Category 4

Computing and AI Infrastructure

What Type of Infrastructure Does This Include

Digital Twin Platforms
BIM-integrated virtual replicas fed by real-time data, used for simulation, planning, and operational optimisation across the full lifecycle.

AI and Machine Learning Systems
pattern recognition, prediction, and optimisation systems for grid balancing, predictive maintenance, demand forecasting, and route optimisation.

High-Performance Computing (HPC) Clusters
parallel processing systems for large-scale simulation, climate modelling, structural analysis, and AI model training.

AI-Specific Hardware (GPUs, TPUs, Neuromorphic Chips)
the specialised equipment that provides the compute power for AI across planning, construction, and operations.

Key Attributes

The analysis and intelligence layer. It turns data into simulation, prediction, and optimisation.

Ranges from largely software-based tools, such as digital twins and models that run on general-purpose computers, to physically intensive systems, such as HPC clusters and AI hardware, which use large amounts of power and water for cooling.

Sits mostly inside data infrastructure, so its footprint compounds the data centre footprint rather than sitting apart from it. On-device (edge) AI is starting to move some of it closer to the asset.

Model energy footprints are largely undisclosed, and the sector's ability to interrogate them is limited, so this is the least transparent category in the matrix.

The Landscape: Investment, Legislation, and Trends

Digital twin adoption is scaling across horizontal and vertical sectors, with Sydney Metro, Jacobs and Honeywell among the organisations applying them through the case studies provided in this section.

AI is accelerating compute intensity and the workload on data centres. Understanding of AI's sustainability impacts, and how they are reported, is evolving rapidly, and regulators and investors are focusing on it.

Australia's Digital Economy Strategy and National AI Plan (2025) set ambitions for AI adoption without yet embedding sustainability obligations.

AI-specific hardware carries supply chain concentration and geopolitical risk around rare earths and critical minerals, and short product cycles that drive e-waste.

References: Australia's Digital Economy Strategy; National AI Plan (2025); Australian Sustainability Reporting Standards (IFRS S1 and S2).

DUAL LENS: OPPORTUNITY AND FOOTPRINT

Sustainability Benefits of Digital Infrastructure

Digital twins can reduce rework and optimise resource use: real-time data and predictive modelling let teams test a design and its construction sequence before building it, reducing lifecycle emissions and shortening timelines.

Digital twins enable scenario testing: interoperable digital twins let planners test climate and resilience scenarios at the scale of the whole asset or network.

AI optimises networks in real time: applied to grids, transport, and water, it reduces curtailment, extends asset life through predictive maintenance, and improves renewable integration. The Jacobs-supported heavy-haul rail case study below shows how AI-supported modelling informs decarbonisation decisions.

Improving hardware efficiency: next-generation chips are reducing inference energy per operation and enabling on-device AI that avoids the cloud upload and download.

Enhancing public engagement: digital twins and AI decision support systems can help designers test more options, and give communities a visual way to understand and respond to proposals before they are built.

Better decisions earlier: simulation and optimisation can reduce rework, defer capital spend and extend asset life, with the largest gains in planning and design when changes to a scheme is often cheaper than latter stages of development.

Digital Infrastructure Issues to Watch

01 **Training and inference energy**
training large language models is highly energy intensive, and running them at scale carries an ongoing energy cost that does not stop after training.

02 **HPC footprint**
high-performance computing has substantial energy and cooling requirements, high embodied carbon, and short hardware refresh cycles.

03 **Greenwashing risk**
efficiency benefits are often claimed for AI and digital twins without measured outcomes, so a gain on paper can mask a net footprint increase.

04 **Supply chain and hardware exposure**
AI hardware depends on rare earths and critical minerals from concentrated supply chains, with environmental and human rights risks in extraction and manufacture, and short product cycles which can drive e-waste.

05 **Knowledge work and fairness**
routine design, scheduling and data processing roles could face displacement, and should be planned for with appropriate programs developed to ensure redeployment and transition opportunities are provided.

The Key Questions

Considerations that might help a member organisation build a business case for action and investment and to govern well are included in the table below.

P **PROCESS**
Do we require measured, verifiable sustainability outcomes from AI and digital twin projects at approval, rather than modelled or projected claims?

O **ORGANISATION AND CULTURE**
Do we have the capability to calculate the footprint of AI energy use and interrogate a model energy claim, and if not, how do we build it?

T **TECHNOLOGY**
Are our digital twins built on interoperable data schemas so new analytics layers can be added without rework?

I **INFORMATION**
Have we set expectations for disclosure of training and inference energy, with independent verification to guard against greenwashing?

Applying This Across the Asset Lifecycle

Below are five common questions you may face across the asset lifecycle, each from the perspective most likely to raise it.

This category potentially has both the greatest enabling potential and the largest footprint, and where measured outcomes matter most. Claims in this category will warrant close scrutiny given the evolving nature of the technology, and fluid policy environment.

Planning

State authority asset owner

"Projects increasingly claim AI will deliver sustainability benefits. What should we require at approval?"

Require measured, verifiable outcomes at approval, not modelled or projected claims, since methods for measuring and reporting AI's sustainability impacts are still developing. Ask for the training and inference energy behind the tool and whether the claimed saving is net of the model's own footprint. Screen out unverified efficiency claims as a greenwashing risk.

Design

Sustainability consultant

"I am advising on a digital twin for a major project. How do I frame its sustainability value and cost?"

Digital twins can reduce rework and optimise resource use, lowering lifecycle emissions, and enable climate scenario testing at planning scale. Build them on interoperable data schemas so you can add new analytics without rework, extending value. But digital twins can be compute-intensive, so pair the benefit with the energy cost and design for a measured outcome, not a modelled claim.

Construction

Construction company sustainability manager

"Our project team wants high-performance computing for modelling during delivery. What is the sustainability position we can take?"

High-performance computing carries high energy and cooling load, high embodied carbon, and short refresh cycles that drive e-waste, with hardware drawn from critical mineral supply chains carrying labour and environmental risk. Weigh up the modelling benefit against that footprint, and ask about cloud versus on-premise efficiency and supplier sourcing commitments rather than buying fast-refreshing hardware.

Operations and Maintenance

Asset owner and operator

"We run AI optimisation across our network. How do we report its footprint and prove the benefit?"

Set expectations for disclosure of training and inference energy from your providers and use independent verification where you can. With lacking standards, it is a challenge to consistently measure AI's footprint with respect to energy today, so treat it as a capability to build. Prove the benefit with measured before-and-after outcomes: curtailment avoided, asset life extended, or energy reduced, rather than assumed savings.

End of Life and Renewal

Asset owner and operator

"AI hardware evolves fast. How do we manage the sustainability of replacing it?"

Short product cycles drive significant e-waste and lock in dependencies on chips, rare earths, and critical minerals. Plan refresh around genuine need rather than vendor cadence, build in reuse and recycling, and record the lifecycle footprint. Where compute is cloud-based, make refresh efficiency and circular economy commitments part of the provider disclosure.

The Cost of Inaction: Gaps in the Current Landscape

Unproven claims, and the real footprint
without a measured-outcomes requirement, AI is credited with sustainability benefits it cannot evidence while its own energy and hardware footprint expands.

No basis for comparison
there is no consistent way to report or compare the sustainability of AI systems, so buyers cannot tell an efficient tool from an energy-intensive one.

Rating coverage gap
rating tools do not yet cover AI and computing infrastructure on par with conventional built assets, so the highest-growth, least-transparent category sits outside our most common toolkit for sustainability.