



S2 INTELLIGENT MANAGEMENT SYSTEM (S2-IMS)

ENGINEERING DISCUSSION PAPER

EVs Are Ready. The System Is Not.

From Adoption to National Mobility Resilience

Document Control

Document ID	S2-WP01
Version	V1.1
Status	Controlled Document
Document Owner	Tito A. Cueva / S2 Safety Systems
Effective Date	8 October 2026
Review Cycle	Annual and after material change
Classification	Engineering discussion paper / reference guide

Publication status. This document is prepared to S2-IMS-SOP-DC-001 V2.0 publication-formatting requirements. It is not an approved controlled master until an authorised document ID, review record, approval and register release have been completed.

Document Control

Revision History

Version	Date	Description of Change	Author	Review Status
V1.0	5 September 2026	First integrated publication. Combines the supplied Part 1 thesis and Part 2 national mobility resilience analysis; adds S2-IMS publication architecture, figures, tables, glossary and references.	Tito A. Cueva	Controlled Document.
V1.1	8 October 2026	Publishing Quality Review	Tito A. Cueva	Controlled Document

Approval Record

Role	Name / Position	Approval Evidence	Date
Prepared by	Tito A. Cueva	Author record	5 September 2026
Technical governance review /	CEO	Required before release	8 October 2026
Approved by	CEO	Electronic approval record	8 October 2026

Evidence and Intended Use

Item	Controlled Position
Purpose	A public-policy and engineering discussion paper for government, industry, fleets, service providers and professional engineering dialogue.
Core proposition	EV capability must be assessed as a mobility-system outcome, not only as vehicle sales or charger counts.
Evidence boundary	Source-derived material is identified as S1-S3. External research is identified as E1-E11. Recommendations are explicitly identified as author recommendations.
Scope boundary	The paper does not create policy, regulatory duties, assurance certification, commercial commitments or claims of S2 deployment maturity.

Table of Contents

Section	Page
Executive Summary	4
1. From Vehicle Adoption to System Performance	5
2. The 6+2 Engineering Governance Model	7
3. Governed Shared Accountability	9
4. The Productivity Adjusted Charging Cost	10
5. Domestic Lifecycle Capability Is Infrastructure	12
6. Global Case Studies and Transferable Lessons	14
7. Fleets as Transition Laboratories	15
8. Data Cyber Security and Trust	16
9. A National Mobility Readiness Roadmap	17
10. Proposed National Mobility Readiness Scorecard	19
11. Bounded Role for S2 Safety Systems	20
12. Conclusion	21
Appendix A. Integrated Decision Canvas	22
Appendix B. Glossary of Terms and Definitions	23
Appendix C. List of Reputable References	24

Navigation note. This static table of contents is derived from the final rendered pagination and verified before release. Headings are structured using Word heading styles for future controlled updates.

Executive Summary

Australia has moved beyond a narrow question of whether electric vehicles can be built and sold. Electric vehicles are mobile energy and digital assets whose real-world performance depends on charging, local electricity networks, software, maintenance capability, data governance, workforce competence, residual-value confidence and the institutions that connect these elements. The central issue is not vehicle immaturity. It is whether the surrounding mobility system is dependable enough to earn trust. [Source-derived: S1; External research: E1-E4.]

Part 1 established the original thesis: the vehicle may be ready while the system around it remains fragmented. Part 2 refined that thesis. Australia does not need one organisation to own the whole system. It needs governed shared accountability across a distributed system: named owners for functions and interfaces, common evidence, measurable performance, proportionate escalation and a learning cycle when an outcome fails. [Source-derived: S1-S3; Author recommendation.]

The integrated 6+2 Engineering Governance Model retains six operational layers - Vehicle, Energy, Infrastructure, Data, People and Economics - and applies two cross-cutting assurance lenses: Mobility Security and National Resilience; and Domestic Lifecycle and Industrial Capability. The model makes visible the risks that sit between organisational boundaries, where customers, fleets and communities experience the result. [Source-derived: S1-S3; Author recommendation.]

