AUTODESK

Revolutionising Sustainability:

Harnessing Cutting-Edge Technology for Carbon Emission Reduction at the Brisbane 2032 Olympics

Contents

01

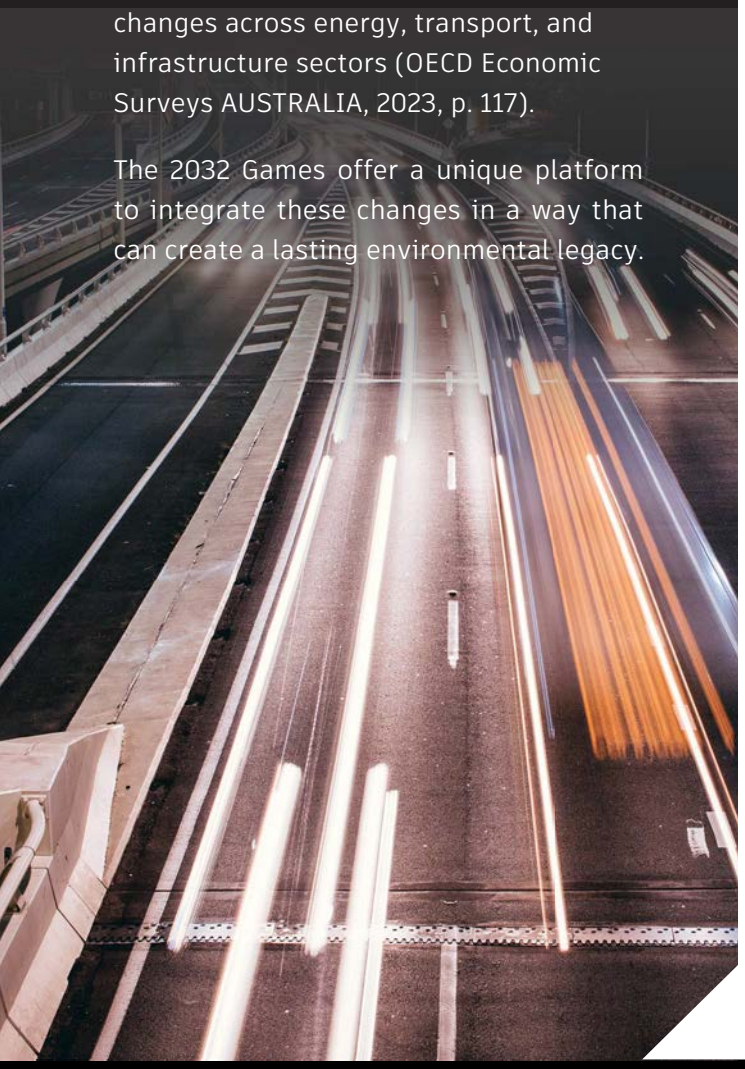
Climate Positive Goals for Brisbane 2032

What if the Brisbane 2032 Olympics set a new global benchmark for sustainability?

The Brisbane 2032 Olympics presents a historic opportunity to establish a global benchmark for sustainability and climate action. As Australia accelerates its transition to net-zero emissions, the Games have the potential to demonstrate cutting-edge technologies, policy innovations, and collaborative industry partnerships aimed at achieving large-scale decarbonisation.

According to the Organisation for Economic Co-operation and Development (OECD), Australia's emissions need to decline at an expedited rate to meet its net-zero goals, necessitating systemic changes across energy, transport, and infrastructure sectors (OECD Economic Surveys AUSTRALIA, 2023, p. 117).

The 2032 Games offer a unique platform to integrate these changes in a way that can create a lasting environmental legacy.



The Queensland Government's Climate Positive Commitment

The Queensland Government, in alignment with the sustainability goals of the International Olympic Committee (IOC), has pledged to deliver a net-zero Olympic Games. As part of Queensland's climate action plan to reach its emissions and renewable energy targets, the Government is targeting zero net emissions by 2050; to reduce emissions by at least 30 per cent below 2005 levels by 2050; and to power Queensland with 70 per cent renewable energy by 2032, mandated by the 2035 Clean Economy Pathway.

