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Technology: A Driving Force for ESG in Real Estate and Infrastructure

"There is a major opportunity for business and product differentiation via social and environmental impact. Scaling up technology is critical to realising this potential and standing out in the market."

Chi Mun Woo
Partner, Climate & Sustainability,
Deloitte Australia

Foreword

Across the globe, we have experienced unprecedented climate events in recent years - from heatwaves in Europe, to floods in Asia and the Pacific, rising temperatures in Africa and wildfires across the Americas. Social and economic challenges also persist, with multiple flow-on impacts from the COVID-19 pandemic, international conflicts, famines, and financial volatility posing threats to societal cohesion.

Real estate and infrastructure have a critical role to play in our responses to these key challenges – whether it be climate resilient and low-carbon properties, nature-positive precincts, or accessible and inclusive housing.

Against this backdrop, and as part of our shared commitment to bettering our future, Deloitte and Taronga Ventures have collaborated to develop a joint perspective on how technology can drive improved Environment, Social and Governance (ESG) outcomes across the critically important real estate and infrastructure space. We draw on our industry-leading experience and expertise to help bring better and more sustainable solutions to market. Our insights are based on research and engagement with Executives from global players, including owners, investors, and managers, as well as learned knowledge as practitioners.

Our aim with this paper is to present a pathway that empowers organisations to make a meaningful step change towards strategic delivery of ESG goals through technology. We identify potential risks and blockers, while also outlining the processes and structures that should be in place to overcome challenges and facilitate successful technology deployment.

We invite you to read on and discover how organisations like Amazon, Monash Hospital, and PGIM Real Estate have used technology solutions to capitalise on their ESG opportunities, while at the same time supporting their long-term strategic goals.

Jennifer Steinmann

Global Climate & Sustainability Leader
Deloitte Global

Chi Mun Woo

Partner, Climate & Sustainability
Deloitte Australia

Jonathan Hannam

Managing Director
Taronga Ventures

Avi Naidu

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"The Real Asset sector - infrastructure, real estate, and natural assets - is seeing a rapid acceleration in the application of emerging technology to bridge ambition and action - especially those that deliver meaningful and measurable ESG impact."

Rebecca Jinks
ESG & Sustainability Director
Taronga Ventures

Image source: PowerStack

Executive Summary

Tenants, residents, investors, and regulators are all knocking on the door of real estate and infrastructure actors, demanding green, affordable, and equitable solutions. Heightened social inequality and wellness issues, combined with more frequent and severe extreme weather events, are aggravating the need for Environment, Social and Governance (ESG) risks and opportunities to be addressed.

Yet today, the built sector still accounts for just over a third of global energy consumption[1], while waste, water and biodiversity are emerging as increasing challenges. The built environment also bears many of our present-day social issues, with people spending more of their time indoors. Digitalisation, COVID-19, and ongoing economic disruptions are adding further pressure across the sector.

Improving ESG performance is a way for astute real estate and infrastructure organisations to differentiate from their competitors. This is especially true when many are not responding quickly and strategically to ESG risks and opportunities.

Organisations that have already boosted their ESG performance are attracting greater commercial returns.

Technology undoubtedly holds the key to responding to these risks and opportunities – it is the ingredient that brings everything together whether through improved data collection and predictive capabilities, process and material innovations, sustainable design, or delivery of new services.

Harnessing the right technology can drive better ESG outcomes, and faster. This paper focuses on solving ESG outcomes across real estate and infrastructure and outlines a framework to support organisations to leverage technology to do so.

According to Taronga Ventures' Innovation survey[2], ESG is considered a significant factor in decision-making for new technologies. So, why aren't ESG technology solutions and innovations being mainstreamed across real estate and infrastructure? And what are the risks of being left behind?

The sector is a slow adopter of new technologies, with a number of common barriers identified.

Yet, inaction has an economic cost as well as implications for safety.

Those organisations that overcome some of the common organisational, commercial, and technological barriers to adoption of new technologies not only mitigate sustainability-related risks. They also gain access to bigger benefits, and sooner, reaping competitive and reputational advantage.

We recognise that decisions around technology selection and implementation must respond to an organisation's ESG priorities, internal capabilities, risk appetite and existing barriers to technology adoption. In combination, these can feel like too big a hurdle to overcome.

To guide real estate and infrastructure organisations, Deloitte and Taronga Ventures have come together to offer an approach to accelerate your ESG outcomes through technology.

In this paper, we identify potential risks and blockers, while outlining the processes and structures that should be in place to facilitate successful technology deployment. These include developing a clear value proposition, empowering internal champions, and tracking and communicating progress and learnings with stakeholders.

Success also requires having a clear view of what makes a technology the right fit for your organisation – from practicality and interoperability, to scalability, security and future relevance.

Building on our research and implementation experience, our approach simply and efficiently addresses the key barriers to technology adoption to enable improved ESG performance – from decarbonisation to accessibility and inclusion - for your organisation.

ESG Technology

In this paper, we define ESG technology as innovative solutions that provide real, measurable, and positive environmental and social outcomes, or impact. This includes improved data collection and analytics to support decision-making, process and material innovations, and sustainable designs.

Image source: Ampd Energy

Contents

How ESG is shifting the foundations

Environmental, social and governance (ESG) issues are the largest and most important challenges of our time.