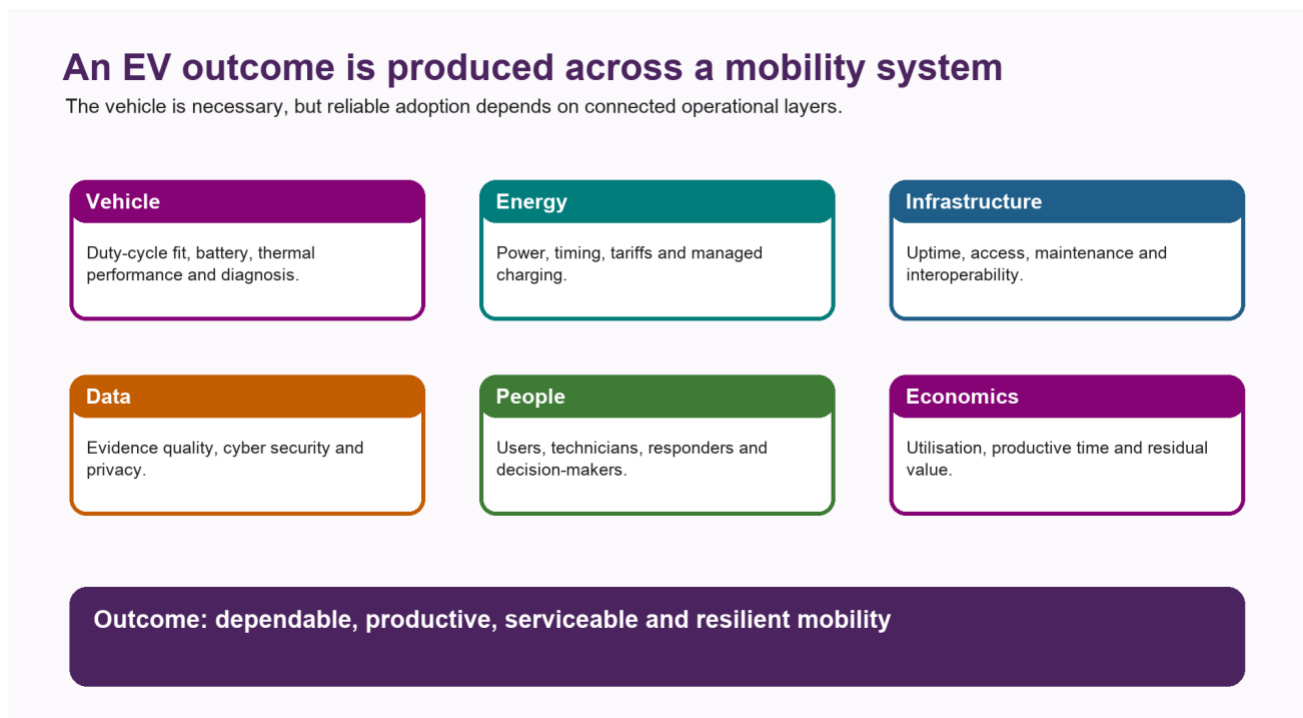
The paper also introduces Productivity Adjusted Charging Cost (PACC), a scenario method that adds access, detour, queue, connection, dwell-time and disruption exposure to energy cost. It does not claim a universal charging duration. It asks operators to measure the whole mobility interruption for the relevant duty cycle. [Author recommendation informed by external research: E1-E3.]

The practical ask. Use fleets as transition laboratories; measure reliability, serviceability and productive time alongside plug counts; treat lifecycle capability and data stewardship as infrastructure; and establish an adaptive evidence-to-action cycle across public and private participants.

1. From Vehicle Adoption to System Performance

The supplied Part 1 paper identified a critical shift. Under the internal-combustion model, the vehicle, fuel supply, service network and market signals had established responsibility boundaries. Electric mobility changes those dependencies. The vehicle outcome now relies on electricity, charging access, software, local network capacity, service competence, data and value confidence beyond the vehicle itself. [Source-derived: S1.]

Figure 1 - A customer or fleet outcome is created across interconnected mobility-system layers. Author-developed infographic based on S1-S3.



Part 1 was deliberately direct in arguing that no single party owned the end-to-end outcome. This integrated edition refines the wording to make the governance requirement more actionable. System delivery will remain distributed among manufacturers, energy businesses, charge-point operators, governments, repairers, fleet owners, software providers, financiers and users. What must be governed are the interfaces and outcomes that none can assure alone. [Source-derived: S1-S3; Author recommendation.]

Table 1 - Transition signals and engineering implications

Observed transition signal	Engineering implication
More EV and PHEV models, sales and fleet deployments	Charging, service and local-network impacts move from isolated cases to recurring operational loads.
Expanded public and depot charging	Installed capacity must be matched by availability, maintainability, access, payment clarity and response to faults.
Broader powertrain and software variation	Dealers and repairers require diagnostic information, high-voltage competence, tools and workable parts pathways.
Growing used-EV supply	Residual-value confidence depends increasingly on condition evidence, repairability, software status and transparent information.
More policy interest in data and infrastructure planning	System planning needs shared visibility while preserving privacy, cyber security and accountable data use.

2. The 6+2 Engineering Governance Model

The model is a decision structure, not a claim that every participant should control every layer. It gives each deployment a consistent set of questions before capital is committed and during operation. The six layers come from the Part 1 framework. The two lenses reflect the subsequent contribution on mobility security, resilience and domestic lifecycle capability. [Source-derived: S1-S3; Author recommendation.]

Figure 2 - Six operational layers assessed through two cross-cutting assurance lenses. Author-developed infographic.

