



MAINSTREAM

The Impact of **DECARBONISATION** on the Asset Manager

A sentiment report on how decarbonisation and the energy transition are reshaping the roles, challenges, and opportunities for Maintenance, Reliability, and Asset Management leaders across Australia's asset-intensive industries.

Research
Partner





About MAINSTREAM

For 30 years the MAINSTREAM research team has engaged with Maintenance, Reliability and Asset Management leaders and their teams to understand their challenges, pain points and the opportunities which exist as they work towards achieving asset management excellence and improving overall business performance.

These findings enable leaders, teams and individuals to understand best practices, compare their companies' performance and working environment to those inside and outside their industry, and make informed and effective decisions.

This is MAINSTREAM's second annual decarbonisation sentiment report. Where our 2024 report established the baseline – asking the profession to name what it feared, what it hoped for, and what it did not yet understand – this 2026 edition tracks what has changed, what has not, and where the most consequential gaps remain.

About This Report

Decarbonisation is a pivotal force reshaping how asset-intensive companies operate. For the second time, we have chosen to compile a Sentiment Report rather than a traditional research paper. This decision reflects our conviction that the most valuable insights in this space do not come from modelling exercises or macroeconomic projections – they come from the people responsible for executing the transition on the ground.

This report captures the immediate, candid reactions of Maintenance, Reliability and Asset Managers who are at the forefront of this transformation – what they are experiencing in their operations, how their teams are responding emotionally and practically, and where the gaps between strategy and reality are widest.

In 2026 we have also drawn on a wider range of external research than in 2024. The findings of CSIRO, Engineers Australia, the Energy Transitions Commission, the Powering Skills Organisation, and others are woven through this report to provide context for what our respondents are experiencing, and to show how their lived reality maps against the national picture.

The result is a report that speaks both inward – into the operations, workshops and planning offices of Australia’s major industrial organisations – and outward, to the broader forces shaping the landscape these professionals navigate every day.



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Australia's National Climate Commitments – The Policy Context

To understand what is being asked of Australia's asset-intensive industries, it helps to understand what Australia has committed to as a nation.

Australia's climate commitments are anchored in the Climate Change Act 2022 – landmark legislation that, for the first time in the country's history, enshrined emissions reduction targets into law. The Act establishes two legislated targets –

- A 43% reduction in greenhouse gas emissions below 2005 levels by 2030
- Net zero emissions by 2050

In September 2025, the Australian Government submitted its updated Nationally Determined Contribution (NDC) under the Paris Agreement, adding a third commitment – a reduction of 62–70% below 2005 levels by 2035. This is a significant step up – requiring Australia to more than double its annual rate of emissions reduction compared with the trajectory achieved to date.

Supporting these headline targets, the Government has set a target of 82% renewable electricity generation across Australia's major grids by 2030 – up from approximately 43% today. This requires one of the fastest electricity system transformations in the world. As Australia's current emissions projections show, the 2030 target is achievable on a budget basis – but the 2031–35 period will demand a pace of change that current policies alone will not deliver.

The Safeguard Mechanism, reformed in 2023, is the primary policy instrument for reducing

industrial emissions. It covers approximately 220 large industrial facilities emitting more than 100,000 tonnes of CO₂-equivalent per year – around 31% of Australia's total national emissions. Each facility's emissions baseline declines by 4.9% per year to 2030, and the mechanism imposes financial penalties for exceeding those baselines. This creates a direct, quantified financial link between day-to-day operational decisions and national climate compliance.

What This Means for Asset-Intensive Industries

Australia's largest emitting sectors are not bystanders to this national commitment. They are the mechanism through which it is delivered.

Mining, oil and gas, manufacturing, energy generation, rail, water, and heavy industrial processing collectively account for the majority of Australia's industrial emissions. These are the sectors in which our 304 survey respondents work every day. Their operational decisions – which assets to upgrade, which equipment to replace, when to accelerate decommissioning, how to source and manage energy, which spare parts and materials to procure – are not peripheral to Australia's climate commitments. They are their substance.

The 43% target by 2030 is four years away. Safeguard Mechanism baselines are already



tightening annually. The 82% renewable electricity target is reshaping the energy inputs these industries rely on. And the 2035 target, requiring a 62–70% reduction from 2005 levels, will demand industrial emissions to fall at a rate the sector has never previously attempted.

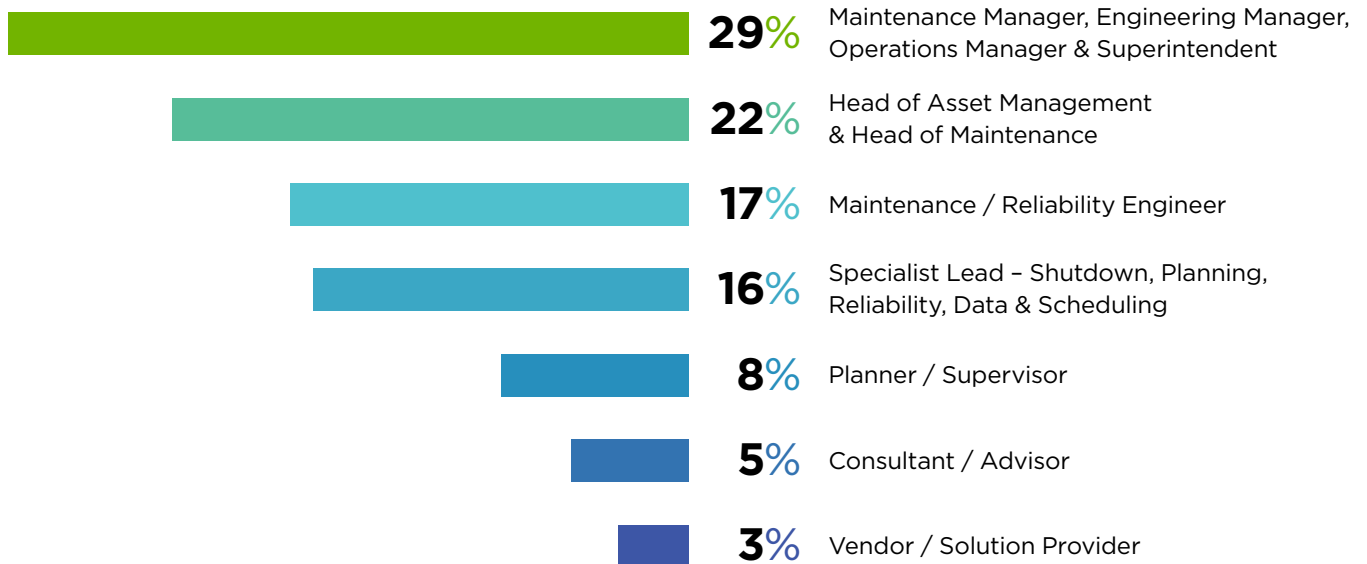
At the same time, these industries are being asked to manage and maintain the infrastructure of the transition itself – solar farms, wind turbines, battery storage systems, electrified haulage fleets, and green hydrogen facilities – alongside the legacy equipment that will remain

operational throughout the transition period. The workforce implications, the skills demand, and the asset management complexity this creates are the subject of this report.

