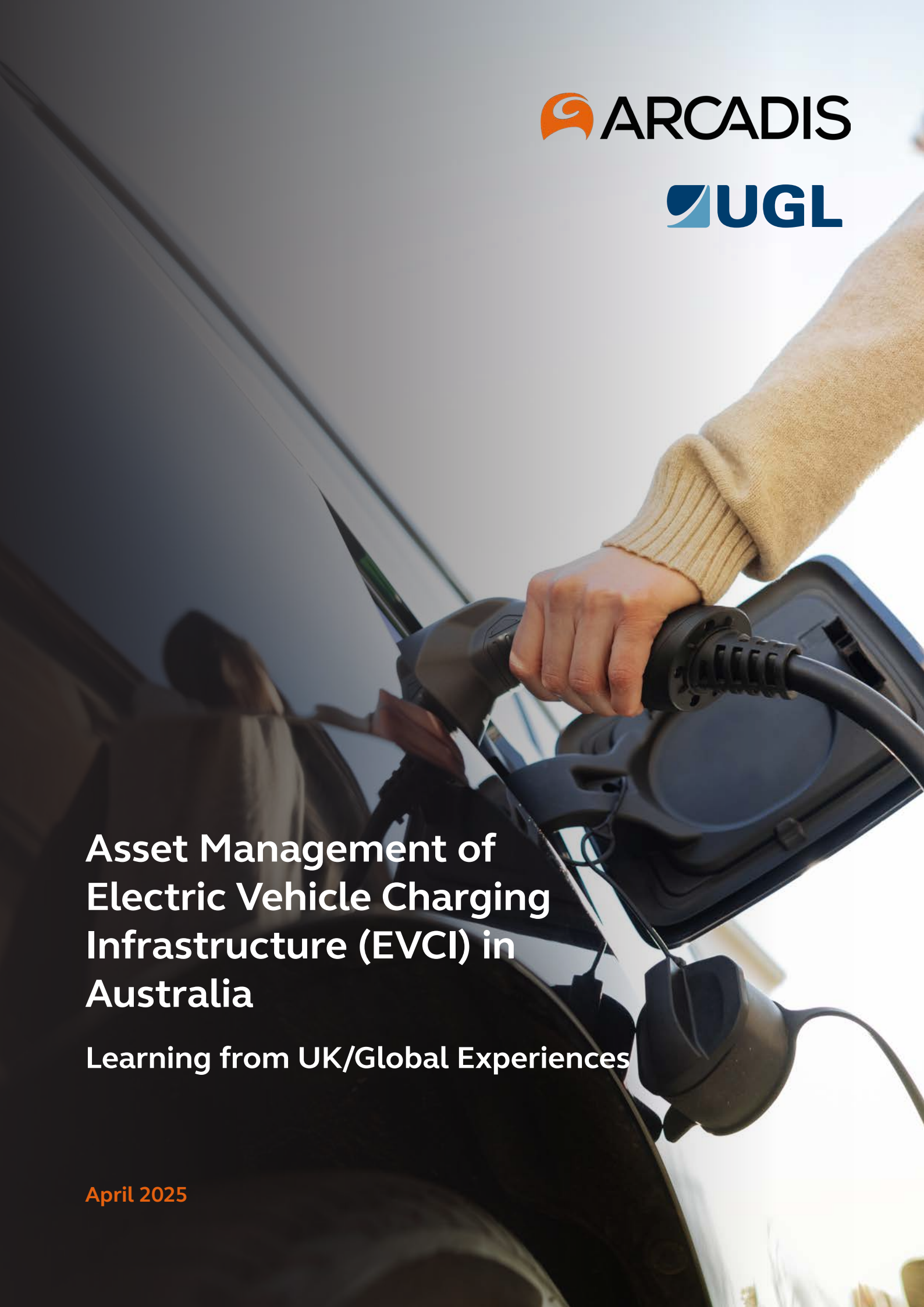


Asset Management of Electric Vehicle Charging Infrastructure (EVCI) in Australia

Learning from UK/Global Experiences

April 2025

As a leading provider of sustainable design, engineering and consultancy, **Arcadis** operates in over 30 countries with more than 35,000 professionals across architecture, engineering and sustainability. Combining digital innovation with industry expertise, Arcadis delivers tailored asset management solutions that drive sustainable mobility and maximise asset performance.