Not only is awareness and action on ESG issues growing, but organisations are increasingly starting to recognise the social and economic costs of inaction. This is particularly true for climate change, with Deloitte research showing that inaction could cost the global economy US$178 trillion in net present value terms from 2021-2070[3].

However, ESG issues are not limited to climate, but are markedly wider and vast.

Real estate and infrastructure organisations are not immune to these factors. At the same time that it is exposed to climate and nature-related risks, the built sector comprises just over a third of global energy consumption[4] and impacts on the natural environment in numerous ways. Social issues pertaining to the built environment are also raising questions for the sector, especially in relation to equity, diversity, accessibility, inclusion, wellness and economic prosperity. Organisational and portfolio resilience is a key output of appropriate ESG management.

Major Factors Driving ESG Issues

- Evolving stakeholder expectations
- Changing global legislative landscape
- Growing scrutiny of performance by investors and stakeholders

> "Real estate assets by definition cannot be moved. As such, we are exposed to significant changes like social trends, environmental changes, policy patterns – innovation is essential for us to be able to navigate those changes and adapt our portfolio and future-proof our assets."
>
> **Stéphane Villemain**
> Head of Sustainable Investment,
> Ivanhoé Cambridge

Now, more than ever, an organisations' impacts on people and the planet are in the spotlight, making improved ESG performance all the more critical

Global policymakers are increasingly paying attention to the role of the sector in achieving economy-wide climate transition ambitions. Net zero buildings were a central feature of the 'Sustainable Cities' initiative launched at COP27 in November 2022, and tightening regulation could result in stranded asset exposure, with properties being difficult to lease or sell if they do not meet market expectations regarding energy efficiency. Mandatory disclosure requirements are emerging, while scrutiny of 'greenwashing' is increasing.

Capital flows also reflect growing awareness of ESG issues. According to market analysis conducted by Taronga Ventures, between 2017 and 2021, the proportion of deals within the "real tech" space focusing on ESG doubled. Investor interest in these technologies increased, with many becoming direct customers of emerging technology companies delivering ESG outcomes. This is a strong indication that investors understand the linkage between ESG and technology, and of the role that technology can play in addressing significant ESG challenges and opportunities for organisations and corporates.

Critical ESG Issues in Real Estate and Infrastructure

Environmental

- Energy consumption and carbon emissions (Scope 1 and 2)
- Embodied carbon and Scope 3
- Nature and biodiversity
- Water management
- Waste and pollution management
- Climate risk, resilience and adaptation
- Air quality management

Social

- Diversity, equity, and inclusion
- Wellbeing, health, and safety
- Housing affordability
- Building quality and safety
- Mobility and accessibility
- Changing behavioural use of assets
- Tenant and community engagement

Governance

- Supply chain (ethical and sustainable sourcing, including modern slavery)
- Digitalisation (cyber security, data privacy, and data management)
- Reporting and disclosure
- Portfolio resilience



Semi-permanent hospital room

Image source: Spacecube

The building blocks of ESG opportunities

A key stakeholder for the sector is its end-user: the customers that visit our precincts and the tenants that occupy our buildings. Tenants increasingly require, and expect, improved ESG performance from their landlords. For corporate tenants especially, a property's sustainability credentials form a core part of their own ESG commitments to stakeholders, and many are seeking environmentally and socially conscious spaces to occupy. These sentiments are reflective in rental premiums for 'green credentials', and 'brown discounts' for buildings with lower environmental standards. Technology has enabled retrofitting and uplift of assets to reduce properties' environmental impacts and increase availability of social amenities required by a new generation of tenant.

As a result, investors recognise that strong ESG strategies and performance can deliver better returns and are adopting ESG performance criteria into their evaluations. The inclusion of ESG metrics in investing criteria is now considered by some as standard practice, igniting a debate as to whether it is still a niche market[5]. In response, organisations are striving to disclose clearer, more concise ESG performance data to demonstrate their long-term sustainability and resilience. Technology has a role to play in ensuring accurate and consistent disclosure that responds to customer and investor priorities.

Legislation focused on energy efficiency (including strengthened energy codes in buildings) is increasingly being updated[6]. Several countries including Australia, the United Kingdom[7] and Singapore[8] have had this type of legislation in place for many years, but the space is fast evolving.

Alongside interest from regulators, investors and the broader community, organisations are increasingly expected to report publicly on their ESG performance. For example, the International Financial Reporting Standards Foundation is harmonising ESG-related financial disclosure standards globally (see more in Deloitte's recent guide to disclosures[9]), including absorbing the recommendations of the Taskforce for Climate-related Financial Disclosure (TCFD) from 2024. Several jurisdictions are exploring mandatory sustainability-related disclosures by corporates, in particular climate disclosures. Momentum is also growing behind nature-related disclosures, for example through initiatives such as the Taskforce for Nature-related Financial Disclosures (TNFD).

Beyond the direct asset, wider precinct, city, and market solutions are required. Again, these can be facilitated and delivered by novel technologies and approaches.

> "Technology and innovation will be key to driving systemic change in helping our portfolio reduce its impact and remain aligned to achieving net zero by 2050, whilst also improving the performance of our investments by reducing risk and improving returns."
>
> **Jonathan Waite**
> Senior Responsible Investment Manager,
> APG Asset Management Asia

The commercial case for improved ESG performance opportunities

Although implementation is challenging, the good news is that return on investment (ROI) can be demonstrated and there are clear and tangible reasons to justify the implementation of technology solutions for ESG outcomes:

Higher rent premiums

Increasingly, owners are realising the benefits of green buildings.