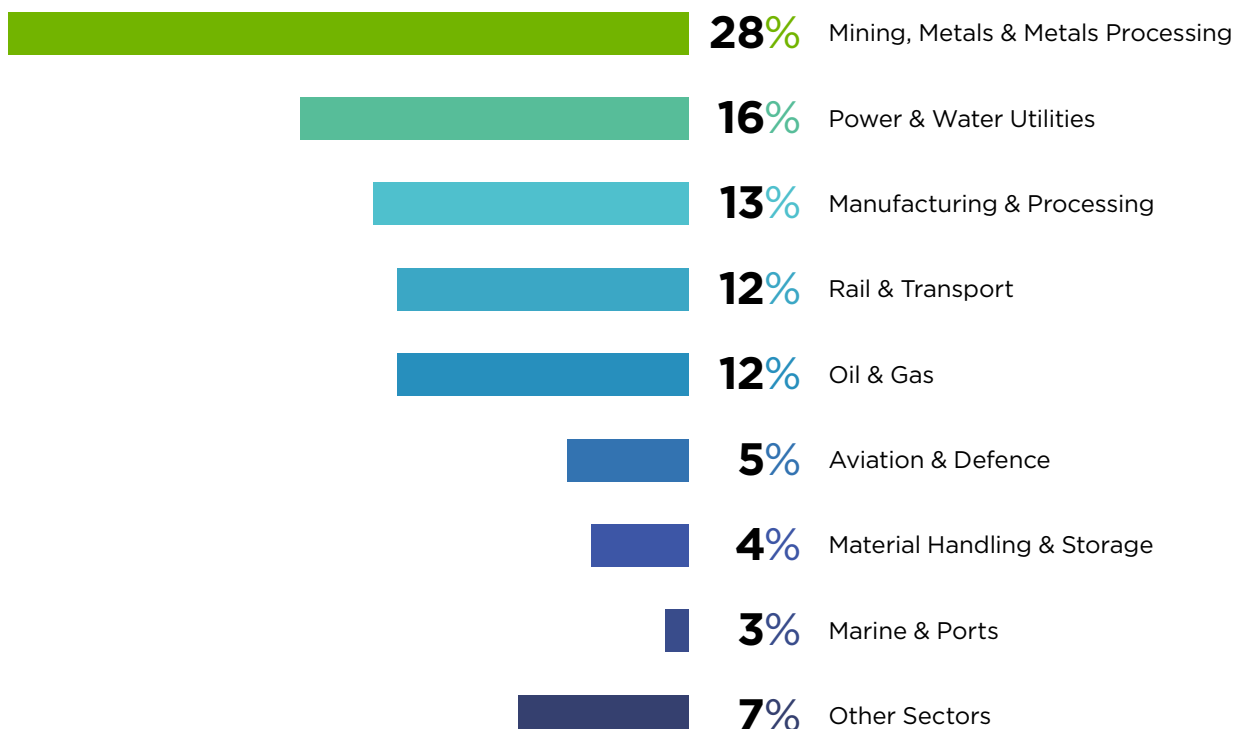
The central question is not whether the transition is coming. The legislation, the baselines, and the global capital flows that underpin it have settled that question. The question this report addresses is whether Australia's maintenance and reliability profession – the people who will execute this transition at the asset level – have what they need to deliver it.

Participant Profile

Please select the option that best describes your role and responsibility.



Industries Represented



Companies Represented

Participants represent a range of industries, asset management maturity levels, and organisation sizes –

Adelaide Airport	Hatch
AGIG	Icon Water
AGL Energy Limited	Incitec
AGL Hydro	James Hardie
Alcoa	MACA
Anglo American	Marathon Food Industries
AngloGold Ashanti	Melbourne Airport
Aquip Systems	Melbourne Water
Aurizon	Mercury NZ
AusNet	Metro Trains Melbourne
Australia Post	New Zealand Steel
BAE Systems Australia	Newmont
Beach Energy	Origin Energy
Bega Cheese	Port of Melbourne
BHP	Public Transport Authority WA
BlueScope	Queensland Rail
Boral	RCR Tomlinson
Bowen Rail Company	Rio Tinto
CBH Group	RPMGlobal
Contact Energy (NZ)	Santos
CS Energy	Seqwater
Cyient	Siemens
Domaine Chandon	South32
DP World	Southern Ports
ElectraNet	Streamlined Asset Management
Enco Group	Sydney Water
Enerven	Synergy
Evoenergy	Territory Generation
Evolution Mining	Thiess
Evora Group	UGL
Fortescue	Ventia
Genesis Energy NZ	Visy Paper
George Weston Foods	Water Corporation
Gladstone Ports Authority	Western Power
Glencore	Wilmar Sugar & Renewables
Graymont	Woodside Energy
Hancock Iron Ore	Worley

The Authors

Survey content was designed and written by the MAINSTREAM research team. The outcomes and sentiment report has been entirely correlated, interpreted and presented by the MAINSTREAM research team.

We wish to thank the many organisations and individuals who participated in this research, and those who gave their time to one-on-one conversations that informed the framing of this report.

We also thank Certus Digital for their sponsorship and commitment to supporting maintenance, reliability, and asset management professionals.

References and Research Sources

The external research referenced throughout this report is drawn entirely from publicly available reports, data, and statements by the following organisations. All citations appear in the body of the report at the point of use.

- Engineers Australia – Making a Clean Transition – Adapting Engineering Talent for a Sustainable Future (2024); Engineers Key to Powering Australia’s Net Zero Infrastructure Workforce, media release (August 2025)
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- Infrastructure Net Zero (INZ) Coalition – Delivering Net Zero Infrastructure – Workforce Report (2025)

DECARBONISATION STARTS WITH BETTER ASSET DECISIONS

TURN DECARBONISATION TARGETS INTO ACTION

The transition is changing what organisations maintain, invest in and retire. Certus Digital helps asset-intensive organisations bring together asset data, performance and investment planning to make better decisions across the asset lifecycle.

- ✓ Get more value from the assets you already have
- ✓ Connect asset data to better investment decisions
- ✓ Prioritise where to invest, modernise or retire



WHAT SHOULD YOU INVEST IN NEXT?

Talk to Certus about turning your asset priorities into an actionable roadmap.

→ **START THE CONVERSATION**

Report Highlights

70+

304 professionals from more than 70 organisations across nine industry sectors participated in this report.

6+

More than six in ten respondents say their teams lack the operational understanding needed to act on the transition effectively.

69%

Budget and cost pressure is the top challenge, cited by 69% of respondents. Integrating new technologies with existing assets is second at 65%.

41%

41% describe their team as cautiously optimistic. 46% describe them as uncertain, anxious, resistant, or disengaged.

9%

Only 9% have fully deployed digital twins or IoT analytics for decarbonisation monitoring. 36% have no plans to do so.

60k

Engineers Australia is calling for 60,000 additional engineer graduates by 2035 to meet net-zero transition demands.

89%

89% of engineers in infrastructure are already engaged in emissions-reduction activities. (Engineers Australia, 2025)

1/5

One in five experienced maintenance professionals does not know whether their organisation has made any public climate commitment.

3.26

The average team understanding score for what decarbonisation means in day-to-day operations is 3.26 out of 5.

#1

Data analytics and predictive maintenance is the most critical new skill, ranked number one by 33% of respondents.

#3

Change management and cross-functional collaboration has risen from seventh place in 2024 to third in 2026.

2.89

The average external contractor readiness score is 2.89 out of 5. The workforce most often deployed for major maintenance is the least prepared.

42k

Australia faces a projected shortfall of 42,000 qualified energy trades workers by 2030. (Powering Skills Organisation, 2025)

65%

65% of respondent organisations have publicly committed to net-zero or emissions reduction targets, up from 58.2% in 2024.

2030

The profession is open to the transition. What it needs is clearer communication, earlier involvement in planning, and practical investment in capability.

Voices from the Field

As part of this research we asked participants a single open question:

“Forget the strategy documents and the press releases. As a maintenance and reliability professional, what’s the one thing about managing this transition that you wish more people understood?”

These are twenty of the responses we received, presented verbatim.

**Maintenance Supervisor,
Iron Ore**

“I’ve got 22 years maintaining diesel haul trucks. They’re telling me in three years we’re going battery-electric. I don’t even know what I don’t know yet, and nobody’s given me a training plan.”

**Maintenance Manager,
Freight Rail**

“We’re replacing diesel locomotives with electric. Great. But our maintenance facilities were built for diesel. The overhead electrical infrastructure, the battery handling equipment, the safety systems for high-voltage work – none of it exists yet.”

**Head of Maintenance,
Food Processing**

“Our board set a net-zero target and put out a press release. Six months later I’m still waiting for someone to tell me which of our gas-fired assets are being replaced, when, with what, and what that means for my team.”

**Maintenance Manager,
Pulp and Paper**

“I’m 47. I’ve been a diesel fitter my whole career. Everyone keeps telling me the future is electric and that’s great for the young ones. But who’s going to retrain me? Who’s going to pay for it? What do I do in the three years between now and when the training actually exists?”

**Reliability Manager,
Coal-Fired Power Station**

"I've got some of the best thermal plant engineers in the country on my team. In five years this station closes. There's nowhere obvious for them to go and we're losing institutional knowledge that took 30 years to build."