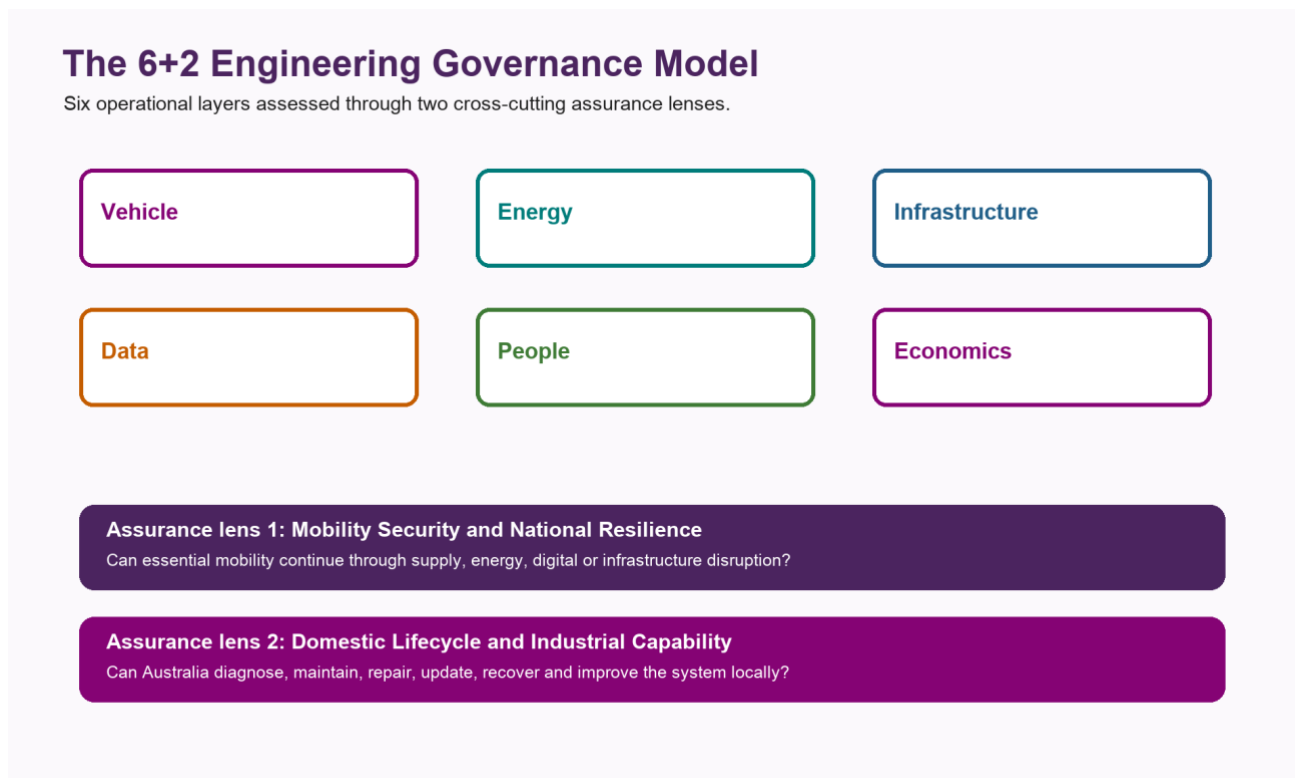


Table 2 - 6+2 decision questions and minimum evidence

Layer or lens	Decision question	Illustrative evidence
Vehicle	Is the vehicle fit for the duty cycle and charging environment?	Range, payload, charging curve, warranty, thermal and diagnostic access.
Energy	Can energy be supplied at the required time, power and cost?	Tariff model, managed-charging plan, peak-load analysis and connection assumptions.
Infrastructure	Can charging assets deliver dependable access in operation?	Site capacity, uptime definition, maintenance plan, safety and fault-recovery arrangements.
Data	Can the system see, explain and improve its performance?	Charging events, battery condition, fault records, privacy controls and cyber architecture.
People	Can users and technicians operate the system safely and confidently?	Training, user guidance, emergency arrangements and escalation pathways.
Economics	Can the business case withstand utilisation and residual-value change?	Whole-of-mobility model, sensitivity analysis and condition evidence.
Mobility security and resilience	Can essential mobility continue under a defined disruption?	Scenario tests, dependencies, recovery arrangements and communication plan.
Domestic lifecycle and industrial capability	Can the system be supported, repaired and improved locally?	Skills, parts, information access, service network, reuse and recovery pathways.

3. Governed Shared Accountability

The word ownership can obscure the real task. A single organisation cannot reasonably own every vehicle, charger, network, service business, data platform and finance product. The governance objective is shared accountability: clear responsibility for an outcome, an interface or a recovery action; transparent measures; a named escalation route; and evidence that corrective action closed the loop. [Source-derived: S3; Author recommendation.]

This approach is especially relevant where a user experiences a failure but no one organisation has both the information and authority to resolve it. A charger may be energised but unavailable in the user interface. A vehicle may be technically capable but unsuitable for an unmanaged depot return pattern. A repairer may be competent but lack timely technical information or parts. The customer sees one failed mobility outcome. [Source-derived: S1; Author recommendation.]

Table 3 - Interface failures that need accountable operating arrangements

Interface	Potential failure	Accountability question	Suggested measure
Vehicle and charger	Connection or payment fails despite apparently compatible equipment.	Who owns diagnosis, customer communication and recovery?	Successful charge-attempt rate and fault-recovery time.
Charger and local network	Demand exceeds site or connection assumptions.	Who monitors load, controls demand and approves remediation?	Coincident peak, constraint events and connection lead time.
Vehicle and service network	Repair is delayed by skills, parts or information access.	Who owns the end-to-end customer recovery pathway?	Time to diagnose, repair and return to service.
Battery condition and resale	Buyer discounts unknown condition and history.	What condition evidence is fit for the purpose claimed?	Method, provenance, uncertainty and intended-use disclosure.
Data and user trust	Operational visibility conflicts with privacy or cyber obligations.	Who authorises data collection, access, retention and incident response?	Data inventory, access controls, audit trail and incident exercises.