The Clean Economy Jobs Act 2024 (Qld) enshrines these targets into law, requiring annual progress reports and sector-based emissions reduction plans.

This directly aligns with the Brisbane 2032 Olympics' climate-positive ambitions.

> *"Climate Change is a challenge of unprecedented proportions, and it requires an unprecedented response. Looking ahead, we want to do more than reducing and compensating our own impact. We want to ensure that, in sport, we are at the forefront of the global efforts to address climate change and leave a tangible, positive legacy for the planet."*
>
> - **IOC President Thomas Bach**

Furthermore, the IOC has mandated that from 2030 onward, all Olympic Games must:

- Minimise and fully compensate for their carbon emissions.
- Implement long-term zero-carbon solutions beyond the Games.

If Brisbane 2032 succeeds in achieving a Climate Positive Olympics, it will set a new standard for international sporting events, proving that major events can be both world-class and climate-responsible.

Integrating the Clean Economy Pathway and Emissions Forecasting into Brisbane 2032 Infrastructure

Maximising Sustainability Benefits and the Circular Economy.

A core pillar of Brisbane 2032's sustainability strategy is the integration of circular economy principles into infrastructure development, procurement, and resource management.

A huge part of this outcome relies on the capability for science, technology, and innovation to uplift real-time decision-making, specifically in the tracking of environmental performance, optimal resource use, and waste minimisation.

Given the government is prioritising the integration of advanced digital tools in infrastructure and asset management to meet net-zero objectives, it follows that enablers including AI, digital twins, and predictive analytics will be required to:

- Enable real-time emissions forecasting and data-driven decision-making.
- Improve environmental asset management through smart monitoring systems.
- Optimise energy efficiency and sustainability performance across all Olympic-related projects.

Governance and Implementation of Climate Goals

To ensure accountability and long-term impact, the Queensland Government's sustainability governance model also aligns with global frameworks, including:

- Enable real-time emissions forecasting and data-driven decision-making.
- OECD Global Events Guidance.
- UN Sustainable Development Goals (SDGs).
- Mandatory sustainability reporting and emissions tracking for all Olympic-related infrastructure.

This governance framework reinforces industry-led initiatives, not only ensuring that companies delivering Olympic projects align with transparent emissions reporting, circular economy requirements, and lifecycle carbon tracking, but necessitating efficient and effective digital mechanisms to drive this type of governance.

From Government Strategy to Industry Execution: Delivering on Sustainability Commitments

With the policy framework in place, industry leaders are now playing a pivotal role in bringing these sustainability targets and tracking to life. This transition from government sustainability mandates to industry execution is where digital solutions, data-enabled business models, and low-emission technologies become essential.advancements can help us to make the right decisions in a way that it never could before.

"The Queensland Government's sustainability commitments are ambitious, but they can be achieved. The most important time to be able to reduce carbon emissions is early in a project,"

"Data-enabled business models, including the digital twin, accessible data, low emission technologies and materials can be produced through maintenance phases to not only enhance risk management for climate change, but also optimise carbon emissions and sustainability for large-scale events such as the Olympics.

"We are close for business and design systems to have the function to align cost and carbon. With a critical need to reduce the impact of carbon dioxide and associated gases, how we operate and what we build are two of the fundamental ways we can create change, and technology systems can manage these things. We must start to evaluate and integrate carbon and cost through the operational phases, which include design and construction."

- Carol Battle, Principal Consultant – Autodesk Sustainability Practice

Snapshot: The Technology and Policy Leading Net-Zero Outcomes

To achieve a Climate-Positive Games, Brisbane 2032 must integrate innovative technologies and data-driven solutions alongside strong policy alignment. Publicly available datasets can now be seamlessly incorporated into design and construction processes, enabling ongoing review and minimisation of carbon emissions throughout the project lifecycle.

Key strategic areas for improvement include:

Smart Infrastructure & Net-Zero Construction

- Implementing low-emission materials and net-zero construction standards to reduce embodied carbon in Olympic venues, drawing from Australia's industrial emissions and materials strategies.