**Maintenance Supervisor,
Steel Manufacturing**

"The technology for green steel exists at pilot scale but not at our volumes, and the maintenance requirements are unknown."

**Asset Engineer,
Wastewater Utility**

"Our carbon reporting obligation under the Safeguard Mechanism is real but the data quality is not great. We're estimating half of it and that's not a reporting problem. It's a measurement infrastructure problem."

**Electrical Engineer,
Underground Mining**

"Now everyone wants electricians and nobody's training them fast enough. I'm actually the most valuable person on site right now and I still can't get a pay rise."

**Maintenance Superintendent,
Offshore Gas**

"We've got a decommissioning timeline that's been pulled forward by six years because of the Safeguard Mechanism."

Reliability Engineer, Rail

"The energy management systems on the new electric fleet generate ten times the data our diesel units ever did. Our reliability team is doing their best with reading sensor outputs."

**Head of Asset Management,
Ports Authority**

"We've got cranes, reach stackers and terminal tractors. The electrification roadmap says replace by 2032. I've asked several times who's funding the grid upgrades required to charge them. No answer yet."

**Maintenance Superintendent,
Road Infrastructure**

"Net zero sounds straightforward when you're in a city. I'm maintaining remote road infrastructure with diesel generators, diesel plant, and diesel everything. The nearest charging infrastructure is 400 kilometres away."

Reliability Engineer, Mining

"The failure modes on a battery-electric loader are completely different to diesel. We don't have the predictive models, we don't have the condition monitoring baselines, and we don't have OEM documentation in language our tradespeople can actually use."

Asset Manager, Gas Plant

"Our plant has seven years of operational life. Seven years ago it had twenty-five. I'm supposed to keep it fully operational and safe right up until the day it's decommissioned, with a workforce that can see the end date and is already looking for other jobs."

Maintenance Manager, Water Treatment

"We've put solar on everything we can reach and now we have intermittent power supply to treatment systems that need to run continuously. Managing that reliability gap is a new maintenance challenge nobody prepared us for."

Engineering Planner, Chemical Processing

"My spare parts strategy was built around known OEM lead times for equipment we've operated for 20 years. Now we're introducing fuel cell technology with one or two global suppliers, six-to-twelve month lead times, and no local service capability."

Maintenance Engineer, Wind Farm

"The turbines are under OEM warranty so the manufacturer controls the maintenance. We have two years to build internal capability from scratch on technology we've never owned before. It's not enough time."

Reliability Engineer, Aviation

"We've started transitioning ground support equipment to electric. The maintenance is different – battery health management, thermal monitoring, charging cycle optimisation."

Asset Manager, LNG Facility

"I've been asked to produce a carbon emissions baseline for every asset we operate. That data doesn't exist in our CMMS. It doesn't exist anywhere."

Maintenance Planner, Open Cut Mining

"Our shutdown schedule was built around diesel service intervals but none of that applies to electric. We need to rethink everything from first principles."

Two Years On – What Has Changed

In 2024 MAINSTREAM published its first decarbonisation sentiment report, engaging 228 maintenance and reliability professionals from 75 organisations. That report found a profession that was broadly aware of decarbonisation as a concept but largely unprepared for its operational implications. Strategy lived in the boardroom. The workshop had not yet received the memo.

Two years on, we returned with a more demanding set of questions. Some things have shifted. Others have barely moved. And in a few areas, the external pressure has intensified dramatically while internal readiness has inched forward only modestly. What follows is an honest reckoning with what the data shows.

Does the workforce understand what is actually expected of them?

2024 43% had a basic idea of what decarbonisation is and how it might affect their industry, but needed more information. 11.4% were only slightly familiar. The language was conceptual – awareness without operational meaning.

2026 Average team understanding score – 3.26 out of 5. 43% rate their team at 3 – aware but not operationally ready. 18% rate understanding at 1 or 2. The concepts have travelled further; the capability has not kept pace.

→ Progress is real but the gap between knowing and doing remains wide. Understanding has moved; operational readiness has not.

Has organisational strategy reached the frontline?

2024 58.2% of organisations had developed a decarbonisation strategy. 25.3% were unsure. 16.5% had no strategy.

2026 66% have now made a public commitment to net-zero or emissions reduction targets. But 19% of respondents still do not know whether their organisation has committed. One in five experienced maintenance professionals remains unaware of their company's public position.

→ More organisations are committing. The message still is not reaching the people who have to deliver on it.

Are organisations using planning tools to prioritise investment?

2024 22.2% had developed a Marginal Abatement Cost Curve (MACC). 54.4% were unsure whether one existed. 23.4% had none.

2026 Only 15% report meaningful use of a MACC – 6% fully embedded in planning, 9% using it informally. 46% remain unsure, with the remainder reporting no MACC in use. The picture has barely moved in two years.

→ One of the most persistent planning failures. Without a MACC, organisations cannot sequence investments efficiently, and risk spending heavily in the wrong order.

Is the Safeguard Mechanism understood and being managed?

2024 Only 12% confirmed their facility was directly impacted. 69.6% did not know. The mechanism was described as “not well understood” across the sector.

2026 24% now cite regulatory compliance as a primary operational challenge. Understanding of the mechanism has improved, but comprehension remains incomplete despite the 2023 reforms that tightened baselines and increased penalties.

→ The policy has been significantly strengthened since 2024. The operational consequences for maintenance and reliability functions are real – but many teams are still not connecting policy to practice.

Are leaders equipping their frontline teams to navigate the transition?

2024 20.3% described their organisation as providing strong support. 48.7% described moderate support. 22.8% said support was limited or sporadic.

2026 Average leadership support score – 3.41 out of 5. 40% rate it at 3 or below. The pattern is similar – leadership is communicating the importance of the transition without consistently translating that into practical support for those who must execute it.

→ Two years of heightened visibility have not produced two years of commensurate investment in frontline capability. The gap between boardroom commitment and operational readiness persists.

Which new skills are considered most critical?

2024 Data Analytics and Predictive Maintenance ranked #1. Change Management and Cross-Functional Collaboration ranked 7th – least important.

2026 Data Analytics and Predictive Maintenance still ranks #1, cited by 33% of respondents. Change Management and Cross-Functional Collaboration has risen from 7th to 3rd, now cited by 17% as their top priority.

→ The most significant skills shift in two years. Experienced practitioners increasingly recognise that the greatest barriers to the transition are not technical – they are organisational and human.

How are maintenance and reliability teams responding emotionally?

2024 85% described their overall sentiment as somewhere between neutral and very positive about the long-term impact of decarbonisation on their role.

2026 41% cautiously optimistic. 13% energised and engaged. 25% uncertain and anxious. 11% resistant to change. 10% disengaged – feeling the transition is remote from their day-to-day work.

→ The headline remains broadly positive. But the texture has changed. In 2024 the transition felt distant. In 2026 it is beginning to land, and anxiety is rising among those who do not yet feel prepared.

The shifts documented above occur against a backdrop of external pressure that has moved significantly since 2024. The Powering Skills



Organisation has put a number on the national workforce shortfall – 42,000 qualified energy trades workers by 2030. Engineers Australia has called for 60,000 additional engineer graduates by 2035 – a commitment it describes as essential to the net-zero transition. Australia’s offshore decommissioning liability has been quantified at \$43.6 billion. The Safeguard Mechanism’s baseline decline rates have been legislated and are now tightening every year.

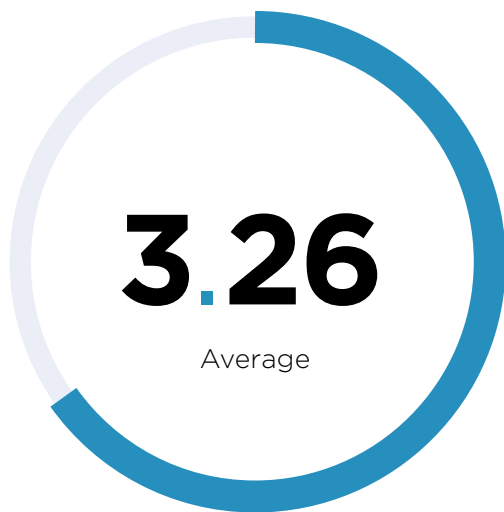
The internal readiness of Australia’s maintenance and reliability profession has improved in many dimensions. But the external pace has accelerated faster. The gap between what is being asked and what the profession is resourced and equipped to deliver has not narrowed. In some respects, it has widened.

