The future of batteries - sustainability and investment trends

Michael Robinson

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Cyan Ventures

“Big Bet” project development and advisory to accelerate and broaden the transition to a net zero, nature positive future

Our mission

Accelerating and broadening the transition to a low carbon, green economy. We aim to make 20 years progress on the sustainability transition in less than 10 years.

What we do

Cyan Ventures is a specialist sustainability project development and advisory firm. We build and advise on the businesses and projects that will accelerate the shift to a green, low carbon economy.

How do we do it

Our focus. Using our proprietary research, we look beyond the current focus areas of the sustainability transition to look at technologies and business opportunities receiving less focus.

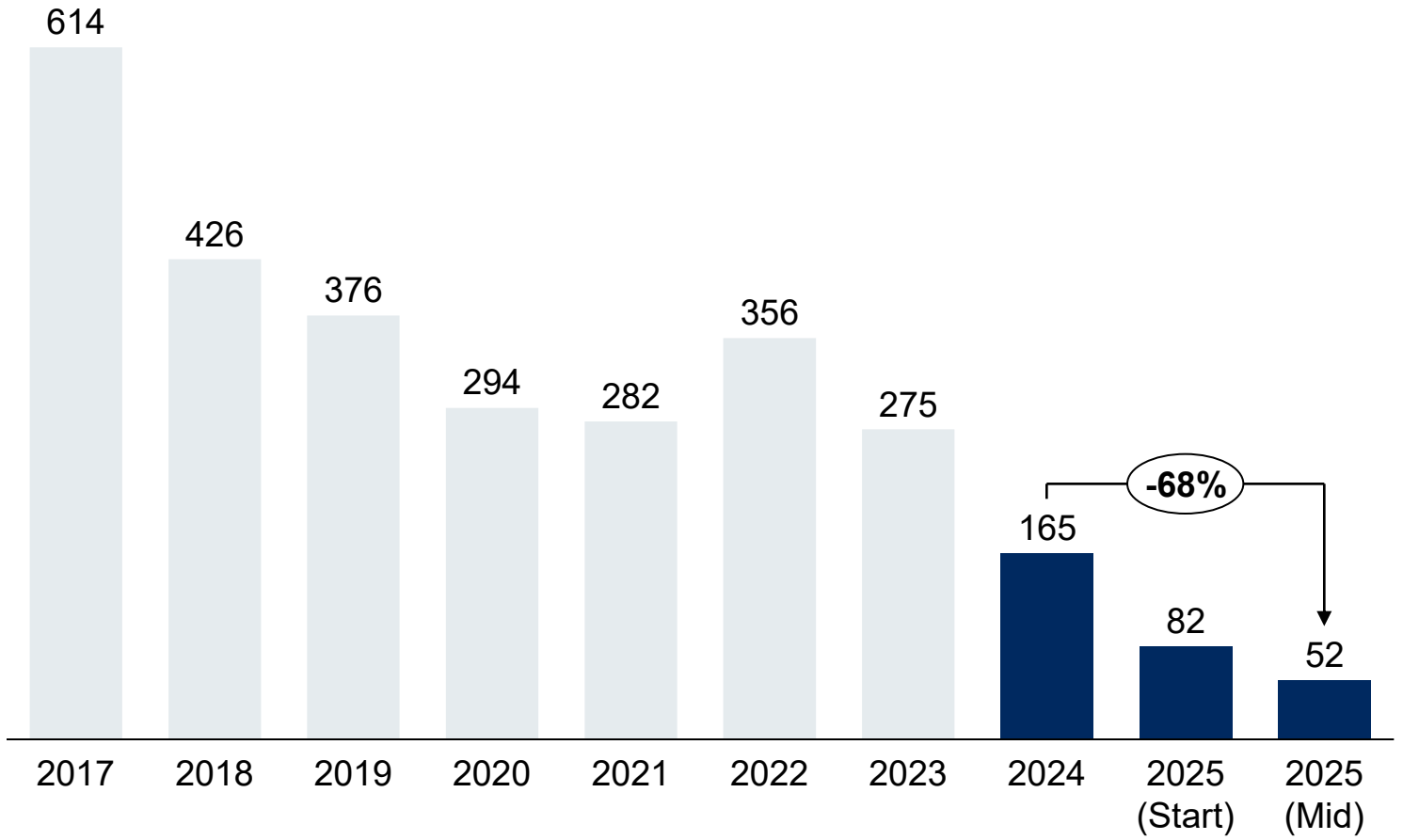
Our approach. We can’t accelerate progress on these sustainability opportunities with a typical engineering team approach. There are often multiple market failures, gaps in supply chains, unclear price signals, etc. Tackling these challenges requires an inter-disciplinary team of leading strategists, project developers, and researchers

