CLIMATE LEADERS COALITION

Roadmap to 2030

Shifting to a Low Carbon Future

by CEOs for CEOs

Australian business collaborating to create a low carbon, prosperous Australia

THE B TEAM

An initiative of the B Team Australasia

"The impact of climate change on the world is profound and presents a serious challenge for us all. We need the collective wisdom of governments, corporations, academics, not-for-profits, small businesses and the entire community to solve this challenge with practical solutions. Every country in the world must play its part without exception. "

CLIMATE
LEADERS
COALITION

David Thodey
Co-Chair, Climate Leaders Coalition

Letter from the Co-Chairs

It is with great pleasure that we can present the vision and stories of the members of the Australian Climate Leaders Coalition (CLC) and of how they plan for their businesses to successfully transition to be part of a net zero, prosperous Australia.

An initiative of the B-Team Australasia, the CLC was founded in 2020 on the basis that we believe that a responsible and equitable transition to a low emissions economy is an opportunity to improve Australia's prosperity. We recognise that change is not easy but that, if done well, it provides great opportunity.

Our CEO members come from a broad cross-section of sectors who support the Paris Agreement commitments and have or are setting public decarbonisation targets.

Our purpose is to share and learn from each other and to help accelerate the practical decarbonisation of the CLC Members. The members see decarbonisation as a way to ensure their long-term economic sustainability – and how they can have an impact and realise competitive advantage and future growth.

The CLC is action orientated and provides an open, confidential and authentic forum for CEOs to share the challenges of their decarbonisation journeys. It is inclusive and provides information and case studies for those CEOs not yet taking action and wanting to understand their options.

CLC Member Commitments

The commitment of members is as follows:

For the viability of our businesses, for the generations after us and for the country we love, we are ambitious for action on climate change. If we act now, we can forge a path to create a future that is low-emissions, positive for our businesses and economy, and inclusive for all Australians. We are committed to playing our part to make that future real. If we don't, our competitiveness is at risk.

- *We take climate change seriously in our business:*
- *We support the Paris Agreement and Australia's commitment to it, including the objective to keep global warming to well below 2 degrees above pre-industrial levels;*
- *We measure the greenhouse gas emissions associated with our environmental footprint and, if not already done, within 12 months of joining will set public emissions targets;*
- *We work with our suppliers and customers to encourage them to reduce their greenhouse gas emissions; and*
- *We believe that a responsible and equitable transition to a low emissions economy is an opportunity to improve Australia's prosperity.*

This report sets out the activities that our members are already taking, and will take before 2030 to lay the foundations for a prosperous and decarbonised Australia. This is not a report of what should be done but rather what is actually going to be done and how this will impact the companies and involve all of their stakeholders from employees and communities to their suppliers, customers and investors.

We present this report as a positive picture of how the decade will unfold and how being proactive and engaged is going to provide the greatest benefits for business and the whole community. We also acknowledge that further action will be needed, and more can and must be done.

David Thodey
Co-Chair, CLC

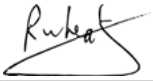
John Lydon
Co-Chair, CLC

Lynette Mayne
Executive Chair, B Team Australasia

CLC Member CEOs

Graeme Hunt
AGL

Matt Halliday
Ampol



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Kym Pfitzner
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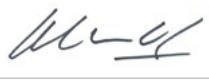

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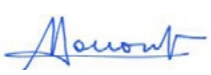

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Rob Scott
Wesfarmers

Chris Ashton
Worley

Members as of 20/10/2021

This report has been prepared with input from all of the Members. Additional drafting and project management support was provided by Deloitte Touche Tohmatsu, CSIRO, Microsoft and Worley.

Graphic design completed by Deloitte Touche Tohmatsu.

"It's imperative that we transition to a low carbon economy, and that we do so quickly, to avoid the worst impacts of climate change, some of which we're already starting to see. And what drives me personally in this ambition is the legacy we're leaving for future generations."

Susan Lloyd-Hurwitz
CEO, Mirvac

"Our generation has an opportunity to put the world on a more sustainable path and the solutions to address the global climate challenges are within our grasp. I want to be able to say to my daughter that I took action, and influenced action, in delivering a more sustainable world."