An increasing number of property managers are reporting that sustainable buildings command premium rents, and that buildings not classified as green or sustainable are subject to a brown discount[10].

Lower operating costs

Sustainable buildings incur lower operating and maintenance costs and are less vulnerable to price volatility[11].

In the United States, Energy Star-certified buildings were observed to consume approximately a third less energy than non-certified properties, contributing to lower overall energy costs. Reduced energy consumption also reduces exposure to volatile energy markets.

This is particularly relevant to asset classes such as 'build to rent' where the developer often absorbs running costs and/or buildings are differentiated on peak services and low fees.

Improved tenant satisfaction and retention

Sustainable buildings bring positive social impacts for tenants, increasing tenant and customer satisfaction and retention.

Research shows that workers in well-ventilated offices record increases in cognitive scores[12]. Such positive social impacts lead to more satisfied tenants which can result in less tenant/owner issues, lower tenant turnover and generate positive reputational benefits for the real estate or infrastructure organisations. Similar benefits apply in public spaces such as shopping centres.

Lower cost of capital and debt

Organisations with a strong ESG performance on average experience lower costs of capital compared to those with poor ESG performance.

This relationship is seen to be true for both cost of equity and the cost of debt[13].

Increasingly, private equity and pension funds have mandates to invest in organisations with strong ESG credentials. Access to capital is therefore increasingly determined by an organisation's ability to meet ESG investment criteria[14]. Green loans are also available offering discounts on basis points compared to standard loans.

New market opportunities

Low-carbon buildings have become one of the most important asset classes in the green bond market.

Green bonds that are tied to low emission or zero carbon buildings are expected to amount to just short of half of the total green bonds market in the long term[15].

Reduced risk of stranded assets

Both physical and transitional risks may lead to stranded assets.

With buildings exposed to the physical threat of increasing extreme weather events driven by climate change, understanding and mitigating the stranded asset risk is an imperative.

Additionally, with regulation requiring particular standards for sale or leasing, many properties that are not transitioned may lose their value completely in coming years.

Higher valuations

Driven by sustainability premiums, the market is increasingly factoring ESG into valuations and strategy.

Research points to more than half of commercial real estate firms in Europe reporting increases in property values from having improved sustainability credentials[16].

Similarly, Deloitte recently engaged with Heads of M&A in the real estate sector who revealed that ESG is increasingly considered a source of value creation, opportunity, and competitive differentiation when developing an M&A strategy. In fact, 67% of survey respondents said they were factoring ESG into deal decision making all of most of the time[17]. Poor performance on ESG is therefore likely to result in non-bids or discounted bids.

Note: In 2023 markets (especially commercial assets) are seeing valuation adjustments post covid and a shift to new ways of working.

"There are enormous growth opportunities for real asset managers to utilise technology and innovation across their portfolios. Whether it is our nation's airports, schools, hospitals or energy infrastructure, technology is unlocking improved outcomes for our communities. It is helping us drive better ESG outcomes through improved environmental performance and ensuring our supply chains are free from modern slavery. Investors more than ever want to see real action on ESG, and technology is helping us to make substantial and measurable progress."

Michael Cummings
Co-Head Infrastructure,
Dexus

Accelerating ESG outcomes with technology

Over recent decades, advances in technology have filtered across social, environmental, and economic structures, making our lives easier, safer, and of higher quality.

Real estate and infrastructure has not been immune to the increasing immersion of technology. Examples of recent ESG-enabling innovations are numerous, from carbon capture solutions during construction, to use of drones to clean the windows of skyscrapers, sensors to monitor and control heating systems, air purification, and blockchain solutions to track supply chains.

Technology is providing efficiencies and promoting innovation at each stage of the real estate and infrastructure value chain. It has a major role to play in supporting improved ESG practices and outcomes.

The proliferation of technology solutions and innovations across real estate and infrastructure is expected to continue[18]. We've already witnessed the recent rise of the hybrid working environment and greater collaboration of geographically remote teams. Interest in alternative operating models such as contactless experiences in commercial and residential settings, and expectations around flexible use of space to suit the service economy, also continues to grow.

What we see today, however, is only the tip of the iceberg in terms of technology adoption for ESG outcomes

This underlines the imperative for consideration of technology as an ESG and commercial accelerator across all phases of the built environment. This is particularly true at the design stage, where considerable efficiency gains can be made. For example, 'digital twins' enable developers and builders to "build before they build", testing design against simulations of key factors such as climate scenarios, ventilation and air flow, and movement of people. When coupled with trends such as modular development, huge gains can be made on reduction of waste and associated emissions.

Emerging technologies will provide a range of contributions to long-term ESG ambitions – be they carbon reduction, increased transparency and tracking, accessibility, and inclusion, and so much more.

The World Economic Forum has identified digitalisation and the innovative use of technology as one of the key enablers to achieve their future vision of cities and buildings••••

How technology accelerates ESG performance across real estate and infrastructure

Beyond Net Zero

Adopting technology to reduce the embodied carbon of an asset is increasingly common.

CarbonCure, a Canadian-based firm, is one organisation supplying sustainable concrete to reduce embodied carbon in construction materials.

They produce low-carbon concrete by injecting industrial-captured CO_2 into the cement batching process. Not only is less cement required, but less carbon is produced due to stronger chemical bonds.