Cyan Ventures has worked across the industry value chain on storage

	New climate markets	Energy system transition
Our focus areas:	▪ Identifying where Australia has competitive advantages in new climate technologies that could underpin future markets (e.g., green iron, polysilicon, green hydrogen). ▪ Unlocking investment in emerging climate tech through research on funding trends, risks, and innovation pathways. ▪ Helping clients navigate and shape the rules in new markets (e.g., market mechanisms, climate risk disclosure). ▪ Exploring the implications of border carbon adjustments and climate-related trade policy. ▪ Building coalitions to align stakeholders on standards, goals, and credibility in climate markets.	▪ Strategic support for grid-scale battery, solar, and transmission deployment aligned with decarbonisation goals. ▪ Evaluating investment and policy opportunities in new energy infrastructure (e.g., distributed energy resources, battery connections). ▪ Assessing cost and regulatory dynamics of transmission development. ▪ Supporting fit-for-purpose governance, regulatory design, and market integration.
Example projects:	▪ Identifying investment opportunities for Australia in the battery manufacturing space. ▪ Measuring impact and accelerating commercialisation for scale-ups in the Clean Energy and Recycling Trailblazer (TRaCE).	▪ Identification of strategic areas of focus for NSW across the battery value chain. ▪ Process evaluation of Renewable Energy Zones (REZ). ▪ Evaluation of programs aimed at battery project acceleration.