4. The Productivity Adjusted Charging Cost

Electricity price alone does not describe the cost of a charging event where time has operational value. A fleet vehicle, tradesperson, regional traveller or emergency service may incur a detour, queue, connection process, charge dwell and re-entry delay. PACC makes those components visible. It is a scenario method, not a universal claim about the duration of EV charging. [Author recommendation informed by external research: E1-E3.]

Figure 3 - PACC measures the full mobility interruption associated with a charging event. Author-developed infographic.

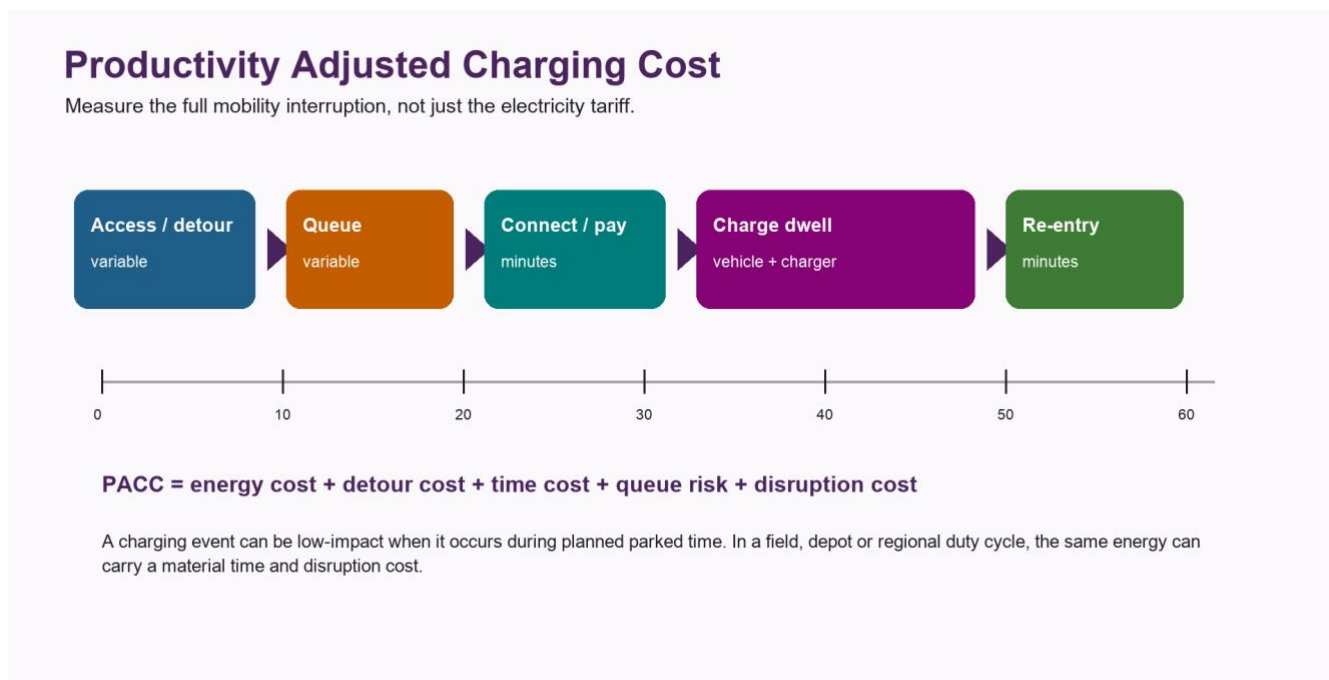


Table 4 - PACC components

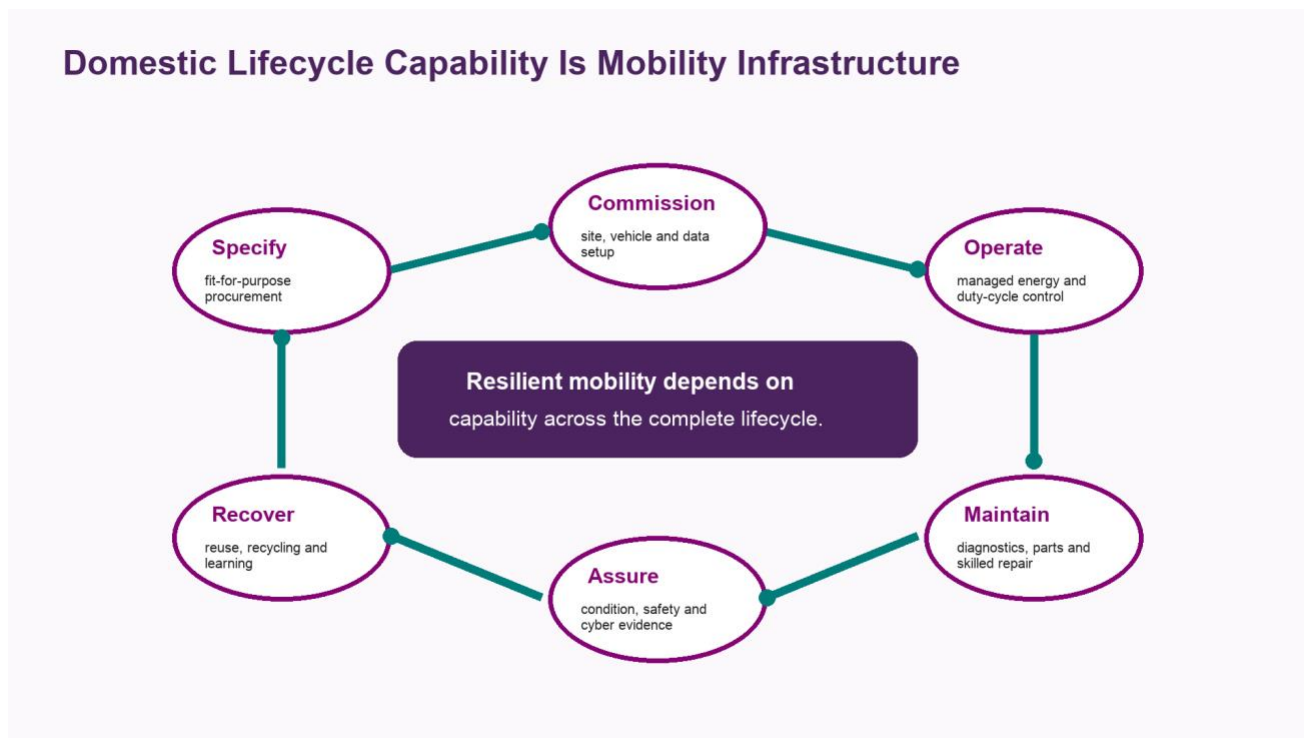
Component	What to record	Why it matters
Energy cost	Tariff, energy delivered, fees and any demand exposure.	Remains an important component, but not the only one.
Access and detour	Distance, travel time and route disruption.	Can be material for mobile or regional duty cycles.
Queue connection and	Wait time, payment or authentication failure, connection attempts.	Converts nominal access into lived availability.
Charge dwell	Time connected and usable energy delivered.	Must be read with vehicle, charger, state-of-charge and thermal context.
Re-entry disruption and	Return to work, missed task, service-level or safety impact.	Connects charging design to productivity and resilience.

Illustrative interpretation. An overnight depot charge within normal parked time may have little productivity penalty. An unscheduled public charge during a field task may create a material time cost even if the electricity price is low. The correct answer depends on the measured duty cycle.

5. Domestic Lifecycle Capability Is Infrastructure

A charger, battery or connected vehicle has little enduring value if it cannot be specified, commissioned, diagnosed, repaired, updated, secured, recovered and improved in the Australian operating context. Lifecycle capability is therefore not a secondary industrial-policy topic. It is part of mobility reliability. [Source-derived: S3; Author recommendation.]

Figure 4 - Mobility resilience relies on local capability across the complete asset lifecycle. Author-developed infographic.



For the used-vehicle market, battery state-of-health information is important only when its method, uncertainty, data provenance and intended use are clear. A condition estimate should not be presented as a warranty, safety certification or universal prediction of remaining life. It should support a transparent decision alongside service, thermal, software, charging and repair history. [Source-derived: S1; Author recommendation.]

Table 5 - Lifecycle capability test