“Australia is at a pivotal moment. We have a generational opportunity to shape a workforce that can lead the world in clean energy. Investing in our engineers and providing them with the tools to succeed will be key to a sustainable and prosperous future.”

**Bernadette Foley CPEng EngExec, Chief Engineer, Engineers Australia,
September 2024**

Understanding What Decarbonisation Means for Our Industry

We asked respondents to rate their team's understanding of what decarbonisation means for their day-to-day role on a **scale of 1 to 5**. The average score was 3.26 out of 5.



13% rated their team's understanding at 5 – genuinely equipped to act

43% rated it at 3 – aware in concept, but not operationally ready

18% rated it at 1 or 2 – very limited or essentially no operational understanding

Team understanding of decarbonisation's day-to-day implications

That number – 3.26 out of 5 – sounds moderate. It is not. It describes a profession in which more than six in ten respondents report that their teams cannot yet translate decarbonisation into the decisions, behaviours, and priorities that their day-to-day roles demand.

This is not a failure of will or interest. The dominant emotional response of maintenance teams to the transition is cautious optimism – people are not opposed to what is happening. They simply do not yet have the specific, operational understanding of what it means for their assets, their maintenance intervals, their spare parts, their safety systems, and their data.

Engineers Australia's research reinforces this picture. Its Making a Clean Transition report found that despite engineers' strong transferable skills, many lack the carbon confidence and employer support to fully drive low-emissions outcomes. Of those who graduate with an engineering qualification, around 35% do not enter the profession at all – further constraining the pipeline of technically capable workers available to the sector.

Has awareness improved since 2024? For 55% of respondents, yes – somewhat or significantly. But 37% describe no change. Three percent report decline. In an environment where the Safeguard Mechanism's baselines are tightening every year, standing still is a form of going backwards.



“Our net-zero targets are better understood by our investors and shareholders than by our maintainers and operators.”

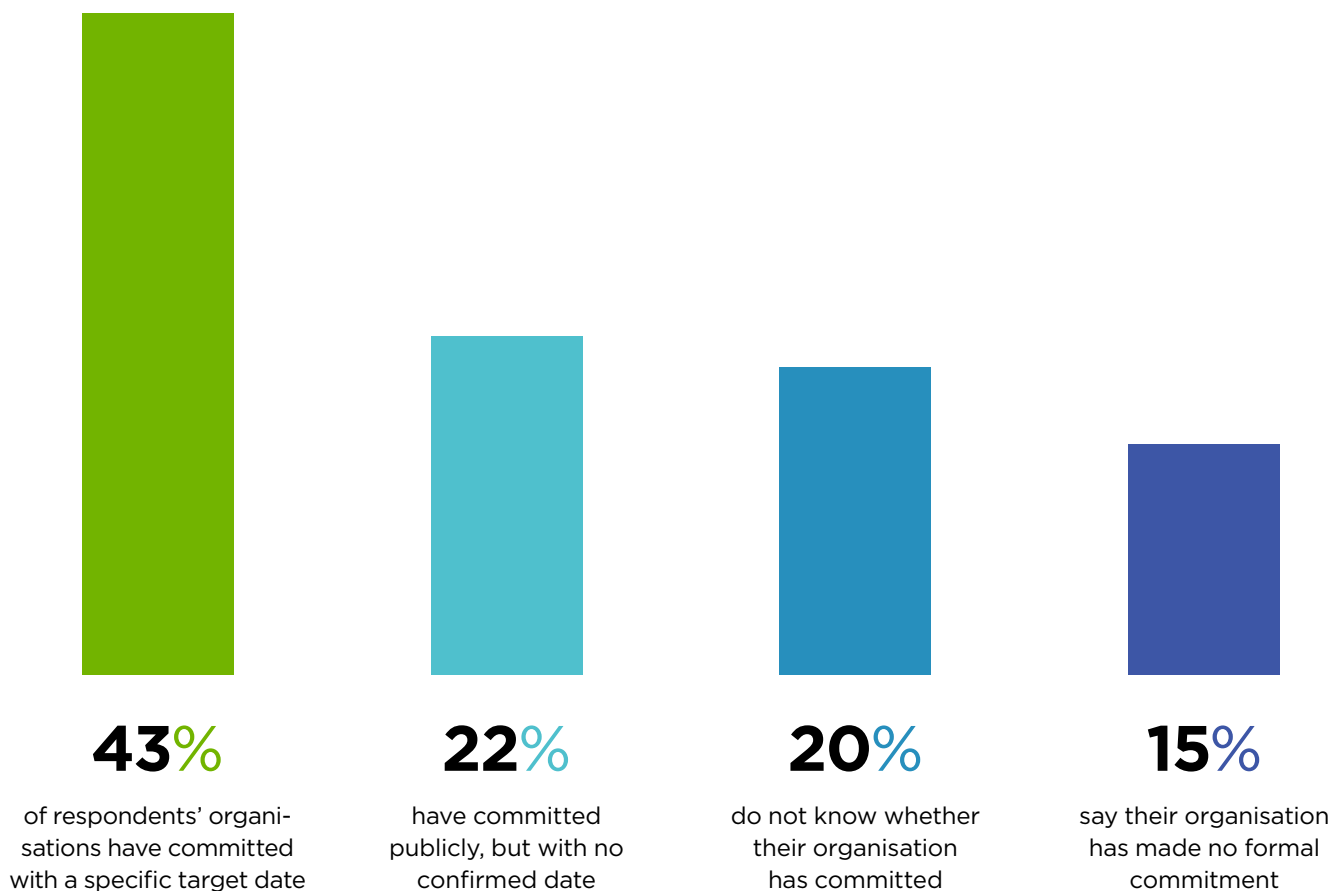
Major Projects Superintendent, Mining

Organisational Strategy and the Commitment Gap

Two thirds of respondent organisations have made a public commitment to net-zero or emissions reduction targets. That is a meaningful step forward from 2024. But the pattern beneath that headline tells a more complicated story.

One in five respondents does not know whether their organisation has publicly committed to net-zero. These are not junior employees – they are maintenance managers, engineering leads, and asset management heads. The targets their companies have announced publicly have not reached them.

This is a communication failure with direct operational consequences. Without knowing whether a commitment exists, what it covers, and what it means for the assets and teams under their management, these professionals cannot make informed planning decisions, cannot set meaningful team objectives, and cannot prepare their workforce for what is coming.



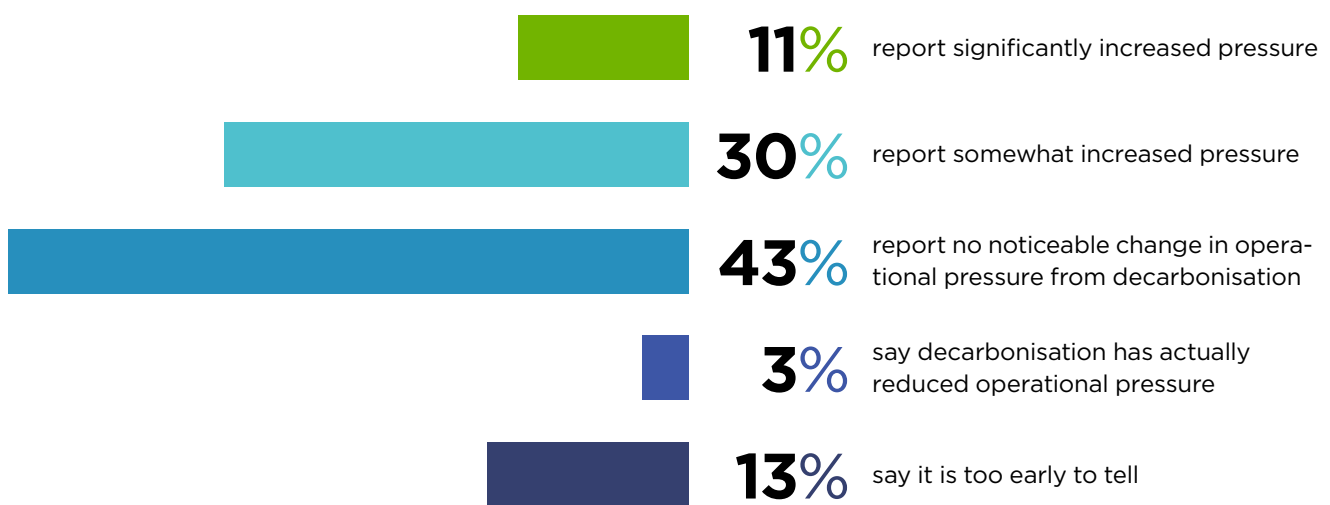


“It’s one thing to talk about sustainability and carbon reduction in boardrooms. It’s another to ensure that the people on the ground understand and are equipped to implement these changes.”