Battery prices have collapsed – and scale is surging

Historical prices for turnkey energy storage systems
Real 2025 $/kWh, usable



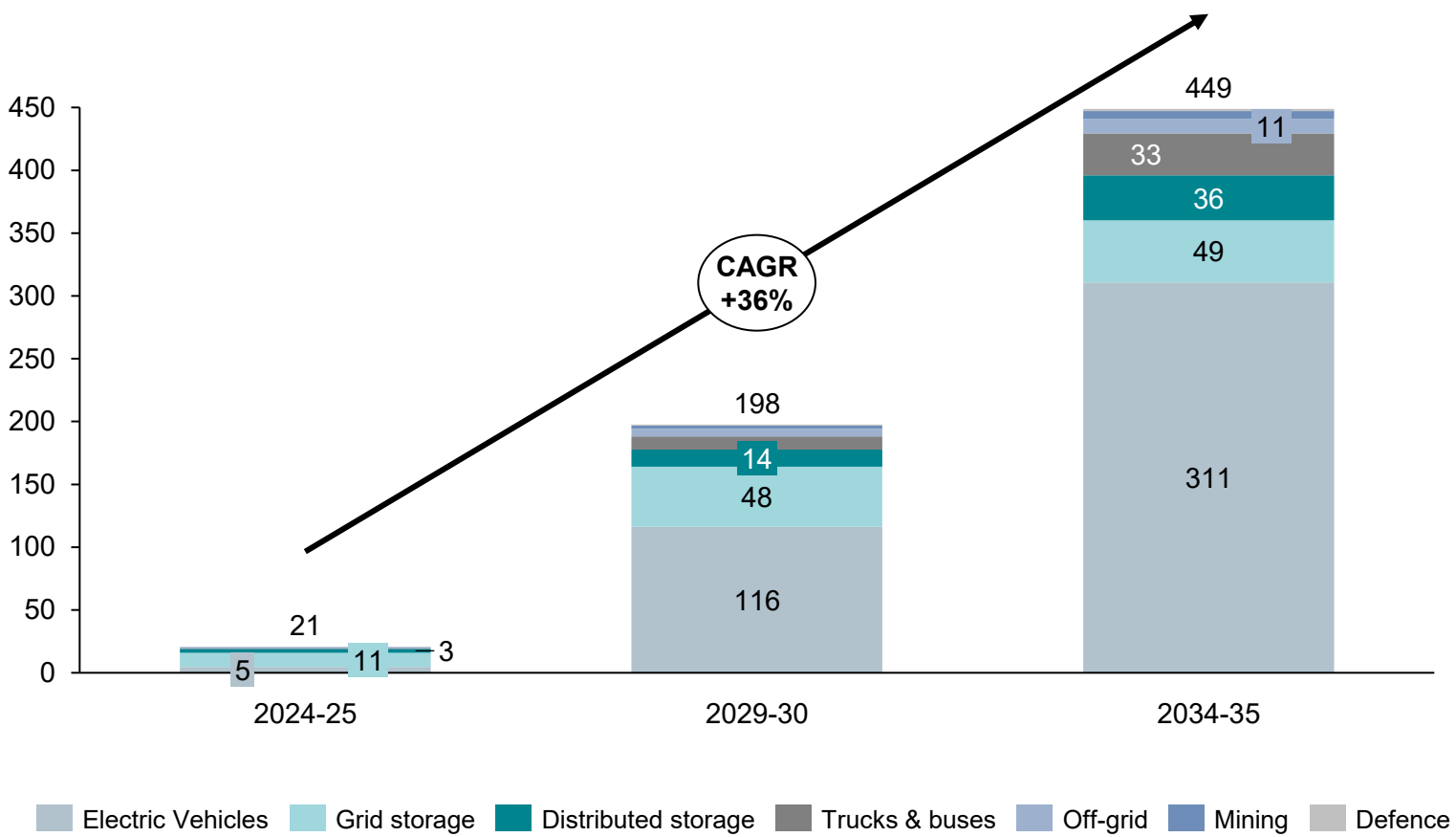
Key Drivers

- **Raw material price collapse**
- **Manufacturing overcapacity**
- **Technology shift and scale**

Source: BloombergNEF; Power China (2025)

Australia’s battery demand is set to take off — across mobility and energy

Australia’s cumulative battery storage demand from 2025-2035
GWh, 2025-2035



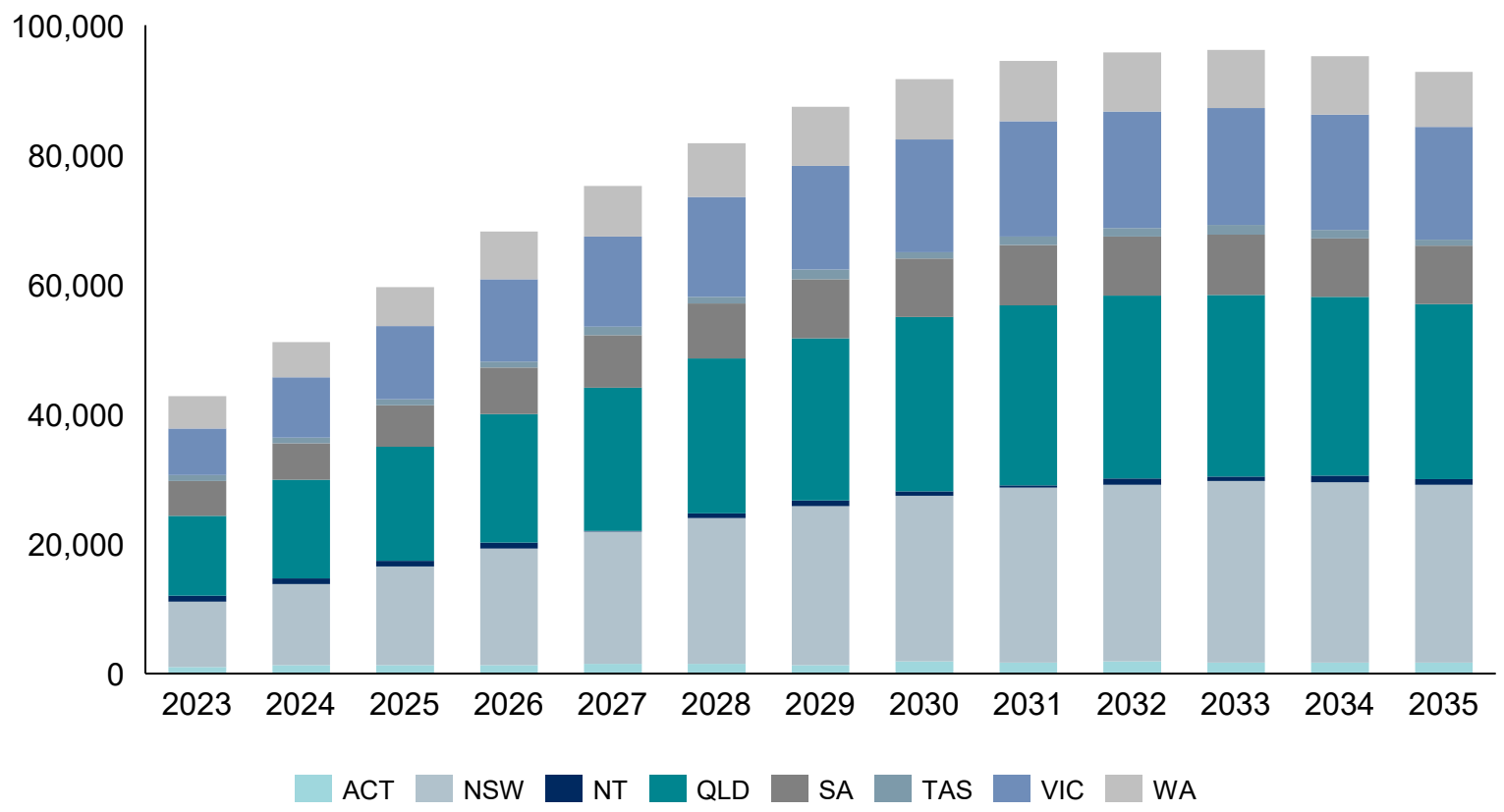
Key growth drivers

- **EV batteries**
- **Distributed storage**
- The recent **Cheaper Home Batteries program**