Capability	Practical question	Readiness evidence
Serviceability	Can a qualified local provider diagnose and repair common faults?	Training, tooling, technical-information access, parts route and escalation contact.
Condition evidence	Can buyers and operators understand relevant battery condition?	Method statement, provenance, uncertainty, limitations and intended-use statement.
Digital continuity	Can safety-critical and operational functions be maintained over time?	Software support, cyber update pathway, access control and asset configuration record.
Recovery circularity and	Is there a safe, lawful route for end-of-life, reuse or recycling?	Partner pathway, transport controls, data handling and decision criteria.

6. Global Case Studies and Transferable Lessons

The following cases are not templates for direct import. Australia has different geography, settlement patterns, energy networks, vehicle mix, market institutions and state responsibilities. Their value is in showing that adoption, network operation, infrastructure reliability, lifecycle traceability and resilience require deliberate operating arrangements. [External research: E5-E11; Author interpretation.]

Table 6 - Comparative case studies

Jurisdiction	Observed approach	Transferable lesson for Australia	Evidence
Norway	High EV uptake accompanied by sustained infrastructure and market development.	Adoption does not remove the need for continuous charging, service and user-experience improvement.	E5
Netherlands	Bidirectional charging roadmap considers coordination across vehicles, networks, markets and users.	V2X needs compatible equipment, permissions, operating rules and an equitable value proposition.	E6
California	Reliability and charger-data standards focus attention on real-world network performance.	Definitions, data availability and repair response matter alongside installed capacity.	E7
European Union	Battery regulation establishes lifecycle information and battery-passport provisions.	Condition and lifecycle transparency should be designed with data governance and proportionality.	E8
Japan	EV and battery demonstrations include disaster and energy-resilience applications.	Resilience use cases need clear duty, safety, connection and operating arrangements.	E9
South Korea	Battery industrial capability, traceability, reuse and recycling are strategic themes.	Domestic lifecycle capability can support value retention, supply resilience and technical capability.	E10-E11

The combined lesson is pragmatic: measure outcomes in operation; make service and information pathways visible; separate evidence from aspiration; and use controlled pilots to prove interfaces before scaling. [Author interpretation.]