Smart buildings and cities

Technologies such as 'digital twins' (digital replicas of physical assets), artificial intelligence, and building information modelling allow for optimal energy use, management of resources, and predictive maintenance in built assets.

Inspace provides 3D digital visualisations of buildings for landlords and agents that enables 360-degree virtual asset tours and inspections for leasing, sales, marketing and other uses.

Such technology can also provide social and economic benefits, for example technologies that support tenants to adapt internal temperatures to optimise worker productivity.

Digitalisation of this nature provides asset owners with greater insight into real-time operational performance and hence the ability to apply sustainability strategies such as energy conservation more effectively.

Climate risk

Partly due to growing demand by investors for climate-related financial disclosures, organisations are seeking technology solutions to assist in collecting asset-level climate risk and forecasting data.

Social benefits

Technology has a role in bringing together communities and people for social benefit, with new applications allowing for easy parcel deliveries, smart controls, integrated cleaning and community engagement.

Social Value Portal is a SaaS based solution that helps organisations procure, measure, manage and report on the social value they create, and make informed decisions grounded in social value creation.

Waste management and the circular economy

Technologies that support circular economy design principles are being explored and implemented throughout the sector across the operations of an asset, as well as the sourcing, transportation, manufacturing, and disassembly of buildings.

Spacecube is a modular construction system that allows for the build, disassembly and rebuild of multiple semi-permanent structures over the useful life of its component building blocks.

In this fashion, an initial build of a community centre can later become a temporary healthcare facility and then emergency accommodation and so on, with each successive application offering a new source of social utility.

Supplier management and supply chain transparency

Artificial Intelligence and blockchain technologies are enabling companies to track resources along a supply chain.

Gaining increased visibility of suppliers enables further transparency, and subsequently increased accountability, in order to:

- Minimise human rights breaches
- Improve material quality, and worker and tenant health and safety
- Assist in tracking resources for later reuse.

Effective supply chain management not only supports improved governance of the high-risk construction sector, it also informs environmental outcomes through accurate tracking of materials sourcing and embedded carbon miles.

OpenSpace offer 360-degree construction photo documentation software that provides the leading analytics tools in the industry to improve transparency and efficiency. The platform enables real time progress tracking and quality reviews to reduce rework, a historical record of construction activities for future defects and disputes and an easy way for owners to remotely monitor the progress of their developments.

"Organisations are facing both expanding stakeholder expectations in relation to ESG, and increasingly complex and extended supply chains. This makes monitoring and management of ESG issues a real challenge. Technology solutions can help to collect and consolidate data to support various ESG objectives."

Oliver Doraisamy
Senior Manager, Climate & Sustainability, Deloitte

"The major global sovereign investors and pension funds are now selecting real estate and infrastructure managers based on their ability to deliver measurable ESG outcomes - it is no longer a nice to have.

At Taronga Ventures, we are seeing many exciting emerging technology companies that provide real and effective solutions, leading to ESG becoming not only a profit centre but also an area that drives innovation and change across a business."

Jonathan Hannam
Managing Director,
Taronga Ventures

Image source: CarbonCure

Key considerations for ESG-technology selection

When assessing whether a proposed technology is the right fit, the following questions are a good starting point to sense-check the solution:

Practicality	Does it satisfy our intended use case/s and need (including improved ESG impact)?
Interoperability	Is the solution compatible with our current technology and processes?
Verification	Does the solution offer sufficient data to prove its effectiveness? Can we use this data to report against relevant ESG standards/frameworks?
Timeliness	What is the timeframe to pilot per asset, project or business unit?
Scalability	Can the technology be deployed at scale or is it asset/project/business unit specific?
Financials	What is the asset/project/business unit cost, ROI and payback period?
Security	Does it introduce new security or cyber vulnerabilities?
Supply	Can the vendors supply it in a timely manner across our portfolio?
Future relevance	How long will this solution be relevant for into the future?

Technology in action

Shared solar for community housing, Allume Energy

Lower operating costs

Allume Energy is making solar accessible to multi-metred buildings across the globe. Allume's product, Solshare, is the world's first behind-the-metre solar sharing system. It enables the output of a single rooftop solar system to be distributed equally between up to 15 separately metred apartments or units without the need of an embedded network.

Housing Choices Australia (HCA) is an independent, national, not-for-profit housing provider that creates safe, quality, and affordable housing for people who are struggling to find a suitable home in Australia's challenging private rental market. In 2019, Allume worked with a leading solar installer to deliver a shared solar solution for one of HCA's apartment buildings in Altona North, Victoria, Australia. HCA purchased the SolShare units outright to ensure residents could receive free solar power.

In the first year of the SolShare units' installation, large households made significant savings on their electricity costs. This resulted in a payback period of 5 years for the technology. Over the first year the system produced 66.6kW of solar, saving 93 tonnes of CO_2.

The homeowners of the 15 units within the HCA apartment building saw a considerable reduction in operating costs whilst also reducing their carbon footprint. A win for the homeowner and the environment.

Allume is active in the UK, USA and Australia.

Source: Allume Energy (2023)

LEED Certified Offices, United States Office Assets

Higher rent premiums

In December 2021, Cushman & Wakefield released a study examining the effects of sustainable strategies on rents and leasing for US office assets. LEED certification was used as the key indicator of sustainable strategies.