Sources: AEMO ISP (2024) Step Change Scenario; Clean Energy Regulator (2024), Liimatainen et al (2019); Wood Mackenzie (2022); Renew Economy (2022); Energy Storage News (2022); SolarRun (2022); Renew Economy (2022); NSW Zero Emissions Buses (2022) ; Department of Defence (2024); Geoscience Australia (2024); Expert interviews

Solar’s early recycling challenge offers a warning and a blueprint

Annual PV waste in tonnes in each state and territory in Australia
Annual PV waste (tonnes)



Key learnings from solar industry for battery recycling

- **Early retirement likely**
- **Waste volumes will grow sharply by early 2030s**
- **Urban waste concentration**

Sources: ACAP (2024)

We’re approaching the tipping point for the battery industry — where scale reshapes industry economics and drivers

FROM	TO
Hypergrowth focused on cost and capacity	Strategic procurement rewards performance and design
Product fragmentation and chemistry complexity	Interoperable, standardised chemistry, plug-and-play battery systems
Hardware driven business models	Shift toward integration and bundled services
Light-touch regulation, fragmented state action	Policy as an enabler and shaper

A circular approach to battery design in Australia looks fundamentally different from the one we have in 4 ways

Key differences	Current design	Optimised design
Disassembly and maintenance complexity	• Uses adhesives, complex enclosures, and fasteners that make batteries difficult, slow, and dangerous to disassemble.	• Batteries designed for modularity and easy access to enable safer disassembly, cell replacement, and longer product life.
Material selection and durability	• Employs diverse, often incompatible materials that are difficult to recycle and may degrade faster under stress.	• Prioritises recyclable, robust materials to improve recovery rates and battery longevity by reducing corrosion and chemical degradation.
Thermal and safety architecture	• Lacks effective thermal containment or spacing, increasing fire risks and degrading cells over time.	• Introduces better thermal architecture, cell spacing, and protective barriers to reduce thermal runaway — boosting cycle life, operational safety, and transportability for second-life or recycling.
Information transparency and traceability	• Provides little to no information on internal composition or degradation, complicating diagnostics and reuse.	• Includes battery passports or digital IDs that provide chemistry, usage, and degradation data — enabling performance forecasting, better sorting, and more efficient second-life or recycling decisions.

This could unlock large value, increasing recovery value by 75%, reducing recycling costs by 25% and saving ~7.5% of life cycle costs

Life cycle breakdown for traditional and optimised lithium-ion battery design
(USD/kWh)

Cost component	Traditional design	Optimised design	Percentage difference (%)
Production cost	100	120	**20%**
Operational cost	50	45	**-10%**
Maintenance cost	30	25	**-16%**
Recycling cost	40	30	**-25%**
Material recovery value	-20	-35	**75%**
Total Life cycle cost	**200**	**185**	**-7.5%**

Sources: Chen et al (2025)

Making a circular battery industry happen requires action in 4 key areas and there are valuable lessons from abroad

Focus Area	Key Actions	International Lessons
Smart product stewardship	• Legislate mandatory EPR schemes for all battery types and participants. • Create a central recycling fund to ensure fair access to logistics, recycling, and education.	
Commercial viability and market incentives	• Internalise reverse logistics costs through producer levies. • Use eco-modulated fees to reward recyclable, reusable, or low-cost-to-process battery designs. • Create long-term market certainty through offtake contracts and cross-subsidisation.	
Technology and safety readiness	• Invest in scalable, low-emissions tech like hydrometallurgical plants. • Fund R&D for disassembly automation, new chemistries, and safe logistics. • Introduce enforceable targets and protocols for fire risk and recovery rates.	
System-wide coordination and infrastructure	• Build national drop-off networks and regional processing hubs. • Establish a strong, independent PRO with funding authority and collection accountability. • Begin with the easiest 50% of battery flows to lower cost and accelerate rollout.	

Key takeaways

- Australia and the states and territories must act now to scale a coordinated, commercially viable battery recycling system before the coming wave of end-of-life batteries overwhelms existing infrastructure.

- Success hinges on four enablers: smart stewardship, commercial viability and market incentives, advanced technology and safety, and integrated national infrastructure — all designed to support a circular, self-sustaining industry.

- Shifting to lifecycle thinking — from design through to disposal — will unlock economic, environmental, and supply chain benefits, re-positioning Australia as a global innovator in battery circularity.