Chris Ashton
CEO, Worley

"Climate change is not just an environmental crisis, its far reaching impacts are also affecting the lives and livelihoods of millions of people and we are already seeing this in our own backyard."

Nicky Sparshott
CEO, Unilever Australia

"From a personal perspective, I want to accelerate decarbonisation so that future generations have the opportunities we have had and more. I want my own kids and their kids and families to be part of that. I want to look back and be proud that I was part of a generation that transformed the world into a better place with a sustainable future, rather than one that acted too late and too slowly to make a real difference."

Matt Halliday
CEO, Ampol

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Contents

Case Studies

Section	Member	Case Study Title	Member	Case Study Title
CEO Guide to Decarbonisation	Worley	Putting the foundations for net zero in place	Schneider Electric	Schneider Electric's Carbon Neutral Plan
Energy Transition	Mirvac	Energy Supply Agreement	CSIRO	Power Purchase Agreement
	Lion	Power Purchase Agreement	Schneider Electric	New Energy Opportunities (NEO) Network
	Dexus	Accelerating the transition to Net Zero	Incitec Pivot & Fortescue	Green Ammonia Feasibility Study
Supply Chains	CSIRO & Coles	Fresh food supply chain study	Unilever	Clean Future: cleaning up detergents
	BHP	Partnering to reduce value chain emissions		
Regions in Transition	CSIRO	CSIRO Missions	Santos	Moomba CCS and zero emission hydrogen
Offsets	Light Warrior	Internal Carbon Pricing: The Carbon Investment Scheme	Deloitte	Offset purchasing strategy
Resilience & Capability	Deloitte	Global Climate Training program for 330,000 employees	Brisbane Airport	New Parallel Runway Project
Finance	Ramsay	Sustainability Linked Refinance	CommBank	Queensland Airports Sustainability Linked Loans
	Incitec Pivot Limited	Sustainability Linked Loan	Wesfarmers & CommBank	Sustainability Linked Loan
	Citi	Sustainability Linked Bonds		
Technologies	CSIRO & Ampol	Hydrogen off-grid clean energy solution in partnership with Endua	Viva Energy	Hydrogen in Mobility
	Fortescue	Decarbonising Mine Transport		

Executive Summary

Massive climate-related transitions will occur in the 2020s and organisations need to act now.

Companies need to build the culture and foundations for long term transition.

Australia has an abundance of natural resources that presents enormous opportunities for companies and the country.

Leadership and capability building are critical to enable the change to happen.

It is critical to ensure that a responsible and equitable transition is delivered.

In driving change now, organisations can build resilience and ensure a thriving future.

This Roadmap to 2030 provides a positive narrative of how organisations can take action to achieve emissions reductions by 2030 and successfully build the foundations for a thriving future for Australia in a low carbon world.

The end of the current decade will be fast upon us and this presents a very different perspective to thinking about the far-off targets of 2050. This is now about action and delivery.

"The end of the current decade will be fast upon us and this presents a very different perspective to thinking about the far-off targets of 2050. This is now about action and delivery."

At a global level the urgency is increasing following the Intergovernmental Panel on Climate Change's (IPCC) AR6 Physical Science Basis report released in August 2021 showing that the climate is changing more quickly than previously predicted.

Australia has a wealth of opportunity through its natural resource endowment. The country has become rich through its ability to monetise its land, its climate and its mineral resources. We are also lucky enough to have abundant resources of solar, wind and land which presents the opportunity for the country to continue to thrive into the future.

This Roadmap shares key elements of the transition paths of CLC members to 2030 and what they need to do by 2025 to enable this future. It also identifies common themes and cross-sectoral issues for all organisations, highlights case studies to demonstrate ways to accelerate decarbonisation, and provides a template of action for other businesses.

Building the culture and foundations to be able to operate as net zero emissions organisations will be a key outcome for 2030, even if the final targets are delivered later. Net zero or climate neutrality is defined by the Science Based Target Initiative[1] as *'achieving a state in which the business model of the company results in no net impact on the climate.'*

The guiding principles used as the report has been prepared were that it must be highly practical, consistent with science and consider issues relating to just transition, the future of work, skills and capabilities and physical climate resilience. Many of the members operate and have suppliers and customers in international markets and so also having a view beyond the national boundaries will be critical to enable their transition.