The research found that LEED certified buildings, controlling quality, class and type of building, achieved noticeable premium rents and revenue. Delving into the results further, a Class A LEED-certified urban office generated a 23.3% price per square foot premium over a non-certified building. A LEED-certified Class B office achieved the highest premium, 77.5% over its non-certified comparable building set. Since 2011, the Class A urban office has held an average of 23.3% price per square foot premium over non-certified buildings. This study demonstrates the opportunity for real estate firms to acquire rent premiums from improving the ESG performance of an asset by acquiring a LEED certification.

Sensors for Social Benefit, Xandar Kardian

XANDAR KARDIAN

New market opportunities

Xandar Kardian is a Canadian and South Korean company that provides sensors to detect and monitor human occupancy. Their sensors use sensitive radar technology to measure the heart rate and breath rate of individuals in a space anonymously.

Beyond occupancy monitoring for commercial tenancies, Xandar Kardian's technology has been applied in healthcare settings to passively monitor the health of patients. In 2022, their solution received FDA 510 (k) clearance for use as a passive, vital sign monitoring device.

One unexpected and compelling use case saw Xandar Kardian's sensors installed in an incarceration facility in Hong Kong. Their sensors picked up a drop in respiratory rate and resting heart rate of an inmate, which is a lead indicator of cardiac arrest. The solution then notified the protective services team to check-on the inmate, who was ultimately saved due to early intervention into his probable cardiac arrest.

It is easy to understand other healthcare and protective services applications these sensors may offer including aged care, healthcare settings, and in high-fatality locations like un-manned bathrooms in the community.

Xandar Kardian is active in Europe, USA, Asia, Australia & New Zealand (ANZ) and will soon be expanding to the Middle East.

Source: Xandar Kardian (2023)

"Initially, we became interested in technology as an opportunity to drive efficiency and create value in our core asset management business. Once our needs to address sustainability were more evident, we saw technology as a critical part of the solution for the broad and challenging set of goals that sustainability demands - from measurement and data collection, to systems improvement and utility savings, and better construction methods and decarbonisation."

Benett Theseira
Managing Director, Head of Asia-Pacific,
PGIM Real Estate

Stumbling blocks to ESG-enabling technology

As we've set out above, the value proposition for adopting ESG-related technology is clear. It accelerates and streamlines the achievement of ESG outcomes, and in doing so, can also strengthen long-term commercial viability.

Despite these opportunities and the increased availability of technology, mainstream adoption of ESG-related technology in the sector is only starting to gain traction. Given the benefits of ESG-related technology, why are more organisations not turning towards the vast amount of technology solutions available in the marketplace?

Sector technology teams are growing, but are small relative to industry counterparts (e.g., in financial services) and willingness to innovate is not as strong as it could be. In general, real estate and infrastructure are considered slow adopters of new technologies for reasons such as cultural aversions to risk (particularly given requirements around safety and quality), ingrained systems and processes, fragmentation across the built environment value chain, and resistance to spending capital on upgrades that are not bricks-and-mortar[20].

Below we share some insights from leading organisations in real estate and infrastructure about their key barriers to technology adoption and deployment.

Key barriers to ESG-enabling technology

The key barriers identified through our research and advisory experience can generally be catagorised into four areas - Risk and compliance, implementation, organisational and commercial barriers. It is important to keep these in mind as you progress through your ESG and technology application journey.

Risk and compliance

Risk and compliance considerations, while necessary, can also serve as handbrakes to the implementation of ESG-enabling innovations.

- Unproven technologies
- Reputational risk
- Greenwashing
- Limited networks and contacts with technology providers
- Limited track records for suppliers
- Security, privacy and data ownership
- Regulatory evolution

This is particularly true where technologies are new, and vendors have limited track records. This can manifest at a personal level – individuals feel exposed to reputational risk by advocating for something unfamiliar to an organisation – or where security, privacy or data ownership questions arise.

Implementation barriers

Implementation barriers to technology adoption are vast as property assets tend to be designed for long lifecycles, without anticipating the technological progressions to be made during these periods.

- Embedding new products / solutions within existing systems (interoperability)
- Cyber security risks and ongoing governance
- Post-implementation needs and operational troubleshooting
- Scaling new technologies across complex operations
- Lack of guidance or standardisation around data

> "We have observed the appetite of asset owners and operators to adopt new technologies grow every year. Unfortunately, industry practices in real estate and infrastructure are so well entrenched, as to make innovation inherently challenging. The ability to make change begins with a mindset shift and ESG has been a strong catalyst in this direction."
>
> **Julian Kezelman**
> Innovation Director,
> Taronga Ventures

Organisational barriers

Organisational barriers refer to the processes, cultures and capabilities within an organisation that prevent it from trialling and taking advantage of new innovations.

- Limited understanding of how to identify, assess and approve trials of emerging technologies
- Lack of internal leadership and culture around innovation
- Fragmented value chains (i.e., with multiple actors involved in projects)
- Limited networks and contacts with technology providers
- Internal legal, procurement and procedural red tape
- Lack of engagement by the right and necessary stakeholders

Innovation executives we interviewed shared that seeking to effect change within an industry geared towards low-risk, consistent delivery was inherently challenging. These problems were seen to be exacerbated by the number of stakeholders required to be involved in innovation projects. For instance, the multiple tiers of contractors and suppliers within construction, or gaining buy-in from multiple decision makers at the levels of fund, asset and facilities management, can hamper decisions about operating assets.