MAINSTREAM, The Impact of Decarbonisation on the Asset Manager, 2024

What Has Increased Pressure on Operations in the Last 12 Months?

We asked respondents whether decarbonisation had materially increased pressure on their maintenance and reliability operations over the past twelve months. The answer splits the profession into distinct groups with very different experiences.



The 43% reporting no noticeable change should not be read as reassurance. Many of these organisations have not yet begun meaningful operational transition – the pressure has not arrived because the work has not started. CSIRO's 2024 modelling of sectoral pathways to net-zero is clear – without accelerated action through the late 2020s, the eventual transition becomes significantly more disruptive and costly.

The 41% who report increased pressure are operating at the leading edge of what the entire industry will experience within three to five years. They are managing hybrid asset portfolios, maintaining new-technology equip-

ment with undertrained workforces, integrating energy monitoring into maintenance decision-making, and navigating accelerated decommissioning timelines. Their operational challenges today are a preview of what is coming for everyone.

The 3% who report reduced pressure are the group worth studying most carefully. These are organisations where proactive investment in energy efficiency, predictive maintenance, and data integration has paid visible operational dividends. They are showing the profession what the upside of decarbonisation looks like when it is managed well.

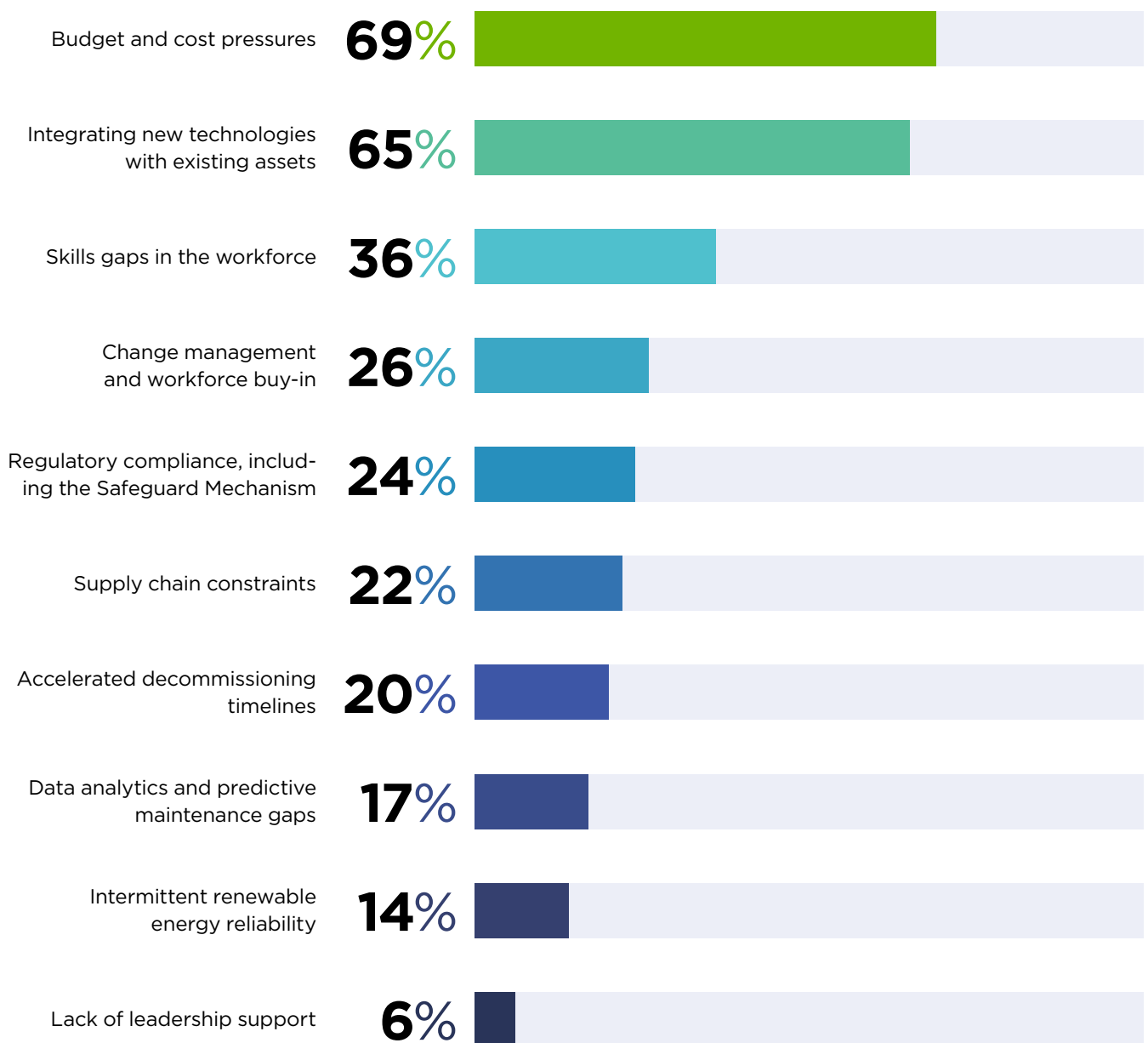


“Before we look at the future, even now there is a massive opportunity to gain efficiencies by just linking the silos between assets and environmental compliance data.”

Planning and Reliability Lead, Mining

The Biggest Operational Challenges for Asset and Maintenance Leaders

Respondents were asked to identify their top three operational challenges arising from decarbonisation. The results are direct – budget dominates, technology integration is close behind, and a third tier of challenges – skills, change management, compliance, supply chain – runs with similar intensity.



Budget and Cost Pressure

Sixty-nine percent of respondents name budget and cost pressure as their primary challenge. Most maintenance budgets were built around existing asset portfolios and their known cost structures. Decarbonisation requires additional investment in new capabilities – technology, training, monitoring systems, and in many cases new assets – without a proportionate reduction in the cost of maintaining what already exists.

The financial model has not been resolved for most organisations. The capital case for many transition investments is clear at the system level – CSIRO’s GenCost data confirms renewables backed by storage remain the lowest-cost pathway for new electricity generation – but at the asset level, in a maintenance budget, the arithmetic of transition is harder to close.

The Hybrid Asset Problem

Sixty-five percent of respondents name technology integration with existing assets as a primary challenge. This is the central operational reality of the energy transition.

The transition to a decarbonised asset base is not an event. It is a twenty-to-thirty-year

period during which most organisations will simultaneously manage legacy equipment and new low-carbon assets, each with different failure modes, different maintenance intervals, different spare parts supply chains, different safety considerations, and different data requirements.

Engineers Australia’s research confirms this complexity – engineers with experience in thermal and legacy systems are generally well-positioned to transfer their skills, but require structured pathways and employer support to do so effectively. Without that support, the hybrid period becomes a period of elevated risk.

Accelerated Decommissioning

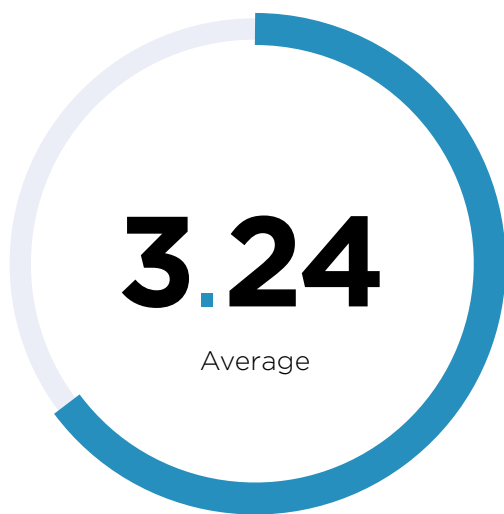
Twenty percent of respondents identify accelerated decommissioning timelines as a primary challenge – a figure that will grow substantially as the decade progresses. In Australia’s offshore oil and gas sector alone, the Government’s 2025 decommissioning liability estimate puts the cost at \$43.6 billion through to 2070, with 55% expected before 2040. This is one of the largest asset lifecycle management challenges the country has ever faced, and it runs directly through the maintenance and reliability function.

