-aided piloting technology to track container movements from terminal to inspection facility, identifying those that require further inspection.

DIVERSIFYING AIRPORT OPERATIONS TO RECOVER FROM COVID-19

To re-energize COVID-19, and capture new market share, several Canadian airports are enhancing their logistics capabilities and are looking to replace traditional baggage at airport. Air Canada has also been piloting and is looking at different solutions to transport.

BEING FLEXIBLE AND AGILE IS ESSENTIAL WHEN DEVELOPING SUCCESSFUL TRANSPORT INFRASTRUCTURE

Being able to share infrastructure assets in a flexible way is more important than ever. This is enabled by modern approaches to the engineering, procurement, and construction management using 3D systems. Engineering methodologies that manage complexity and climate, and digital twin and simulation technologies to strengthen and accelerate design, enable trade-offs and reduce design risk. There’s need to be upskilled by inclusive delivery models including progressive, collaborative and alliance models for contracting.
How can Optimal Reality solve for real-time operational excellence?

A DIGITAL DISCUSSION WITH DELIOTTE AUSTRALIA EXPERTS
SEAN MCLOWERY - PARTNER AND CALEB SAWADE - PRINCIPAL

Optimizing our cities for a safer, smarter and more sustainable way to live.

Optimal Reality.

“Optimal Reality provides a completely different approach to managing infrastructure. Rather than reacting to issues as they arise, it allows for proactive decision-making based on data and analytics. This can be particularly valuable in situations where infrastructure is under strain, such as during peak usage periods or during extreme weather events.”

For example, for Airservices, we were asked to provide network planning to reduce disruption. The result? Reducing airborne delays by a forecasted 33% when applying our simulator as a disruption management tool to foresee unexpected events, and a new portal for transparent and agile collaborative decision making between Airservices and their online partners,” says Caleb.

Transport operators have traditionally solved congestion issues with new infrastructure, but with Optimal Reality’s ability to optimize existing infrastructure, new and existing networks can be managed more effectively.”

“Optimal Reality provides a comprehensive view of the network, allowing for better resource allocation and improved efficiency. By integrating data from various sources, we can provide operators with real-time insights to make informed decisions.”

Solving the world’s most complex problems with our innovative digital twin solution by linking physical and digital networks in real-time. Running millions of permutations in the optimal area powered digital twin model within seconds, solving infrastructure’s most pressing issues today for a safer, smarter and more sustainable way to live.

Scan this code to find out more about Deloitte’s Optimal Reality

Scan this code to watch the Airservices case study video

Sean Mclowery, Digital twin solutions expert, agrees “It’s all about optimizing decisions, supported by what we refer to as ‘mission control’, as shown in the image, ‘Imagine having all the right information at your fingertips, previewing what will happen in your transport network - what you plan to do and what you need to do there. Then you back that decision, making sure everyone else is in the right place, ensuring the dynamic services are also important. We can explore what could happen in these three minutes, right now, just as if it were three minutes. This is everything’ says Sean.

This is where digital data come to play. They can provide a way forward to change complex systems with more confidence than ever before. By making data available from physical systems, organizations can make better, faster and more informed decisions for their business operations and performance in the physical world.”

Conor Sawade, a machine learning expert, explains how this means urban transportation operators can escape the ‘unmanaged future’.

‘Firstly, prediction. This means being able to map what’s going to happen in a given transport network - like a train, bus, bridge or ambulance route - in a confidence-based way. Secondly, collaboration across partners. We need to encourage people to solve problems inside and between departments, ranging from traffic and health, to operational and community services. In the past, and other organizations need to maintain an ecosystem of collaboration. And finally, integrated data. Data sources don’t need to be bidirectional, or unidirectional, anymore.”

For the ‘unmanaged future’ urban transport networks, the digital twin technology acts as a confidence-based model. It enables real-time decision-making, providing insights to operators to improve their network planning and operations.”

“We have seen some wonderful moments for our clients, where the digital twin of their transport network - ranging from rail trains to traffic control to a state’s entire transport network - has enabled more robust decisions to be made, improving not just safety, but also reducing congestion and time delays. Decision making processes for every organization. If you close a railway, it could mean congestion will dissipate somewhere else. But if there’s a road on which the route you’re diverting traffic to, your decision has resulted in two blocked routes. This sort of robust digital twin can help inform decisions to avoid disruption.”