Commercial barriers

Commercial barriers tend to arise at the technology selection and/or implementation phases.

- Unclear value propositions/benefits (including limited financial representation of ESG benefits)
- Long-term ROI vs short-term performance targets
- Limited data on technology viability and performance
- Implementation costs (including how to split/share them)

We see this where a technology has an untested commercial value proposition, or where the technology provider is unable to articulate the benefits of the innovation in a language that resonates with the purchaser. In a sector where margins can often be low (especially in construction), it is particularly important that technology providers are cognisant of corporate priorities and protocols.

Limited data on financial ROI from technology projects can also prevent adoption, especially with stakeholders that compare against known returns for capital upgrades to property. The technology may not have an immediate ROI, so a challenge arises around how to fund the technology and manage the tension between growth expectations and investment into the future.

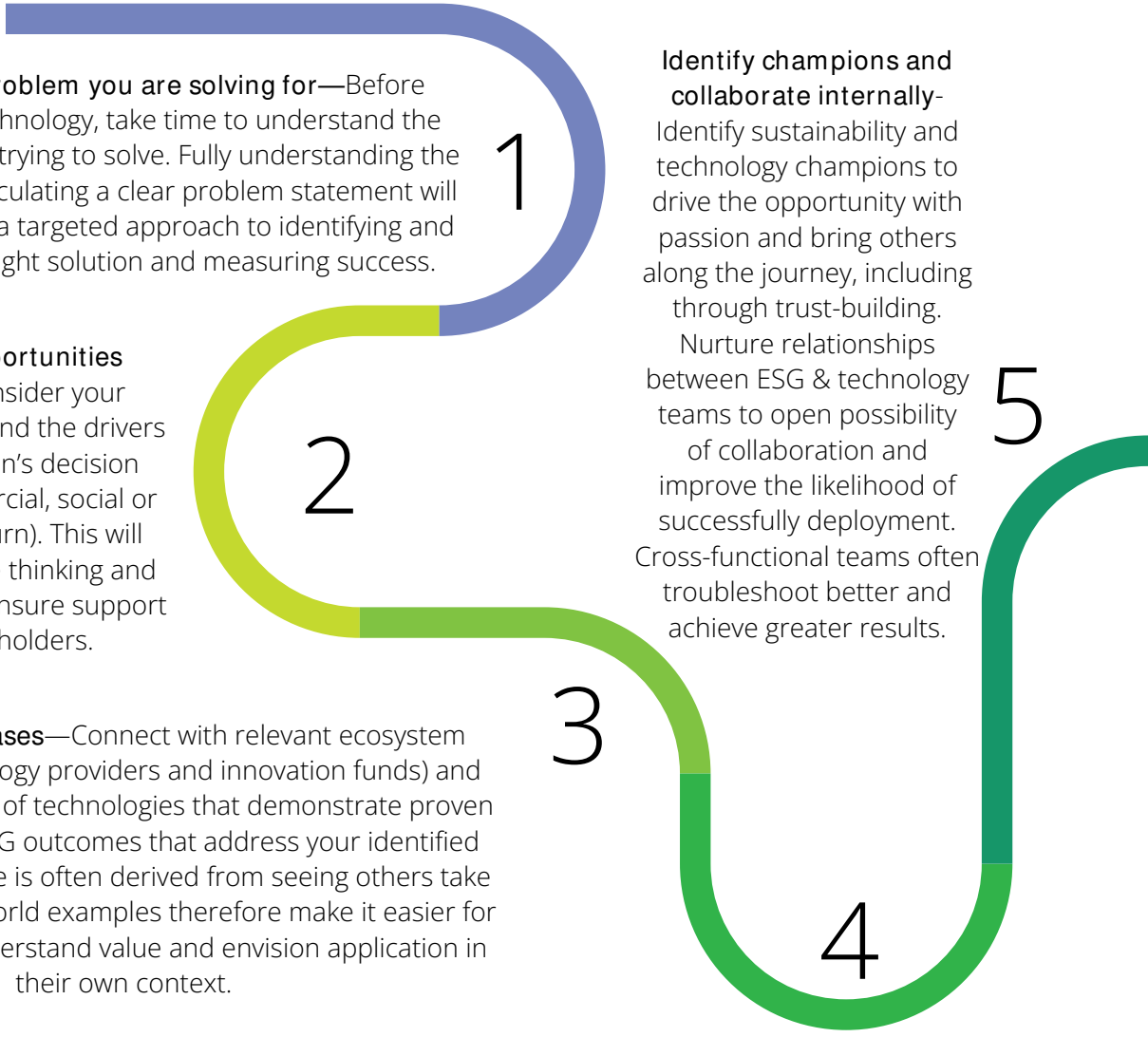
Implementation costs are also a significant consideration, with questions commonly raised around whether the landlord or tenant should pay and whether to allocate costs to operating or capital budgets (especially for hardware solutions).

> "I want to be able to shift from proxy data to real data when measuring environmental impacts. That will require regulation, but it will equally require technology, in order to ensure that data is good data and that we can verify it."
>
> **Julie Townsend**
> ESG Lead for Europe & Asia Pacific,
> PGIM Real Estate

Pathway to successful technology adoption

The advantages of implementing ESG-related technology are clear. However, not all organisations have identified a clear pathway for implementing such technologies successfully at scale.