“Companies are risking significant stranded asset exposure by basing investment decisions on current emissions policies rather than anticipated future ones.”

**Climateworks Centre / Energy Transitions Commission,
Pathways to Industrial Decarbonisation, 2023**

Confidence in Meeting 2030 and the Importance of Having a Plan

2030 is four years away. For organisations managing decade-long capital planning cycles and multi-year procurement lead times for major equipment, the practical window for action is closing faster than the calendar suggests.



Confidence score in meeting 2030 emissions reduction targets

In September 2025 Australia set a 2035 target of 62-70% below 2005 levels, building on its 2030 commitment of 43%. The scale of the ambition is significant. Australia's current projections suggest it will meet the 2030 target on a budget basis – but the 2031-35 budget will require a more than doubling of the annual emissions reduction rate.

The 55% at the midpoint are not failing – but they are not confident either. They are organisations that can articulate the destination but are uncertain they have the budget, the people, the technology, and the leadership alignment to arrive there on time. For maintenance and reliability leaders, this uncertainty is not abstract. It

manifests as competing priorities, undertrained workforces, and investment decisions that must be made without adequate data.

One of the most consistent findings across both research cycles is that organisations with a Marginal Abatement Cost Curve (MACC) – a structured tool for sequencing decarbonisation investments by cost-effectiveness – feel more in control of their transition. Yet the use of MACCs has barely changed since 2024 – only 15% report meaningful use, and 46% remain unsure whether their organisation has developed one. This is a planning infrastructure deficit with direct consequences for investment efficiency.



“What measures should asset managers take to account for the risks associated with stranded assets in the context of decarbonisation efforts?”

General Manager Engineering, Mining

The Safeguard Mechanism – Compliance Pressure Meets Operational Reality

The Safeguard Mechanism is Australia's principal policy instrument for reducing emissions at large industrial facilities. Reformed in 2023 and effective from 1 July 2023, it applies to approximately 220 facilities emitting more than 100,000 tonnes of CO₂-equivalent per year – covering around 31% of Australia's total emissions.

Under the reformed mechanism, each facility's baseline declines by 4.9% each year to 2030. Facilities that exceed their baseline must purchase Australian Carbon Credit Units (ACCUs) or Safeguard Mechanism Credits (SMCs) to offset the excess. As at November 2024, the maximum civil penalty for excess emissions is \$330 per tonne.

Our 2024 research found the mechanism was broadly not understood – only 12% confirmed their facility was directly impacted, and nearly 70% were unsure. In 2026, regulatory compliance has risen to become the fifth-most-cited operational challenge at 24%. Understanding has improved, but remains incomplete.

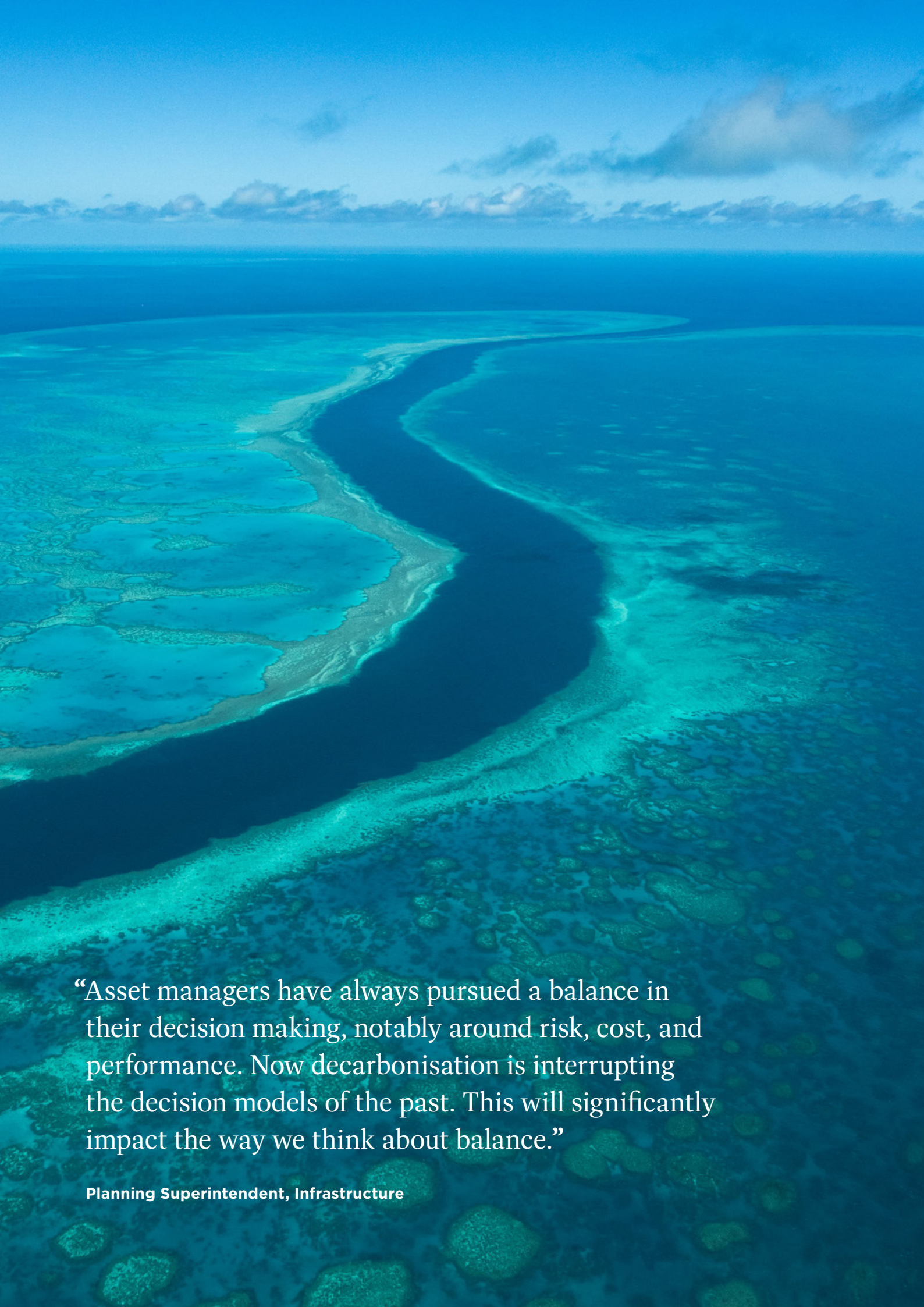
The Clean Energy Regulator's 2024–25 data shows total emissions from covered facili-

ties fell by 2.4% in the first full year of the reformed mechanism. However, the use of offsets increased by 45%, with many facilities choosing to purchase credits rather than invest in on-site emissions reduction. This is a short-term response that the tightening baseline will eventually make untenable.

For maintenance and reliability teams, the Safeguard Mechanism is not a compliance issue that sits with the legal or finance function. Operational decisions – about which equipment to upgrade, which processes to optimise, which assets to prioritise – directly affect a facility's emissions performance and therefore its compliance position. The mechanism has created a direct financial link between maintenance practice and emissions outcomes.

“How do we work with regulators proactively so that we adapt to remain compliant?”