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PUBLIC AND PRIVATE PARTNERSHIPS

Bridging the gap for a better future

CROSSING BRIDGES WITH RYO TSUJIMOTO - PARTNER, INFRASTRUCTURE & CAPITAL PROJECTS, DELLOITE VIETNAM AND JAPAN

WE’VE ALL SEEN THE DIVIDE BETWEEN EMERGING AND DEVELOPED COUNTRIES AND ECONOMIES, BUT HOW ARE WE BRIDGING THAT GAP AND WHAT ROLE CAN PRIVATE AND PUBLIC SECTOR ORGANIZATIONS PLAY?

One government in Asia that is actively forging new bonds of trust across sectors is the Japan International Cooperation Agency (JICA). As one of the largest bilateral international donor organizations (IDOs) in the world, JICA has played a key role in infrastructure development. It has supported some of the largest infrastructure projects in Asia, bringing JICA into play in emerging markets. With such an impact on Asia’s development, the government is embracing public-private partnerships (PPPs) in developing countries to enhance the business environment, support infrastructure development, and enhance public services.

Ryo Tsujimoto, Deloitte’s partner for Infrastructure & Capital Projects in Vietnam and Japan, explains the importance of government organizations like JICA in funding critical infrastructure improvements. “It’s only reasonable that these firms make an impact in markets in developing countries. We aim to help JICA achieve its objectives to promote renewable energy management, and help JICA provide financial support for start-up companies to create business innovations,” says Ryo.

Further aid in Indonesia, JICA and its partners were recently approached by the Indonesian government to help with an ambitious plan to develop 1,200 km of roads through PPPs. JICA is an off-eight-day project in Indonesia to develop the strategic road network in northern Indonesia with a PPP scheme. JICA will support the project in the implementation of the PPP scheme.

“This kind of a PPP is expected to be a showcase of successful PPP capacity development – ranging from planning, procurement, and monitoring – by an international donor to drive infrastructure and economic improvements by focusing on assets that will generate revenue and improve ways of life,” says Ryo.

Another great JICA investment drive is in Kenya, where a world-leading coffee industry is critical to the country’s economy. JICA is supporting efforts to improve coffee supplies and increase access to foreign markets. This project is expected to support the development of a coffee supply chain, which is a critical component of the country’s economic growth.

We are driven by purpose, to make an impact that matters, and an industry-centric belief that infrastructure must be designed and used to enhance outcomes and services for clients.

Working extensively in the public, private, and capital investment sectors and powered by collaboration, innovation and transformation, we find solutions to the most pressing issues facing our clients and communities.

From green infrastructure and sustainability, smart technologies to a quality lifecycle approach – we drive ambitious outcomes, minimize risk and accelerate delivery.

Connect to infrastructure that builds better lives. Visit www2.deloitte.com/infrastructure-for-good

Deloitte

Construction projects have grown larger, riskier and more complex. And capital projects have a uniquely long-lasting impact on climate change. Given the urgent need to accelerate economic recovery, it’s clear that well-planned infrastructure investments are critical.

Deloitte takes pride in our legacy of helping clients integrate capital projects into economic recovery and delivering first-class infrastructure projects around the world, supported by our global network of Infrastructure & Capital Projects professionals with deep expertise across sectors, services and geographies.
“THE CLIMATE CRISIS IS THE MOST IMPORTANT SOCIETAL CHALLENGE OF OUR TIME. THE CHALLENGES ARE ENORMOUS, AND NO ORGANIZATION CAN SOLVE THEM SINGLE-HANDEDLY. THE GREATEST IMPACT WILL COME THROUGH THE COLLECTIVE ACTION OF LIKE-MINDED ORGANIZATIONS, PEOPLE, INNOVATORS AND NON-GOVERNMENTAL ORGANIZATIONS. IT’S UP TO US ALL TO TAKE ACTION AND BE PART OF THE SOLUTION.”

— PUNIT RENJEN, CEO DELOITTE GLOBAL