To guide organisations on this journey, Deloitte and Taronga Ventures have joined forces to offer a simple and effective approach to accelerating ESG outcomes through technology.



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Identify the problem you are solving for—Before identifying a technology, take time to understand the problem you are trying to solve. Fully understanding the problem and articulating a clear problem statement will ensure you take a targeted approach to identifying and deploying the right solution and measuring success.

2

Assess risks, opportunities and drivers—Consider your priority ESG issues, and the drivers of your organisation's decision making (i.e., commercial, social or environmental return). This will help to frame future thinking and conversations, and ensure support from key stakeholders.

3

Research value cases—Connect with relevant ecosystem actors (e.g., technology providers and innovation funds) and identify case studies of technologies that demonstrate proven commercial and ESG outcomes that address your identified problem. Confidence is often derived from seeing others take the first step. Real world examples therefore make it easier for stakeholders to understand value and envision application in their own context.

4

Develop value proposition—Find commonalities between ESG and technology strategies to identify areas of mutual motivation. Engage senior stakeholders (Board and Executive) on potential for improved ESG outcomes using technology building the impact narrative. Link benefits from improved ESG performance to commercial outcomes.

5

Identify champions and collaborate internally- Identify sustainability and technology champions to drive the opportunity with passion and bring others along the journey, including through trust-building. Nurture relationships between ESG & technology teams to open possibility of collaboration and improve the likelihood of successfully deployment. Cross-functional teams often troubleshoot better and achieve greater results.

Our approach addresses the key barriers to adoption and deployment that we have identified through research and interviews, as well as through our extensive strategy and implementation experience. It also ensures technology outcomes are aligned to the long-term strategic goals of the organisation.

Designed to simplify the technology adoption process while remaining comprehensive enough to ensure a successful outcome for your organisation, the approach may be deployed as a checklist to identify where previous attempts to adopt ESG-related technology might have failed.

Launch pilots, starting with easy wins—Launch technology projects with highest probability of success first, to build risk appetite for the more complex options. Pilots are the most credible way to demonstrate value and limit opposition to broader implementation.

7

Establish governance arrangements—Articulate clear roles and lines of accountability, set measurable targets, and develop risk mitigation strategies (covering implementation, financial, operational, reputational, and regulatory risk). This includes establishing how progress will be reported across the business - see next step.

8

6

Identify technology solution—Once the problem is understood, begin researching market solutions and developing the value proposition to identify the most appropriate technology. Some organisations may have capacity to evaluate this in-house, while others may seek support from external technology and/or ESG experts.

9

Measure, report and communicate—Collate data, distil insights and share learnings to seek support for larger or more complex technology roll-outs. Celebrating success and communicating to key decision-makers will assist in securing further investment. Ensure this is done transparently and regularly.

10

Explore opportunities for scale—Identify and implement any necessary adjustments based on the pilot. Build case and strategy for implementation., with outcomes and value in mind.


CARBON CURE.
WHO KNEW THAT POURING CONCRETE COULD BE LIKE PLANTING TREES?

Case studies: Examples of successful ESG-enabling technology adoption

Environment case study

CarbonCure and Amazon HQ2 (USA)

1) Needs and Capabilities

Concrete is responsible for an estimated 7% of global carbon emissions through the chemical reactions in its production. Developers seeking to reduce embodied carbon in their assets (i.e., carbon emissions from construction materials and processes) have targeted concrete, the world's most used building material, as the greatest opportunity to reduce carbon impacts from construction.

The Canadian company CarbonCure supports the production of low-carbon concrete by injecting captured CO2 during the concrete manufacturing process. The CO2 immediately and permanently mineralizes and increases the concrete's compressive strength, meaning less cement is required in each mix – and less carbon is produced.

CARBON CURE™

2) Pilot Design

Amazon HQ2 is part of the online retailer's Metropolitan Park site, an existing urban renewal and development project in Arlington, Virginia just outside Washington, DC. The first phase of ground-up construction saw the redevelopment of a block of vacant warehouses into two new LEED Platinum-certified buildings, new retail space for area businesses, and plenty of open space for the community to enjoy. These buildings are the first step to creating an urban campus where Amazon's future 25,000 employees and the local community can live, work and play.

The project will use an estimated 81,000 cubic metres of concrete made with CarbonCure, which will save approximately 1,100 tonnes of CO2.

3) Scaled Implementation

In this development, Amazon HQ2 is targeting a 10% reduction in the amount of embodied carbon compared to typical construction practices, followed by a commitment to offset 100% of the remaining embodied carbon. This goal helps support Amazon's Climate Pledge, an initiative to be net-zero carbon by 2040, 10 years before the Paris Agreement.

Source: Amazon (2022)


MonashHealth
Monash Medical Centre
22
24
20

Social case study

SpaceCube and Monash Hospital (Australia)

SPACECUBE.

1) Needs and Capabilities

Early in the COVID-19 pandemic, hospitals attempted to forecast demands from COVID-19 patients on respiratory wards, trying to predict capacity constraints that might affect patient care. Hospital operators sought temporary facilities to rapidly scale their capacity, if required by the evolving pandemic situation.

Spacecube offered a potential solution via a modular construction system for creating semi-permanent infrastructure. The solution had been deployed to create community centres, emergency accommodation and healthcare facilities (with a range of other applications). It is able to be disassembled, reused and repurposed multiple times over its useful life.