7. Fleets as Transition Laboratories

Fleets convert an abstract transition into measurable duty cycles, charging demand, downtime, maintenance requirements, driver experience and residual-value exposure. They are therefore strong candidates for disciplined pilots, provided participation is voluntary and the governance model is clear. A fleet pilot should test an operational question, not merely demonstrate that equipment can be installed. [Source-derived: S3; Author recommendation.]

Table 7 - Minimum fleet-pilot evidence

Test area	Minimum question	Evidence produced
Duty-cycle fit	Can vehicles complete the required routes, payload and service commitments?	Route, load, weather, state-of-charge and exception evidence.
Charging productivity	Where does the charging event affect operating time or service level?	PACC components, schedule impact, dwell and recovery data.
Local energy impact	Can charging be managed within site and network constraints?	Connection data, coincident peak, control strategy and override record.
Serviceability	Can faults be resolved safely and within an acceptable time?	Diagnostic, parts, training and repair turnaround evidence.
User trust	Can drivers and managers understand status, costs and exceptions?	Feedback, incident records, communication quality and response time.

Fleet outcomes should not be generalised automatically to private vehicles or other geographies. Their purpose is to create evidence that can support better procurement, investment and policy decisions within the tested context. [Author recommendation.]

8. Data Cyber Security and Trust

Electric mobility creates data pathways among vehicles, charging equipment, payment systems, fleet platforms, service tools, energy providers and apps. Data can improve planning and fault recovery, but only if collection, access, retention, interoperability and security are governed. The existence of data is not permission to use it for unrelated purposes. [Source-derived: S1; External research: E3; Author recommendation.]

An operational evidence model should distinguish raw data, validated information, asset context, condition intelligence, risk or prognosis, recommendation, accountable work and verified outcome. Each conclusion should remain traceable to method, version, confidence, limitations and an accountable person or organisation. [Author recommendation.]

Table 8 - Trust controls for mobility data

Control area	Minimum control question	Examples of evidence
Purpose limitation	Why is the data needed and who may use it?	Data inventory, purpose statement and approved access roles.
Cyber security	How are devices, identities, updates and incidents managed?	Architecture, access controls, vulnerability management and incident exercise.
Interoperability	What must be exchanged and how is quality evaluated?	Interface specification, validation rules and exception handling.
Human accountability	Who can act on an alert or recommendation?	Named owner, decision record, escalation and verified outcome.

9. A National Mobility Readiness Roadmap

The proposed roadmap is a staged learning architecture rather than a request for a new system owner. It connects evidence, integration and accountability across existing participants. Governments may set policy and funding settings; industry may deliver vehicles, energy, charging and service; professional institutions may convene technical dialogue; and users and fleets can contribute operational evidence. [Source-derived: S2-S3; Author recommendation.]

Figure 5 - Adaptive engineering governance turns observed performance into continual improvement. Author-developed infographic.