Decarbonised Transport & Mobility

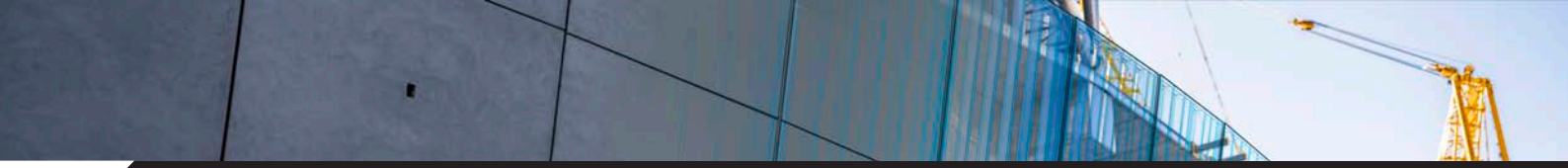
- Expanding low-emission public transport and active mobility infrastructure as part of broader transport electrification goals.
- Prioritising pedestrian- and cycling-friendly urban planning as part of the Brisbane 2032 sustainability strategy.

Advanced Carbon Accounting & Transparency

- Strengthening emissions monitoring and data-driven accountability mechanisms, aligned with Australia's carbon crediting and Safeguard Mechanism reforms.

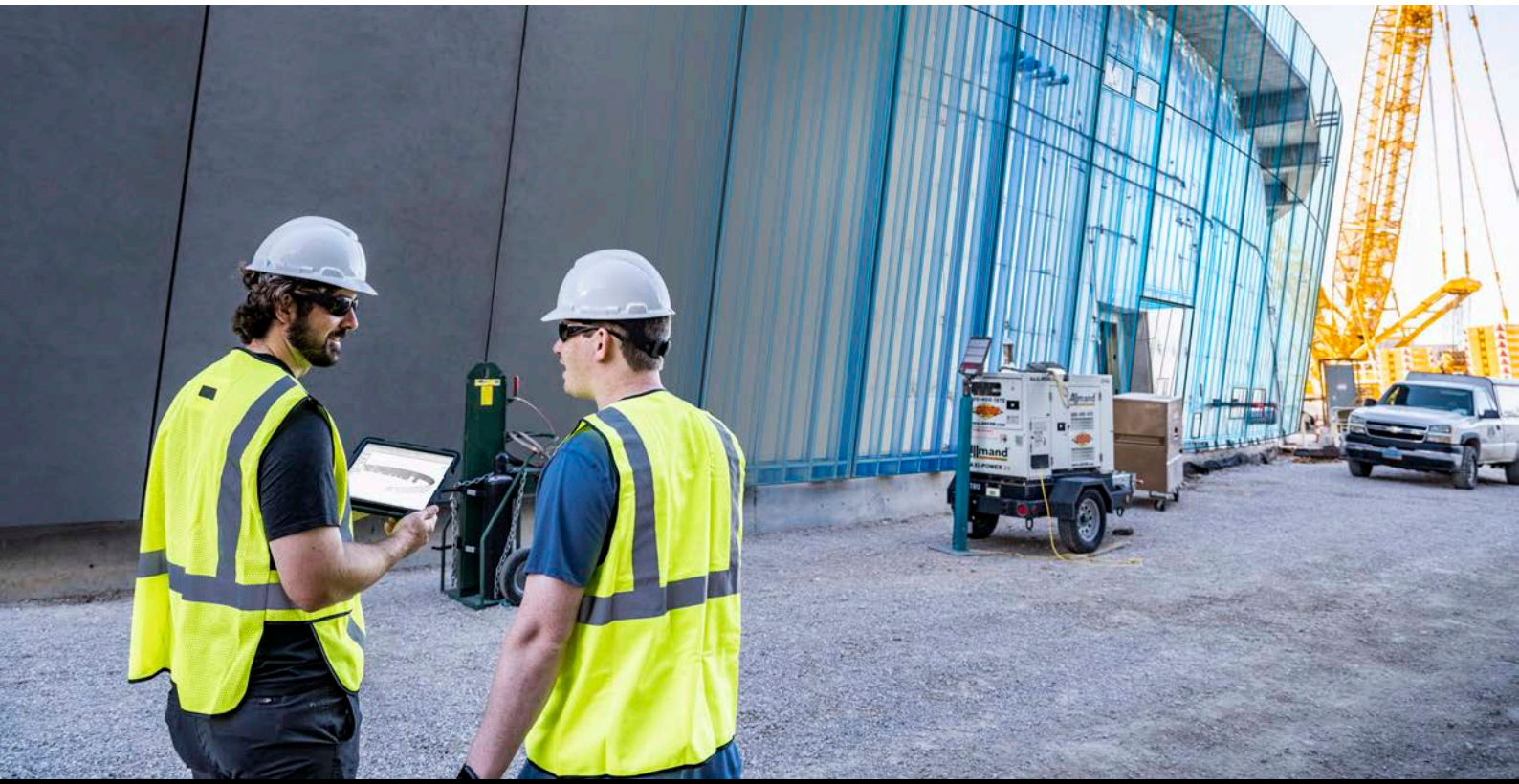
Renewable Energy Integration

- Investing in energy storage solutions to support solar and wind stability, a key element in Australia's renewable energy transition.



"Because of the complexity in managing misaligned and disaggregated design data, carbon footprints of buildings and infrastructure are typically done at the end, when most of the opportunities to make impactful decisions has passed. For example, if we don't know whether a steel or wooden bridge would be the best option before considering all the structural, cost and carbon requirements, how do we know the best way to move forward? We're now at a point with technology that we don't have to rely on guesswork. Those systems can now surface the information to inform better decision making and also track it through to construction. We've never had this level of technological potential before, and it's all coming together to generate better outcomes for sustainability."

- Carol Battle, Principal Consultant, Autodesk Sustainability Practice



02

Cross-Sector Collaboration: Ensuring a Sustainable Brisbane 2032

Brisbane 2032 is more than just a sporting event—it serves as a testing ground for large-scale sustainability initiatives. Achieving success will require collaboration between government, industry, and research institutions. Key areas of focus include:

Scaling Clean Energy Projects: Driving investment in renewable infrastructure and climate-smart urban planning, supporting Queensland's goal of 70% renewable energy by 2032 and 80% by 2035 (Elevate 2042, p. 42).