We use our global expertise and a proven track record to provide innovative asset management solutions for Electric Vehicle Charging Infrastructure (EVCI). With extensive experience in the UK and Europe, Arcadis applies strategic insights, data-driven methodologies and lessons learned to enhance the performance, reliability and sustainability of EVCI assets. This approach aligns strategic advisory with operational delivery to ensure long-term asset effectiveness.

With expertise in electricity transmission, battery systems and rail infrastructure, **UGL** is well-positioned to upgrade transport systems. This includes EVCI for electric buses, trucks, cars, battery-electric locomotives and shoreside charging for ships and ferries, along with asset management solutions. UGL is working with clients and government agencies to support the transition to electrified transport infrastructure. It is fully equipped to deliver EVCI projects across road, rail, and marine sectors, covering design, engineering, procurement, management and maintenance.

ARCADIS UGL

Introduction

It’s projected that Australia’s electric vehicle (EV) fleet will significantly expand to achieve the country’s Net Zero target by 2050. Supporting this level of EV adoption will require an extensive build-out of Electric Vehicle Charging Infrastructure (EVCI).

Currently there are 180,000 EVs in Australia. If there are one million by 2030, Australia will need approximately 2.8 million charging stations - 560 times the present provision of around 5,000 EV chargers across approximately 2,500 sites.

The challenge of scaling EVCI rapidly while maintaining efficiency and reliability necessitates strategic asset management informed by international best practices.

This paper explores asset management principles for EVCI, examines key lessons from Arcadis UK and Europe EVCI implementation over the last few years, and provides recommendations to enhance Australia's approach to asset management and maintenance that can be delivered within the capabilities of UGL - one of Australia’s preeminent new energy, electrical and transport engineering contractors.

The Current Landscape of EVCI in Australia

Several initiatives and projects within Australia provide a foundation for EVCI expansion. Key examples include:

- ARENA's Funding Initiative:
  - The Australian Renewable Energy Agency (ARENA) have provided funding for the development of 130 EV stations across the country, supporting a national charging network.
  - ARENA allocated $100 million towards the Focus Areas: Trucks, Charging and Innovation - aiming to support demonstration and deployment of heavy vehicles, charging solutions and other innovation supporting uptake of EVs.
- Ampol's Transition to Future Fuels: Ampol is actively transitioning from a traditional hydrocarbons business to a future fuels provider, including EV charging infrastructure, battery energy storage systems (BESS) and photovoltaic (PV) technology integration.
- Public-Private Partnerships: Collaborations between government and private enterprises, such as the deployment of fast-charging corridors on major highways, are helping to fill critical gaps in the national EVCI network.

Australia's public EVCI network consists of approximately 2,500 charging sites categorised as follows:

- 1,928 standard chargers (< 24kW)
- 365 fast chargers (24 – 99kW)
- 99 ultra-fast chargers (> 100kW)

With projections suggesting a potential increase to 10,000 sites within the next five years, the urgency to implement efficient asset management strategies is clear. These assets can vary significantly in terms of setup costs, charging times and operational performance:

- AC Slow Charging: 39 hours for a full charge, low setup cost
- AC Fast Charging: seven hours for a full charge, moderate setup cost
- DC Rapid Charging: 0-80% charge in 18 minutes, high setup cost

Each requires a different asset management approach to ensure optimised performance. Research of the early deployments indicate focus on asset safety and compliance but less attention on sustained performance and longevity of the EVCI assets.

International Lessons Learned

Countries like the UK have accelerated their EV infrastructure deployment to meet aggressive electrification targets. However, several challenges have emerged, providing valuable lessons for Australia.

<u>Inefficient Early Installations</u>

- Early EVCI deployments often lacked efficiency and reliability.
- Many assets became obsolete or were inadequately provisioned, leading to underutilisation or overcapacity issues.

The primary impact of inefficient early installation led to situations where equipment was not fully leveraged to its potential, resulting in wasted resources or alternatively overcapacity issues, both of which resulted in unnecessary costs and operational inefficiencies.

These problems reduced the overall reliability of the equipment in some areas, negatively impacting on the client/user experience and causing maintenance challenges, both of which decreased the return of investment.

Additionally, some early inefficient installation resulted in costly upgrades and replacements, which further exacerbated strained budgets and timelines.

Ineffective Asset Management Approaches

- Suboptimal maintenance practices increased costs and operational risks.
- A lack of predictive maintenance approaches often resulted in reactive, ad hoc repairs.

As a result of ineffective or absent asset management plans, many asset owners faced higher costs and increased operational risks due to issues not being properly identified or addressed. Unexpected repairs and breakdowns led to extended downtime, which caused significant user disruptions and attracted negative media attention. This coverage fuelled public frustration and dampened market confidence in EV adoption, potentially affecting the broader EV transition strategy.