Engineering Manager, Power Utility

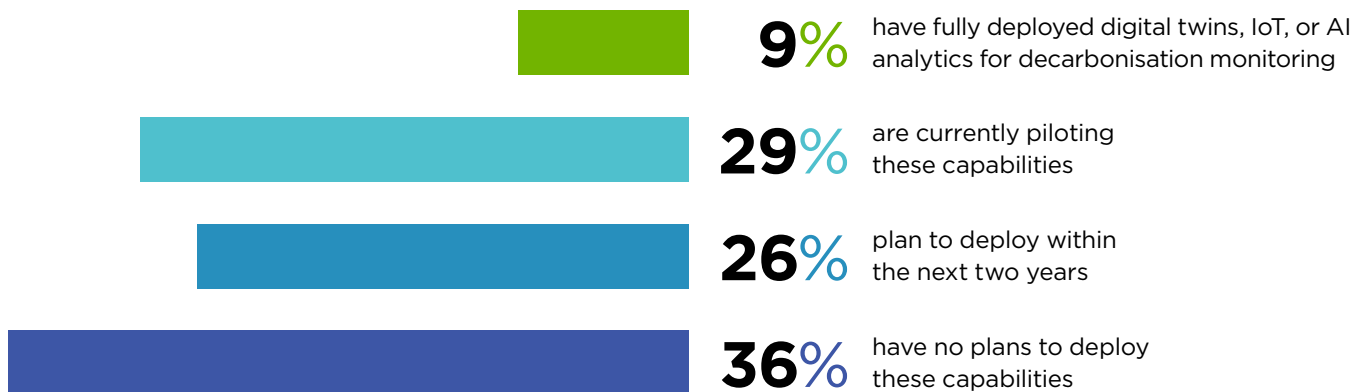
An aerial photograph of a coral reef system. A deep, dark blue channel winds through the reef, separating different sections. The water in the shallower areas is a lighter, vibrant blue, revealing the intricate patterns of the coral below. The horizon is visible in the distance under a sky with scattered white clouds.

“Asset managers have always pursued a balance in their decision making, notably around risk, cost, and performance. Now decarbonisation is interrupting the decision models of the past. This will significantly impact the way we think about balance.”

Planning Superintendent, Infrastructure

Technology Adoption – Digital Tools for a Decarbonised Asset Base

CSIRO's research consistently identifies digital technology – IoT sensors, data analytics, digital twins, AI-driven predictive tools – as a critical enabler of cost-effective decarbonisation. Managing the complexity of hybrid asset portfolios, monitoring energy consumption, identifying emissions hotspots, and optimising maintenance intervals on new-technology assets all depend on data infrastructure that most maintenance organisations are still building.

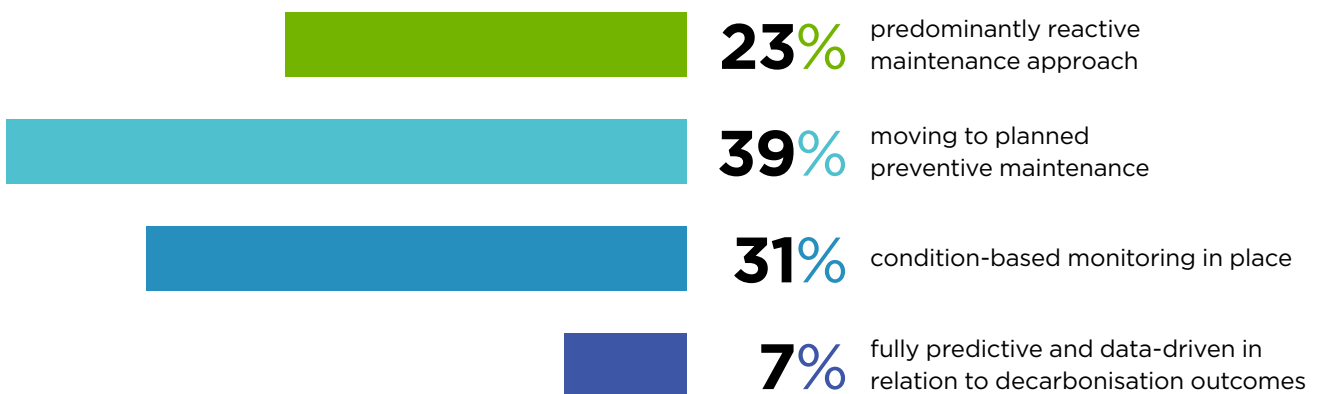


Only nine percent of respondents have fully deployed these tools for decarbonisation purposes. Nearly a third have no plans at all. This is a significant technology readiness gap in a sector where data-driven asset management is rapidly becoming standard practice.

The 29% currently piloting are the most strategically positioned cohort in this dataset. They are building internal capability, learning what works, and creating the business case for scaled deployment. The experiences of these organisations – what they have learned, what they would

do differently, what they wish they had started earlier – are among the most valuable knowledge assets in Australian industry right now.

Maintenance maturity matters here too. The ability to benefit from advanced digital tools depends on having a functional, data-generating maintenance practice to build on. Our survey found 23% of organisations remain predominantly reactive in their maintenance approach. Reactive maintenance and data-driven decarbonisation management are structurally incompatible.



“As we pursue decarbonisation, we have very little guidance as to how the role of our Reliability Engineers will change.”

Head of Maintenance Engineering, Manufacturing

The Workforce Crisis – Skills, Capability, and the Contractor Gap

Australia is in the middle of a structural workforce crisis that will directly constrain the pace of industrial decarbonisation. This is not a skills gap that can be resolved through recruitment alone. It is a systemic shortage that runs from the training pipeline through the trades workforce to the engineering profession.

The National Picture

- Australia faces a projected shortfall of 42,000 qualified energy trades workers by 2030, with the gap expected to worsen by 2050 without coordinated action. — Powering Skills Organisation, High Load, Short Supply, August 2025
- Training in electrical trades has fallen 40% short over the past decade, leaving a current shortage of approximately 22,000 apprentices. — Powering Skills Organisation, 2025
- Australia will need approximately 85,000 more electricians by 2050, with 32,000 more needed by 2030 alone. — Jobs and Skills Australia, as cited in PSO 2025 Workforce Plan
- Operations and maintenance roles are expected to account for 65% of the electricity sector workforce by 2033 – the energy sector’s long-term employment profile is fundamentally a maintenance profile. — Race for 2030 / Clean Energy Council, Australian Electricity Workforce for the 2024 ISP, September 2024
- Engineers Australia is calling on the Australian Government to commit to 60,000 additional engineer graduates by 2035 to ensure Australia has sufficient engineering talent for

the net-zero transition. — Engineers Australia, August 2025

- 89% of engineers, scientists, and architects currently working in infrastructure are engaged in emissions-reduction activities – well above the 50% average across the total infrastructure workforce. — Infrastructure Net Zero Coalition / Engineers Australia, August 2025

What Our Survey Found

The national data is reflected in what our own respondents told us.

“Engineers are not only central to the infrastructure workforce today, they are the linchpin of our clean energy and net-zero transition.”

Romilly Madew AO, CEO, Engineers Australia, August 2025

Within our survey population, 36% of respondents identify workforce skills gaps as a primary challenge – and this figure almost certainly understates the true scale of the problem. Skills gaps are often experienced first as integration challenges, cost overruns, or change management failures before they are correctly identified as fundamentally capability gaps.

The average contractor and trades workforce readiness score in our survey was 2.89 out of 5. Only 3% rated their contractor workforce as well ahead of their needs. Twenty-four percent rated it at 1 or 2 – essentially unprepared.

This matters because major maintenance activities – shutdowns, capital projects, specialist technical work – are routinely performed by contract workforces. If those workforces cannot safely and competently work on new-technology assets, organisations face a direct choice between delaying transition activities and accepting elevated risk.

Fortescue's response to this challenge has been instructive. Facing a requirement for approximately 1,800 electricians at the peak of its decarbonisation program, the company concluded it could not hire its way to that number. In June 2026 it opened a dedicated Power Up Training Centre in Perth, partnering with South Metro-

politan TAFE and North Metropolitan TAFE to train electrical apprentices and upskill fitters in battery-electric vehicle maintenance.

“The biggest challenge was not technology but making sure there were enough skilled people for installation, maintenance and operation. We realised we couldn't simply hire our way out of the problem. We needed to help create the workforce.”

Dino Otranto, CEO, Fortescue Metals, June 2026

The challenge of mid-career workers was highlighted repeatedly in our research. Younger workers will adapt readily to new technologies. Workers approaching retirement will exit the profession before the full weight of the transition arrives. It is the mid-career cohort – experienced, embedded in existing systems and practices, with fifteen or more working years ahead of them – who face the most profound personal and professional transformation.