Implementing Policy Incentives: Strengthening carbon pricing mechanisms and green procurement policies through the Safeguard Mechanism, encouraging industry-led sustainability efforts (OECD, 2023, p. 112).

Engaging Communities in Climate Action: Creating transparent sustainability roadmaps that involve stakeholders at all levels, fostering behavioural shifts and policy integration (Elevate 2042, p. 19).

Industry Procurement and Lifecycle Assessments: A Pathway to Net-Zero Games

The Q2032 Procurement Strategy: Ready.Set.Go. ensures that sustainable supply chain practices are embedded throughout the Games, allowing businesses to align with emissions reduction and ethical sourcing mandates (Elevate 2042, p. 14).

The Strategy outlines sustainability requirements for industry partners, focusing on carbon transparency, sustainable material sourcing, and long-term emissions reductions. Ensuring compliance across engineering, procurement, and construction phases is critical to delivering a Climate-Positive Games.

Advancements in digital design, lifecycle methods, and technology standards offer practical opportunities to implement a net-zero vision. This vision is exemplified through upcoming facilities for the Olympic Games and can serve as a proof of concept for broader applications throughout Australia.

"The design, construct and operation of healthy Olympic facilities will convert to high-performing athletes and people attending and utilising the built space during the event. People attending the Olympics will value non-tangible benefits in facilities such as natural light, thermal comfort and indoor air quality, public transport proximity, and location to social and competitive events attendance,"

- Sumit Oberoi, Senior Manager, Industry Strategist, APAC Autodesk Construction Solutions

Innovation and Use Cases: Data Frameworks, Digital Collaboration and Digital Design Methods.