Furthermore, the lack of foresight possibly shortened the lifespan of assets, requiring more frequent replacements or upgrades, which placed additional strain on the overall program budget.

Lack of Regular Real-Time Fault and Condition Monitoring

- Many systems relied on minimal contractual support from suppliers making performance monitoring difficult.
- No inbuilt telematics and/or method of providing real time EVC availability information for customers.
- The absence of real-time data hindered informed decision-making and asset optimisation.

Due to a lack of regular real-time fault and condition monitoring, asset owners experienced significant challenges. Many systems relied on minimal contractual support from suppliers which made performance monitoring difficult and often inefficient. Without inbuilt telematics or a reliable method to provide real-time EVC availability information, customers faced the frustration and inconvenience of arriving at charging points that were out of service when they needed to charge their vehicles. This lack of visibility led to significant disappointment as customers were unable to rely on the charging infrastructure, creating a negative experience and undermining confidence in the system.

In addition, it was considered that the absence of real-time data severely hindered informed decision-making, making it difficult to optimise asset performance across the portfolio effectively. As a result, issues went undetected for longer periods, leading to increased downtime, dissatisfied customers, reputational damage, higher maintenance costs and a diminished return on investment.

End-of-Life Asset Management

- Countries with mature EVCI networks face challenges related to asset end-of-life, including sustainable disposal, recycling and material reclamation.

As EVCI networks mature, the lack of effective end-of-life asset management can potentially lead to significant challenges for both asset owners and the community. As EVCI equipment reaches the end of its lifespan, issues around sustainable disposal, recycling and material reclamation will become critical. Without proper management strategies in place, assets may end up in landfills, contributing to environmental harm and regulatory non-compliance.

Furthermore, the absence of a clear plan for decommissioning can lead to increased costs for EVCI owners and operators who may face fines or the burden of handling outdated equipment. This can negatively impact both financial performance and corporate reputation, especially as sustainability becomes an increasingly important consideration for stakeholders.

From Lessons Learned to Strategic Implementation

Moving from lessons learned to the strategic implementation of asset management for Australia's EVCI requires a comprehensive and coordinated approach. Evidence from early EVCI deployments in Australia indicates that similar challenges faced globally are already emerging locally. Addressing these issues begins with a detailed assessment of the current state of Australia's charging infrastructure, identifying gaps in both deployment and management practices.

Arcadis' global experience in asset management can inform the development of a national asset management framework that incorporates best practices from other countries. Such a framework should standardise lifecycle management, maintenance protocols and data-driven performance optimisation. Drawing from insights from international projects and early experiences, Arcadis' framework enables a robust, scalable approach that supports the long-term performance and sustainability of EVCI assets.

Real-time monitoring systems need to be deployed to track the performance and condition of EVCI assets. Predictive maintenance strategies must be implemented to proactively address potential issues and reduce downtime and operational costs in the future. Investment is required both in the technology and capacity building to equip maintenance teams and asset managers with the skills to understand and utilise data analytics and advanced asset care techniques. At the initial stage of planning and installation, UGL can help with asking the right questions in regard to what data is critical, what data will provide clients with the information to make informed decisions on their asset in the future.

Equally important is the establishment of data governance structures to oversee the collection and management of the data as well as delivering key asset management initiatives. To maximise future value, the efforts of asset maintenance service providers like UGL, need to be aligned with national objectives and regulatory standards. Stakeholder collaboration, including government, private operators, and technology providers, is crucial to the success of this endeavour.

By transitioning through these phases, Australia can mitigate some of the risks identified by earlier adopters and ensure that its EVCI assets are resilient, sustainable and capable of meeting the growing demands of EV adoption. This proactive approach will maximise the performance and lifespan of EVCI, reduce costs and enhance the overall reliability of the charging network.

Strategic Asset Management for EVCI

The proven risks associated with failing to implement a strategic asset management plan highlight the importance of adopting a proactive approach for Australia's EVCI development. Lessons from international experiences and from early deployments in Australia demonstrate that infrastructure can quickly become inefficient and costly to maintain without a structured and holistic approach available from mature asset managers and maintainers like UGL. This includes the required cultural change amongst asset owners that may need to be driven alongside the asset management processes and technology.

Australia is not immune to the operational challenges such as frequent outages, expensive repairs and asset obsolescence which have been observed in other regions where rapid implementation has been undertaken without the rigor in asset management planning and strategy. A robust Concept of Operations developed alongside these documents will inform of level of service requirements and other critical performance requirements that can be delivered by UGL.