“What keeps me up at night is worrying about the mid-career workforce. Our younger workforce will embrace the big shift. The ageing workforce will exit in the next five to ten years. But our mid-career workforce will have to transform big time to keep up with the speed of change.”

Head of Asset Management, Water Utility

New Skills for Maintenance and Reliability Professionals

We asked respondents to **rank seven critical new skills for their maintenance and reliability teams over the next three years.**

The result reflects a profession developing a more nuanced understanding of what the transition actually demands.

#1 Data Analytics & Predictive Maintenance

Ranked #1 by 33% of respondents

#2 Renewable Energy Systems Integration & Maintenance

Ranked #1 by 23% of respondents

#3 Change Management & Cross-Functional Collaboration

Ranked #1 by 17% of respondents

#4 Energy Efficiency Optimisation

Ranked #1 by 15% of respondents

#5 General Decarbonisation Training & Education

Ranked #1 by 15% of respondents

#6 Regulatory Compliance & ESG Reporting

Ranked #1 by 14% of respondents

#7 Carbon Footprint Measurement & Reduction

Ranked #1 by 6% of respondents

Data analytics and predictive maintenance has remained the top priority across both research cycles. The recognition that managing both legacy and new-technology assets requires stronger data capability – better monitoring, better prediction, better decision support – is well established in the profession.

The rise of change management and cross-functional collaboration from seventh place in 2024 to third in 2026 is the most significant shift in the skills data. Seventeen percent of respondents now rate this as their single most critical skill need. This reflects an emerging consensus – the most significant barriers to the transition are not technical. They are organisational – they concern how teams communicate, how decisions are made across functions, and how organisations carry their people through transformation.

Engineers Australia's research is aligned with this finding. Its work on the clean energy workforce transition found that while engineers possess strong transferable technical skills, the challenge increasingly lies in softer capabilities – carbon confidence, cross-disciplinary communication, and the ability to embed sustainability thinking into procurement, planning, and design decisions.

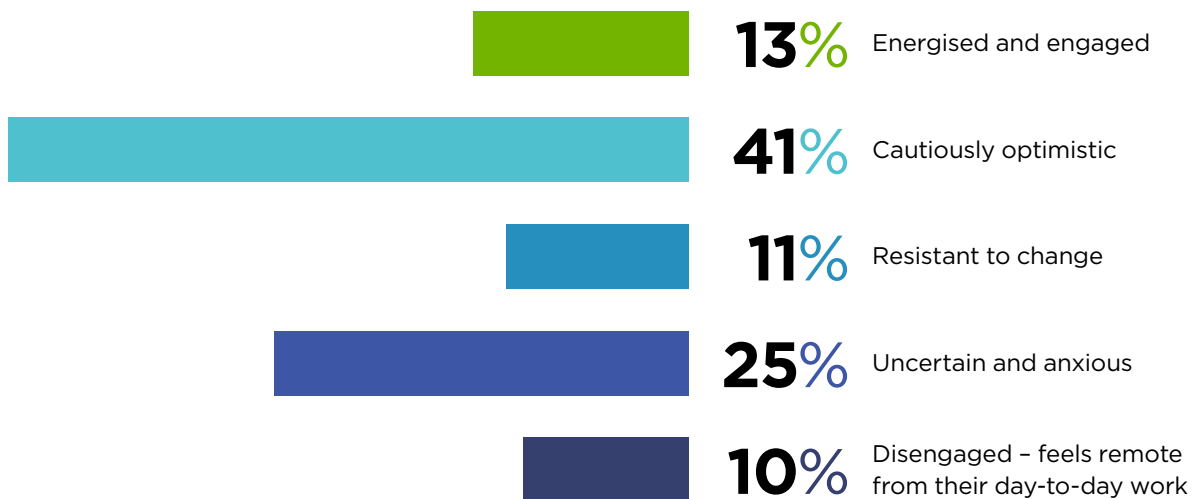
The relatively low ranking of carbon footprint measurement reflects where regulatory expectations currently sit. As Scope 3 obligations mature and the embodied carbon of spare parts and materials becomes a live procurement consideration – which it will, as the Safeguard Mechanism tightens and supply chain emissions attract greater scrutiny – this ranking will shift.

“Engineers, with their problem-solving mindsets, are vital to create innovative solutions to spearhead the transformation to net-zero. Many engineers will make the transition to the renewable energy sector easily, but some will require additional support. New measures are needed to make pathways clearer and to ensure a sufficient stock of engineers in the face of competing industries.”

Bernadette Foley CPEng EngExec, Chief Engineer, Engineers Australia, 2024

Overall Sentiment and the Emotional Reality of the Transition

Decarbonisation is not just a technical or financial challenge. It is a human one. The maintenance and reliability professionals navigating this transition are doing so in real time, with real consequences for their teams, their roles, and their professional identities.



The majority – 54% – describe their teams as cautiously optimistic or energised. This is one of the most important findings in this research. It means the workforce most critical to the energy transition is open to the journey. They are not, as some narratives suggest, opposed to change. They are willing to adapt, willing to develop new skills, and willing to be part of something significant.

What they need, consistently and urgently, is clearer communication about what is expected of them specifically, structured capability development before new assets arrive, genuine

involvement in planning decisions that affect their work, and confidence that their organisations are investing seriously in equipping them.

The 46% who are anxious, resistant, or disengaged represent a real implementation risk. The energy transition cannot be delivered from above. It is executed by the engineers, technicians, planners, and trades professionals who maintain assets every day. An anxious or disengaged workforce is a slower, more error-prone workforce in the middle of the most complex technical transition Australian industry has ever undertaken.



The path from anxiety to optimism is not mysterious. It runs through clarity of expectation, practical training, meaningful involvement, and visible leadership investment. Organisations that are getting this right – the 3% who report reduced

operational pressure, the 6% with fully deployed digital monitoring capabilities, the organisations that have built proactive training programs before new assets arrive – show that the transition can be managed well. It requires intentional choices.

“We are a valuable resource and have a lot to add to the conversation. Yes, the context has changed. But engineers have been working to minimise losses for a long time. It’s the way we think and are trained.”

Asset Management Lead, Rail

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What Are We Learning from Organisations Getting This Right?

Across this research and our 2024 study, a consistent picture emerges of the practices that distinguish organisations managing the transition well. These are not aspirational frameworks. They are observable practices in organisations participating in this research right now.

1 Involve maintenance before the contract is signed

In organisations where the transition is working, maintenance and reliability leaders are involved in capital planning from the earliest stages of asset acquisition or modification. Maintenance requirements, failure mode analysis, spare parts strategy, and workforce capability are considered before contracts are signed – not after equipment arrives on site. The failure to do this is the single most common source of preventable cost and risk in the transition.

3 Reframe decarbonisation as the next stage of reliability excellence

The most powerful cultural shift reported by leading practitioners is the reframing of decarbonisation not as an external compliance burden but as the next evolution of what great maintenance looks like. Reducing energy waste is the same instinct as reducing unplanned downtime. Monitoring emissions hotspots is the same discipline as monitoring vibration signatures. The skills and mindset that make great maintenance professionals are precisely what the energy transition requires.

When maintenance teams are helped to see this connection, engagement rises and resistance falls. When it is imposed from outside as a separate agenda, anxiety rises and resistance follows.

2 Build capability before new assets arrive

Fortescue opened its Power Up Training Centre in Perth specifically to build the capability its electrification program demanded. This is the principle applied – capability development must lead procurement, not follow it. Training a maintenance technician to competence on a new technology platform takes twelve to twenty-four months. Organisations that begin only after new assets are operational are guaranteeing a capability gap at the worst possible moment.

Engineers Australia makes the same point from the engineering profession's perspective – pathways must be clearer, training must be proactive, and employers must actively support transition through diverse continuing professional development and interim roles that help engineers build relevant experience before they need it in full.

4 Develop an explicit strategy for the hybrid period

Most organisations have a net-zero destination. Fewer have an explicit strategy for the decade of portfolio complexity that precedes it. The hybrid period – when legacy and new-technology assets coexist in the same operation – requires specific planning – for workforce structure, for spare parts, for maintenance standards, and for data infrastructure that can handle fundamentally different asset types simultaneously.



MAINSTREAM

The Impact of Decarbonisation on the Asset Manager

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