2) Pilot Design

Monash Health decided to pilot Spacecube as a potential solution to their COVID-19 response due to its ability to immediately and flexibly respond to uncertain current and future requirements.

Australia's first COVID-19 RESUS Medical Facility at Monash Health was built within 3 weeks. The modular infrastructure was built and installed by Spacecube within 15 hours. The facility used 25 cubes, spanning 360sqm over two-levels, and housed six negative pressure resuscitation beds; a nurse's station; medication room; and utilities. Spacecube contributed towards the value of the project by incorporating amenities and a staff breakroom to support the critical medical team.

3) Scaled Implementation

From an ESG perspective, Monash was able to rapidly increase its operational capacity, ready to support its community through the pandemic. Spacecube was able to recycle the facility at the end of its useful life, which ultimately was rebuilt as another medical facility for another hospital.

Through this project, Monash Health demonstrated the value of this flexible and sustainable infrastructure system to be redeployed for future similar outbreaks or emergency applications.

Source: Spacecube


OPENSPACE
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THE JOBSITE TIME MACHINE • WWW.OPENSPACE.AI

Governance case study

OpenSpace and PGIM Real Estate (China, Seoul, and Singapore)

1) Needs and Capabilities

For developers like PGIM Real Estate, who operate across multiple geographies, it is challenging to stay close to project developments through contractor updates or, alternatively, to travel regularly to site.

OpenSpace is a software platform that maps 3D captured images of construction sites against 2D plans or digital building information models (BIM). This allows for:

- Near real-time oversight of construction projects
- Better transparency on work completed
- Avoidance of clashes and future rework
- Records of construction processes for future reference

In addition to image capture and visualization, the software also measures automatic tracking of work delivered (i.e., quantities of materials, percentage completion) against project plans.

OPENSPACE

2) Pilot Design

PGIM Real Estate in Asia Pacific originally trialed OpenSpace in a mixed-use development in Shanghai. The COVID-19 pandemic hit shortly after the project was commissioned, so the PGIM Real Estate team had highly restricted abilities to travel to China to oversee project progress.

Taronga Ventures introduced OpenSpace as a tool that would offer PGIM Real Estate an immediate view of what was happening on the ground and keep track of contractor progress and progress claims submitted.

The images captured and archived also provided additional accountability and records of construction quality and progress, thus improving project governance and future sustainability of the asset.

3) Scaled implementation

Since then, PGIM Real Estate's development team has adopted OpenSpace's solution for multiple development projects including in Korea, Singapore and elsewhere in the world, allowing for remote inspections and monitoring of sites and a lower carbon footprint due to reduced travel requirements.

Source: OpenSpace

"Technology will be the overwhelming contributor to the step change we need to achieve our global environmental goals. We have actioned the majority of opportunities available to us purely from an operational and design perspective - leaving technology to fill the gap in solving for the negative impacts in an adequate timeframe, to leave a world which future generations can enjoy."

Avi Naidu
Managing Director,
Taronga Ventures

Conclusion

Improving ESG performance is central to real estate and infrastructure organisations differentiating from their competitors, driving increases in asset value and rental premiums, and addressing ESG risks.

Technology is increasingly playing a key role in solving some of the world's most pressing challenges and will be the step change needed to meet our global ESG ambitions.

More and more companies in the real estate and infrastructure sectors are using technology solutions to track their emissions, reduce water and waste footprints, and better track social outcomes. This trend is set to continue, with significant potential for new technologies to support other ESG objectives. This is good news for organisations and communities globally.

This paper offers a blueprint for harnessing the right technology to drive ESG outcomes, and faster. Central to our approach is:

- Developing a well-researched value proposition
- Ensuring solutions align to your organisation's unique business model and risk profile
- Taking key stakeholders along the journey of selection, deployment, troubleshooting and scaling, and
- Tracking and communicating progress, including successes and challenges.

While our case studies provide examples of successful technology deployment, each organisation must take its own path to ESG maturity in order to move the needle on global outcomes.

Technology must be embraced today if we are to meet the needs of tomorrow.

Build for successful ESG outcomes: Next steps

Deloitte.

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Deloitte Australia

Climate & Sustainability

Build a more resilient, inclusive, and sustainable future.

Deloitte Climate and Sustainability is a team of over 300 dedicated experts in Australia supporting our clients in business, government and our communities to take practical action to decarbonise, become climate resilient and invest in the economic opportunity of Australia's transition to a net zero economy.

Deloitte has been a leader in identifying a coordinated climate transition as an enormous economic opportunity for Australia. Our recent The Turning Point report estimated this opportunity at $890b over 50 years.

To help businesses seize that opportunity, we helped establish the Climate Leader's Coalition and provided the economic modelling for the Business Council of Australia's Net Zero 2050 commitment.

Taronga Ventures

Emerging Technology and Innovation

Invests in innovation and technology to drive change in our built environment.

As a leading real asset technology ('RealTech') investor, we support the future evolution of the built environment by identifying, investing into and supporting emerging RealTech companies.

We focus on driving real and measurable change, to create a better built environment through sustainable and responsible investment.

Our ESG Impact innovation program supports institutional real asset owners and operators in achieving their environmental, social and governance ('ESG') goals, by identifying and driving the adoption of best-in-class ESG technologies and innovations in their business to create demonstrable value.

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Image source: Alvéole

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