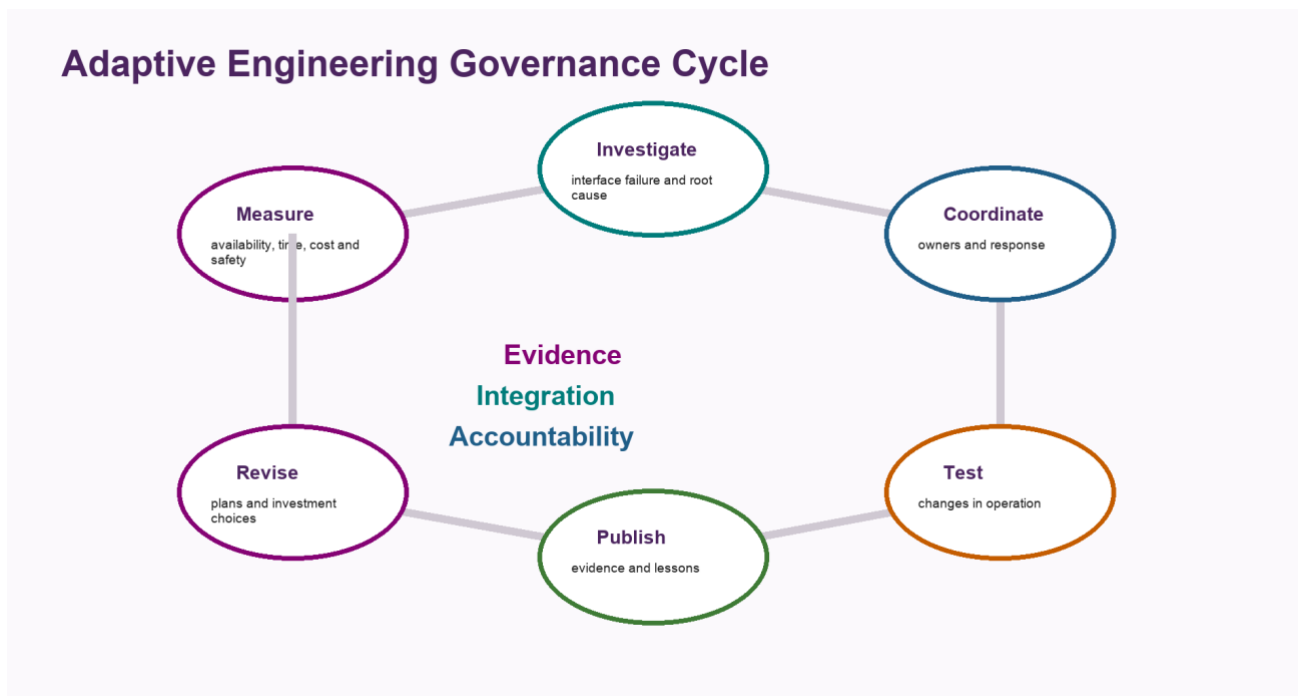


Table 9 - Illustrative roadmap

Phase	Focus	Practical outputs	Accountability emphasis
1. Establish	Common problem definition and evidence needs.	Interface map, agreed terms, priority use cases and participation boundaries.	Named owners and clear scope.
2. Measure	Operational baseline across representative environments.	Availability, PACC, serviceability, grid and user-experience evidence.	Data quality, privacy and reproducibility.
3. Test	Controlled fleet, regional, depot or service pilots.	Validated operating lessons, fault pathways and improvement actions.	Explicit pilot governance and no over-generalisation.
4. Improve	Investment, standards, procurement and capability response.	Updated guidance, business cases, skills pathways and performance measures.	Decision evidence and change control.
5. Review	Ongoing learning from operating performance.	Periodic scorecard, incidents, lessons and revised priorities.	Transparent follow-through.

10. Proposed National Mobility Readiness Scorecard

A scorecard should balance preparation measures with lived outcomes. It should not reward infrastructure counts while leaving users, fleets and service providers unable to obtain dependable outcomes. Measures must be tested with participants before use and reported with definitions, scope and limitations. [Author recommendation.]

Table 10 - Illustrative readiness measures

Domain	Illustrative measure	Why it matters
Availability	Defined fast-charger uptime and successful charge-attempt rate by relevant site type.	Availability is an operational outcome, not only an asset count.
Productivity	Median and tail PACC by representative duty cycle.	Makes time and disruption visible beside energy cost.
Serviceability	Time to diagnose and repair; technical-information and parts access.	Tests domestic lifecycle capability.
Grid integration	Managed-charging participation, coincident peak impact and connection lead time.	Connects vehicle adoption to local energy-system operation.
Trust	User-reported confidence, price/status clarity and fault-recovery quality.	Captures practical usability and confidence.
Resilience	Essential-mobility continuity under defined disruption scenarios.	Tests dependencies and recovery pathways.
Circularity	Condition-evidence availability and reuse/recycling pathway.	Supports value retention and responsible lifecycle planning.

11. Bounded Role for S2 Safety Systems

S2 Safety Systems is not presented as the owner of Australia's EV transition, a regulator, a policy authority, a charging operator, a standards body or a substitute for OEM, network, fleet, government or professional responsibilities. Its potential contribution is narrower: Australian engineering work that can make asset condition, maintenance evidence, operational events and human decision pathways more visible and governable. [Source-derived: S3; Author recommendation.]

Table 11 - Potential S2 contribution and boundary

Potential contribution	Boundary
Asset and operational evidence	Requires validated inputs, agreed data rights, cyber controls and accountable human review.
Condition and maintenance intelligence	Is not a safety certification, regulatory determination or substitute for competent inspection.
Fleet learning and reporting	Only where participants agree use cases, privacy, procurement and commercial controls.
Interface analysis	Does not claim integration with every vehicle, charger, network or platform without specific evidence and agreement.
Governed decision support	S2-AI is governed decision support and does not replace accountable engineering judgement.

Within the S2 architecture, S2-BRAIN™ is the embedded operational intelligence layer; S2-AIM™ is governed asset intelligence; S2-INTEL™ is the operational intelligence platform; and S2-AI is governed decision support. These labels describe an architecture, not an assurance claim. Any real deployment requires a defined use case, evidence model, validation, privacy assessment, cyber controls and accountable owners. [Source-derived: S3; Author recommendation.]

12. Conclusion

EV technology is advancing quickly. The enduring question is whether the surrounding mobility system can provide dependable outcomes for people, fleets, businesses and communities. Australia does not need a single system owner. It needs distributed responsibilities joined by explicit interfaces, measurable performance, resilient lifecycle capability and an adaptive learning cycle. [Source-derived: S1-S3; Author recommendation.]

A system that is ready to sell but not ready to support will create friction, uncertainty and value loss. A system that measures its outcomes, learns from interface failure and invests in capability can build the trust required for adoption at scale. The next stage is not simply more vehicles or more plugs. It is stronger engineering accountability for the mobility system that connects them. [Author recommendation.]

Appendix A. Integrated Decision Canvas

Use this canvas before a material EV deployment, pilot, site investment or program decision. It is an advisory guide, not a regulated assurance tool. [Author recommendation.]