- **Asset introduction and finance –** conceive and deliver Olympics projects and facilities considering the full lifecycle impacts, incorporating emission factors; build investment cases on lifetime value using digital simulations that consider net zero-related impact and cost implications.
- **Engineering, procurement and construction –** Demonstrate a culture of coordination, cooperation and collaboration across disciplines, and work on a connected design model, to achieve a low-emissions design intent; incorporate lifecycle assessments of materials used in the facilities; procure the digital and physical asset, incorporating emission-related data, under the same contract; engage in subscription-style supply and maintenance of assets; and incorporate real-time data (such as smart sensors, drones, and wearables) throughout construction.
- **Operations and maintenance –** Track and monitor materials and asset emission performance through predictive maintenance, automated procurement, and supply chain alignment; perform maintenance concurrently on digital and physical assets, updating with improved materials and technologies.
- **Demolition and decommissioning post-Olympics –** Realising lower end-of-life costs and risks as the identification of reusable and hazardous materials and ensuring demolition/construction implications are known and managed through the project lifecycle for the Olympic Games.

Climate Resilience and Risk Mitigation: Safeguarding Brisbane 2032 from Extreme Weather Events

Australia is highly vulnerable to climate-related hazards, with wildfires, extreme heat, and heavy rainfall being among the most pressing risks. The Brisbane 2032 Olympics will be held in a region particularly susceptible to flooding, storm surges, and extreme temperatures, necessitating robust climate adaptation strategies to protect infrastructure, participants, and the wider community.

The Need for Proactive Climate Resilience Planning

The OECD (2023, p. 144) identifies Australia as one of the most climate-vulnerable OECD nations, with northern Australia facing increased exposure to climate hazards. Heavy rainfall and flooding are projected to become more frequent due to changing weather patterns, while heatwaves threaten outdoor sports, spectator comfort, and athlete performance. Without proactive adaptation measures, extreme weather events could disrupt the Games, damage infrastructure, and undermine sustainability goals.

Elevate 2042 (p. 18) underscores that the Brisbane 2032 Games must prioritise climate resilience, ensuring that new infrastructure, transport networks, and public services are designed to withstand climate extremes and minimise environmental impact.

Key considerations include:

- Flood-resistant infrastructure to prevent damage and service disruptions during high-intensity rainfall events.
- Urban heat island mitigation strategies, such as increased green spaces, shading solutions, and reflective building materials.
- Resilient transport networks to maintain accessibility during extreme weather conditions.
- Comprehensive risk mapping and forecasting to improve emergency preparedness.

The Queensland Government's Clean Economy Pathway aligns with these recommendations, emphasising the need to incorporate climate hazard considerations into land-use planning and infrastructure investment (Queensland Treasury, 2024, p. 12).

By integrating climate resilience into Games planning, Brisbane can set a new benchmark for sustainable mega-events.

Tech in Play: Integrating Digital Water Management Solutions for Climate Resilience

Given the high likelihood of intense rainfall and flooding events, water management and climate resilience solutions are essential for mitigating these risks. Digital twin technology, real-time flood modelling, and predictive analytics can play a critical role in protecting Brisbane 2032 from climate-related disruptions.

Water management is central to addressing some of the world's most pressing challenges, as communities face the impacts of deteriorating water infrastructure, rising costs, and growing populations. In regions like South-East Queensland, known for its susceptibility to climate events such as flooding, Autodesk Water solutions provides effective solutions to these ongoing challenges through hydraulic modelling and cloud technologies.

These tools enhance efficiency and sustainability across all phases of the water asset lifecycle.

Recent examples demonstrate how this technology can be applied to minimise risk and achieve sustainability goals through advanced data analytics, connectivity, and strategic planning.

"The goal of technology is not only to mitigate the risks surrounding events such as the Olympics, but also to reduce emissions and address long-term climate impacts. To achieve this, alignment on embodied carbon standards is critical. It is essential that all stakeholders—government agencies, event organisers, and local businesses—are aligned in their use of systems and technologies to support these shared objectives."

- Carol Battle, Principal Consultant – Autodesk Sustainability Practice

03

Success Stories

Qatar World Cup

Qatar is one of the most water-stressed countries on Earth, with low, seasonal rainfall and flooding a concern at certain times of the year. This is amplified by a flat and low-lying landscape.