Unplanned and reactive maintenance can be a major concern, often leading to unscheduled downtime and inflated costs. Australia's vast geography further complicates this issue, as accessing remote sites for urgent repairs can be both time-consuming and expensive, thereby potential creating more downtime and disruption. This is particularly critical given Australia's regulatory environment, where non-compliance with safety and environmental standards can lead to penalties and reputational damage.

Performance degradation coupled with downtime is a key risk, especially in regional areas, where charging options for users may be limited. Inconsistent and unreliable charging infrastructure undermines user confidence, which can not only slow the adoption of EVs but potentially persuade EV champions to revert to traditional fuels. The implementation of real-time performance monitoring is critical to ensure the status of asset is known and that asset managers like UGL and operators have the necessary insights to optimise operations and mitigate the risks of inefficient asset usage and missed opportunities for preventative interventions.

The mindset and cultural changes within the operational sector, to effectively use the data collected by monitoring systems and apply the appropriate intervention based on the asset management approach is as critical as collecting the data itself. By adopting a value framework with a strategic, holistic approach, as proposed by Arcadis, and leveraging up-to-date, accurate data - such as that aggregated by systems managed by UGL - Australia can drive data-driven decision-making. This approach will help avoid the inefficiencies seen internationally and enable the development of a robust EVCI aligned with the country's Net Zero goals.

In summary, from the early implementors, it is learnt that key concepts for EVCI strategic asset management approach include, but are not limited to:

1. **Real-Time Monitoring**
    - Establishing monitoring systems to provide continuous performance insights.
    - Enhancing decision-making with real-time data on asset condition and usage.
2. **Predictive Maintenance**
    - Leveraging predictive techniques to reduce maintenance costs and minimise risks.
    - Prioritising maintenance activities based on asset performance data.
3. **Asset Modernisation and Lifecycle Management**
    - Implementing strategic upgrades to ensure assets remain reliable and efficient.

- Utilising data-driven insights to optimise performance and extend asset lifespans.

4. **Sustainable Asset Disposal and Upgrade Planning**
    - Developing sustainable practices for end-of-life asset disposal.
    - Planning proactive upgrades to prevent obsolescence and ensure regulatory compliance.
5. **Establish a Data Governance Structure and Concept of Operations**
    - Establish aligned data quality standards and implement regular quality checks to ensure data is being maintained and updated in line with operational requirements.
    - Clearly define ownership and stewardship of all asset data in the ConOps and assign strong leadership to drive initiatives and ensure adherence.

Conclusion

The rapid expansion of EVCI is essential for Australia to meet its Net Zero target by 2050. However, this growth must be underpinned by a strategic asset management approach to prevent issues such as performance degradation, high maintenance costs and premature asset failures.

Lessons from other countries have highlighted that EVCI networks can quickly become unreliable and inefficient without proper planning and oversight. This risk is exacerbated by the constant changing nature of the EVCI sector, as charging operational requirements and technology are rapidly changing and evolving.

The experiences of other countries have highlighted that robust asset management is essential to the long-term success of EVCI. Australia, facing its own unique challenges of vast geographic distribution and evolving regulatory demands, can learn from these lessons to avoid pitfalls such as poor performance, high maintenance costs and premature asset obsolescence. By addressing these risks early through strategic planning, Australia can position itself to meet the growing demand for reliable and efficient EV infrastructure.

Key elements and recommendations

Strategic asset management is essential for scaling EVCI

- The rapid growth in EV adoption necessitates a robust EVCI implementation program supported by proactive asset management to prevent performance issues, inefficiencies and increased costs.

Lessons from international experiences must guide local initiatives

- Countries like the UK have faced challenges in early EVCI deployments, including maintenance issues, performance degradation and asset obsolescence. Australia can avoid similar pitfalls through improved planning, monitoring and robust inspection, and monitoring technology adoption.

Investment in real-time monitoring and predictive maintenance

- Establishing systems for real-time data collection and predictive maintenance will reduce downtime, improve asset performance, and optimise lifecycle costs and reduce the risk of reputational damage and user disruption and dissatisfaction.

Sustainable and future-proofed infrastructure

- Planning for sustainable asset disposal, recycling and material reclamation is crucial to ensure regulatory compliance and long-term viability.

Data-driven decision-making

- Leveraging data analytics and implementing a rigorous data governance structure to maintain and manage asset data to support lifecycle management, maintenance scheduling and performance optimisation will maximise the value of EVCI investments.