Table A1 - Integrated decision canvas

Question	Evidence to seek	Accountable decision
What outcome is required?	Duty cycle, users, location, service level, resilience needs and scope boundary.	Sponsor confirms intended outcome and decision criteria.
What interfaces create risk?	Vehicle, charging, energy, service, data, finance and user dependencies.	Named owners agree interface responsibilities and escalation.
What must be measured?	Availability, PACC, serviceability, local energy impact, trust and lifecycle evidence.	Data owner confirms quality, access and privacy controls.
What happens when it fails?	Fault recovery, customer communication, repair, operational contingency and lessons learned.	Operating owner validates recovery path and review trigger.
What would justify scale?	Pilot results, limitations, repeatability, capability and economic sensitivity.	Decision authority records evidence and conditions for expansion.

Appendix B. Glossary of Terms and Definitions

Table B1 - Glossary

Term	Definition
Battery passport	A digital record associated with a battery that can carry model and battery-specific information. The EU Battery Regulation provides one regulatory example.
Charging event	The full elapsed mobility interruption: access, detour, queue, connection/payment, charge dwell and re-entry.
Charge-point operator	An entity that operates charging equipment and associated services.
Domestic lifecycle capability	Practical domestic capacity to specify, maintain, diagnose, repair, update, secure, recover and improve mobility-system assets.
EVSE	Electric Vehicle Supply Equipment: equipment that supplies electricity to a vehicle, commonly called charging equipment.
Mobility resilience	Capacity to maintain safe, affordable and dependable mobility under normal and disrupted conditions.
PACC	Productivity Adjusted Charging Cost: a scenario method that adds time, access, queue and disruption exposure to energy cost.
State of health	An estimate of a battery condition relative to a reference condition. Method, uncertainty, data provenance and intended use should be clear.
Successful charge-attempt rate	The proportion of charge attempts that meet a defined successful-session criterion; distinct from equipment uptime.
Uptime	A defined measure of equipment availability. Its definitions and exclusions must be stated; uptime alone may not capture failed charge sessions.
V2G / V2H / V2L	Vehicle-to-grid, vehicle-to-home and vehicle-to-load energy uses. Deployment depends on compatible equipment, approvals, operating rules and user value.

Appendix C. List of Reputable References

Source material supplied for the integrated publication

Table C1 - References

ID	Reference
S1	Cueva Pérez, T. A. (2026). EVs Are Ready. The System Is Not. TCP-EV-Syst V1.1, supplied source document, 20 July 2026.
S2	Cueva Pérez, T. A. (2026). Establishment of a National Forum for Automotive and Future Mobility Engineering. Engineers Australia Board Paper, supplied source document, 28 July 2026.
S3	Lee, H. W. (2026). Email contribution on EV system accountability, mobility security and domestic lifecycle capability, supplied source material, 2 September 2026.
E1	Department of Climate Change, Energy, the Environment and Water. National Electric Vehicle Strategy. https://www.dcceew.gov.au/energy/transport/national-electric-vehicle-strategy (accessed 5 September 2026).
E2	Department of Climate Change, Energy, the Environment and Water. Driving the Nation Fund and DRIVEN Program. https://www.dcceew.gov.au/energy/transport/driving-the-nation-fund (accessed 5 September 2026).
E3	Australian Energy Market Operator. Electric Vehicle Data Availability Taskforce and Electric Vehicle Data Recommendations. https://www.aemo.com.au/consultations/industry-forums-and-working-groups/list-of-industry-forums-and-working-groups/deip-ev-taskforce (accessed 5 September 2026).
E4	Department of Industry, Science and Resources. National Battery Strategy. https://www.industry.gov.au/publications/national-battery-strategy (accessed 5 September 2026).
E5	Statistics Norway. Registered vehicles / electric-car statistics, 2025. https://www.ssb.no/en/transport-og-reiseliv/landtransport/statistikk/bilparken (accessed 5 September 2026).
E6	Government of the Netherlands. National Roadmap for Bidirectional Charging. https://www.government.nl/documents/2026/06/22/national-roadmap-for-bidirectional-charging (accessed 5 September 2026).
E7	California Energy Commission. EV Charger Data and Reliability Standards. https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/ev-charger-data-and-reliability-standards (accessed 5 September 2026).
E8	European Union. Regulation (EU) 2023/1542 concerning batteries and waste batteries, Article 77. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32023R1542 (accessed 5 September 2026).
E9	Ministry of the Environment, Japan. Sector Coupling Demonstration Project for EVs and replaceable batteries / renewable energy. https://www.env.go.jp/en/headline/2539.html (accessed 5 September 2026).
E10	International Energy Agency. Global EV Outlook 2025 - Electric vehicle batteries. https://www.iea.org/reports/global-ev-outlook-2025/electric-vehicle-batteries (accessed 5 September 2026).

ID	Reference
E11	International Energy Agency. Global EV Outlook 2026. https://www.iea.org/reports/global-ev-outlook-2026 (accessed 5 September 2026).
Reference boundary. External sources are cited for context and comparative learning. Their inclusion does not imply endorsement, partnership, certification, policy adoption, performance equivalence or approval by the cited organisations.	