Qatar is working to landscape the country extensively, transforming the elevation of the small nation by building ambitious, architecturally striking skyscrapers, stadiums, and a network of roads to connect it all. This intensive infrastructure improvement requires intense water management.

Preparing for the 2022 FIFA World Cup, The Supreme Committee for Delivery & Legacy (“SC”), one of the most important details for holding the event was making sure every team had high-quality, safe training facilities and accommodation that met with FIFA’s strict requirements.

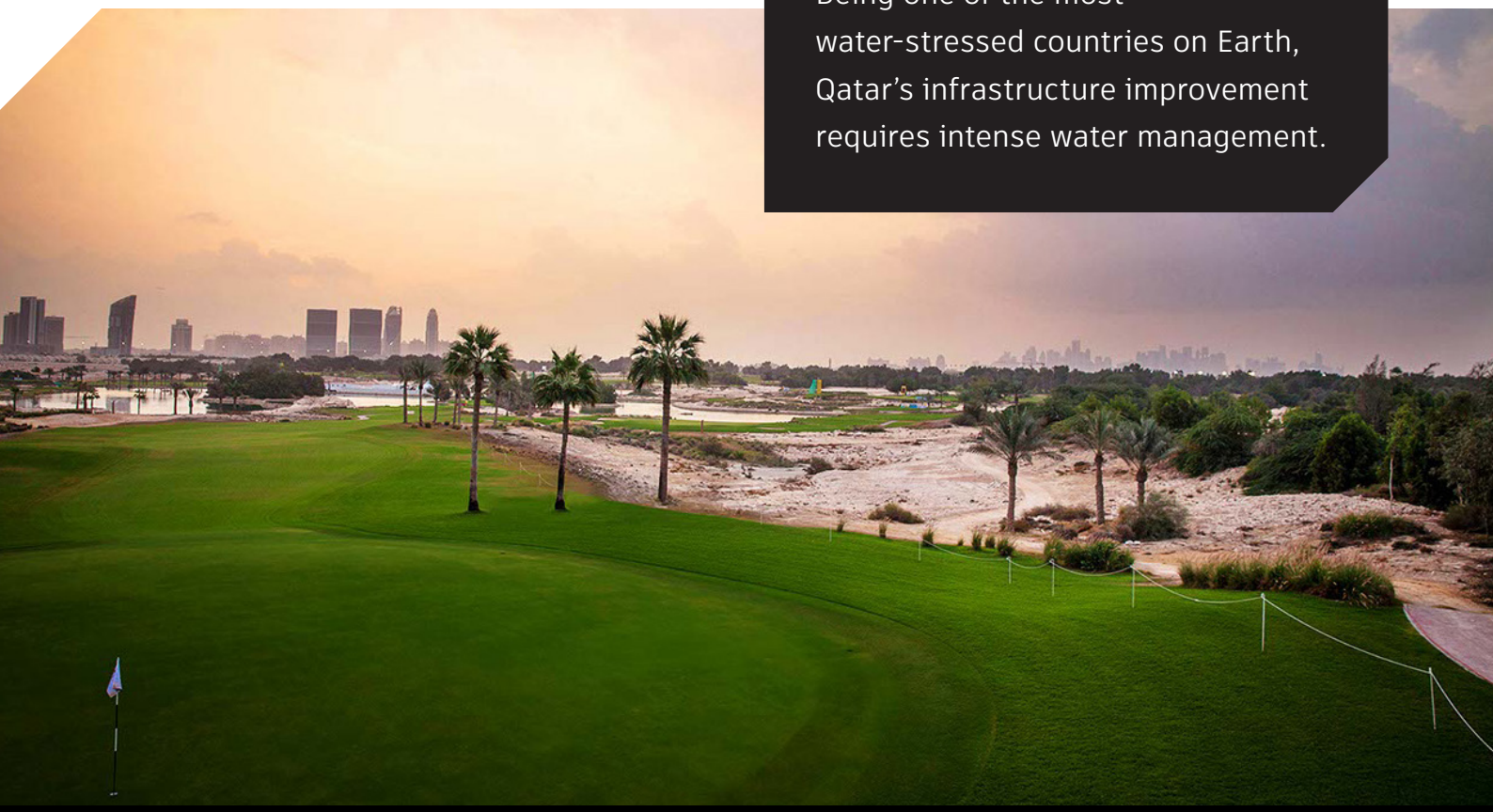
As part of the project and the ambitious Qatar Vision 2030 goals, water professionals SEERO, a firm that provides design, engineering, consultancy, and construction management services, is a regular choice for performing flood risk assessments.