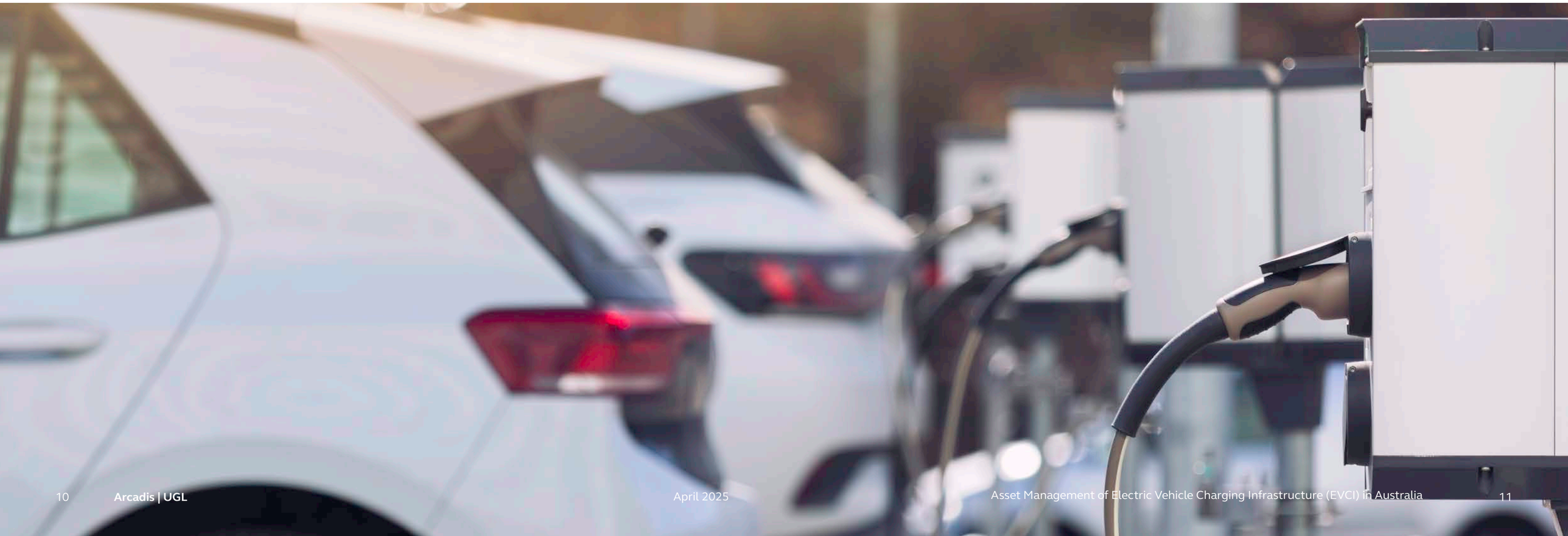
Integrated stakeholder collaboration

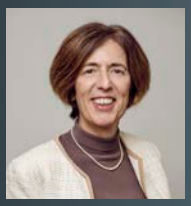
- Effective asset management requires collaboration across stakeholders, including government, private sector operators, and technology providers, to align efforts and share best practices.

With EV adoption accelerating in Australia, the effective management of EVCI assets is more critical than ever. Drawing on lessons from international experiences from industry leaders like Arcadis and UGL a robust asset management framework that supports sustainable growth, minimises risk, and maximises asset performance can be developed.

By leveraging data-driven strategies and implementing predictive maintenance, Australia's EVCI network can become a model of efficiency and reliability, ensuring it meets both current and future demand while aligning with long-term sustainability goals.

In conclusion, strategic asset management is not just an operational necessity but a crucial enabler of Australia's transition to a low-emissions economy. By learning from global experiences shared by Arcadis and applying best practices by UGL, Australia can build a future-ready infrastructure that supports both environmental and economic objectives.





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Arcadis is a leading global partner, delivering transformative projects with businesses, cities and industries. With over 35,000 people active in more than 30 countries, we bring together the best minds from around the world to deliver intelligent products and solutions that address the challenges of climate resilience, energy affordability and livable cities.

UGL

UGL, a member of the CIMIC group, is a specialist end-to-end engineering, services and operations provider. With a rich history dating back to 1899 we're now a market leader in many of the sectors in which we operate. UGL is helping to shape Australia through its major infrastructure projects and is preparing for the future with its energy, Defence, telecommunications and technology expertise. UGL has projects, operations, offices and more than 11,000 employees throughout the country.