As part of the project, SEERO was tasked with helping at one of the most interesting locations, the Doha Golf Club. Home to the Qatar Masters golf tournament, the Doha Golf Club contains 10,000 trees and shrubs, along with special varieties of cacti imported from the US.

The Doha Golf Club presents many water-related challenges. Water-intensive landscapes that are built in desert locations require special water considerations for regular upkeep and maintenance, but also for long-term planning and flood prevention.

Before FIFA-compliant training sites were built near the club, using Autodesk Water solutions as a tool, SEERO was able to successfully determine the maximum flood level at locations in this varied landscape where runoff streams intersect with proposed roads to ensure road embankments always sit above flood levels.

> Being one of the most water-stressed countries on Earth, Qatar’s infrastructure improvement requires intense water management.



The team used the strategic modelling environment and forecast rainfall data to deliver predictive impact maps 12 hours before the rain started to fall.

Flood Mapping in Tasmania

In 2016 and 2018, devastating floods affected Tasmania, resulting in millions of dollars in damage and significant losses for communities. After these events, the Tasmanian and Australian governments funded the Tasmanian Flood Mapping Project to better understand the state-wide flood risk, help build stronger community resilience, and support effective emergency response and recovery decision making.

SES Tasmania (SES) were supported by WMAwater, Indicium Dynamics, and Autodesk. One of Autodesk's water solutions, InfoWorks ICM was used to create a digital twin to model flood events and provide the right tools and intelligence to SES and its emergency management partners.

In the first year, base information for the digital twin was improved, the strategic modelling environment was established, and hydrologic and hydrodynamic models for large historic flood events across Tasmania were calibrated. This was followed by delivery of 0.5 per cent, 1 per cent, and 2 per cent Annual Exceedance Probability (AEP) current climate and future climate strategic flood maps for most of mainland Tasmania.

In October 2022, record major flooding occurred in Tasmania. Within 48 hours of the major peaks occurring for the initial flood event, flood modelling experts at WMAwater and SES used the strategic modelling environment with observed and forecast rainfall data to produce impact maps for the majority of flood-affected areas. This advanced preparation let the team deliver predictive impact maps 12 hours before the onset of rainfall. These maps were used to inform operational response strategies, and public information and warnings.

The project enables SES Tasmania to improve their response times in flood events. To further reduce response times and reliance on others, they plan to continue the rapid development of their flood prediction and analysis capabilities by automating the ingestion of Weather Bureau forecast data and production of flood prediction and impact assessment maps.

Next Steps: Creating a Sustainable Legacy for Brisbane and Beyond

The Brisbane 2032 Olympics presents a landmark opportunity for Queensland to lead the world in sustainability-driven infrastructure, transport, and urban development. By effectively integrating policy, technology, and industry collaboration, Brisbane 2032 can set a new global standard for climate-positive event delivery, ensuring that government agencies, project partners, and industry leaders work together to drive long-term, system-wide transformation.

This whitepaper has outlined the following key pillars for success:

- **Government Leadership and Policy Alignment:** Queensland's Clean Economy Pathway, Q2032 Procurement Strategy, and net-zero commitments provide a robust sustainability framework that must be executed with precision and urgency.
- **Technology as a Sustainability Enabler:** Digital innovations such as digital twins, predictive analytics, and AI-driven emissions tracking enable real-time decision-making and carbon transparency across infrastructure planning, transport networks, and public services.
- **Industry Partnerships Driving Real-World Impact:** Sustainable procurement, low-carbon materials, smart urban mobility, and climate resilience strategies will define the Games' long-term economic and environmental legacy.
- **Embedding Climate Resilience into Infrastructure and Services:** Queensland must proactively integrate flood-resistant infrastructure, water management solutions, heat mitigation strategies, and emergency preparedness measures into Brisbane 2032's urban development plans.

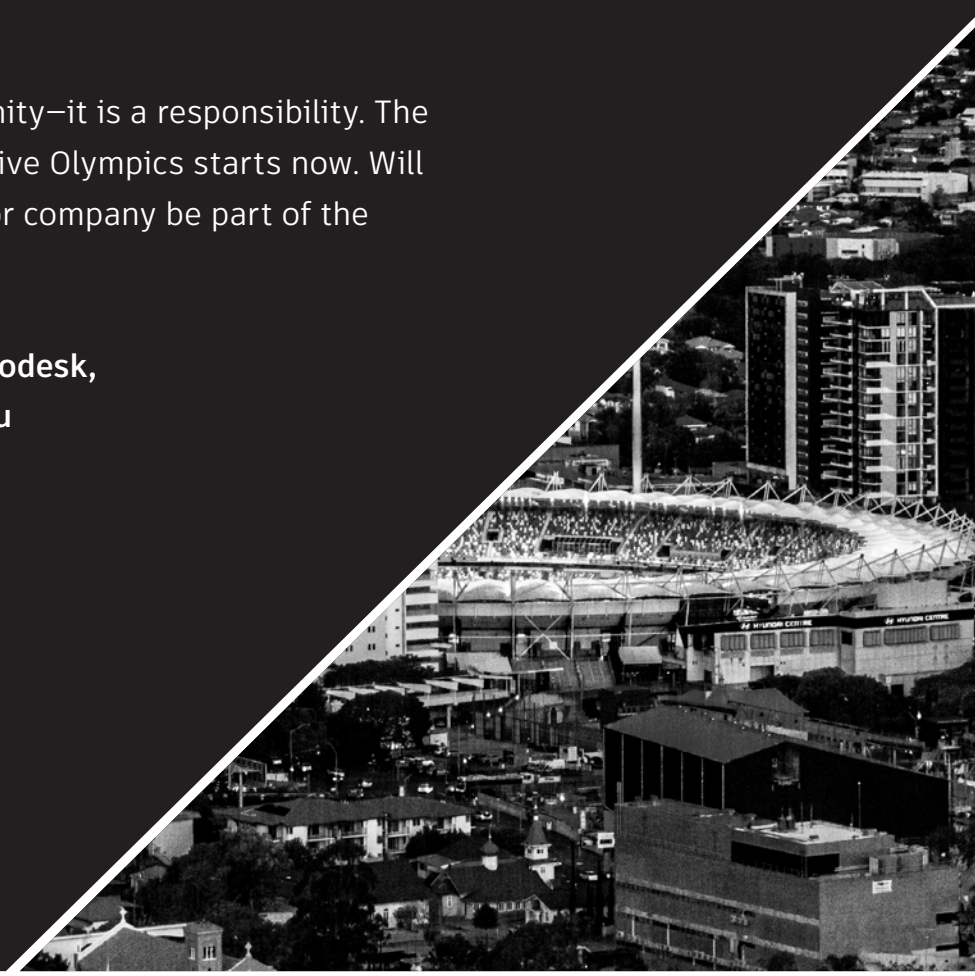
AUTODESK

Brisbane 2032: A Transformational Legacy

The Brisbane 2032 Olympics must not only be a celebration of human achievement—it must be a demonstration of Queensland's leadership in climate-positive infrastructure, transport, and urban transformation. By embracing technological innovation, government leadership, and cross-industry collaboration, the Games can set a new international benchmark for sustainability-driven mega-events.

This is not just an opportunity—it is a responsibility. The pathway to a Climate-Positive Olympics starts now. Will your agency, department, or company be part of the transformation?

To find out more about Autodesk, visit www.autodesk.com.au



AUTODESK