It is being shared publicly to help build the knowledge base for organisations and enable CEOs across Australia to make better decisions on their own futures. It is by CEOs for CEOs.

There are many ways that this report could have been framed to tell the story of change. The structure used presents a logical framework for organisations to consider their own transition. It captures most of the critical issues that every business must consider. Whilst there are also many other challenges for specific sectors that need to be addressed, addressing the issues covered here will provide strong foundations for the low carbon world.

Building capabilities is a recurrent theme across all the sections of the report. These capabilities apply not only for increasing specialist climate knowledge but also across all functions within an organisation from procurement to finance to operations. Different ways of working along value chains and across sectors are also going to require new capabilities to succeed.

Leadership on this issue is another critical element that was highlighted by members. The leadership by CEOs within their own organisations is seen as the fundamental enabler of change.

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Only through building the understanding of impacts from individual decisions will organisations be able to effectively transform themselves.

The level of uncertainty is another recurring theme. Whilst the clarity of the end point might be increasing, the options and pathways to get there are not straightforward. With the philosophy of *'the perfect being the enemy of good'*, it is critical for organisations to accelerate their progress whilst also maintaining optionality on the exact solutions to be deployed.

Using scenario analysis and building flexible pathways will enable organisations to adapt by 2030 in a no-regrets manner as the changes to the market, technology and the speed of action are settled. Organisations need to take action across three spheres of activity:

- Solutions that are clear today and can be deployed and scaled immediately.
- Solutions that appear to be ready for deployment in the 2025-30 window but require extensive preparation of infrastructure, systems or markets. It will be critical to start working on this preparation work immediately to ready the foundations.
- Solutions, such as for hard-to-abate sectors, that are unlikely to be commercially deployable at scale until after 2030. For these, it will be critical to collaborate with researchers, peers, suppliers and on pilots projects to progress development.

Only by accelerating all of these activities will organisations be able to successfully transition. The CLC Members are assisting each other to accelerate this activity.

This Roadmap provides a clear and realistic pathway for business in Australia to adapt to the changing world of the 2020s and, in so doing, help to deliver a prosperous future for themselves, their communities and for the country as a whole.

CLC Roadmap to 2030

Australian business collaborating to create a low carbon, prosperous Australia

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Roadmap Principles

- Building the culture and foundations for long term transition
- Taking a leadership position to inspire others
- Ensuring a responsible and equitable transition
- Embrace uncertainty and delivery action now
- Be consistent with science

Enablers

Finance

Natural capital will be bankable

Non-financial reporting will be fully integrated

Alignment will be consistent across all finance classes

Financiers will set and meet financed emissions targets

Cost of capital to be fully inclusive of climate and ESG

Deep Decarbonisation Technology

Initial focus on efficiency, renewable energy and fuel switching

Prepare markets and infrastructure for near-ready technologies

Research and partner for longer-term hard-to-abate solutions

Focus on global markets and commercially viability

Massive transformation and significant opportunities

	Today	2025	2030
Energy	Australia is installing renewable energy rapidly but the emissions intensity of the grid remains high. The market rules need modernisation and gas, heating and transport fuels have not yet significantly reduced their emissions intensities.	Demonstration projects supplying low emissions fuels. Refuelling and recharging infrastructure in operation. Integration of demand response and energy storage. Regulatory changes to enable energy innovation.	Fit for purpose electricity, gas and transport market rules. Renewables and firming technologies widely deployed. Successful retirement of coal power stations well advanced. Gas network decarbonisation/low-carbon fuels accelerating.
Supply Chains	Supply chain emissions starting to be measured but knowledge of scope 3 boundaries and emissions is limited. Few end products claiming full carbon neutrality. Trading partners flagging potential border tariffs.	Automated accounting systems enabling transparent emissions data transfer across supply chains available. Public benchmarking of product emissions intensity started. Supply chain alignment for similar emissions targets.	Members are part of a resilient and strengthened carbon neutral supply chain with transparent, and automated collation of emissions data that achieves their 2030 target. Emissions product labelling fully operational.
Regions in Transition	Regional Australia represents >8 million people, 30% of GDP, and 60% of export earnings - some are the most threatened by a changing climate. Some communities and councils are mapping transition pathways for their regions.	Collaborative stakeholder groups and honest community engagement mapping the future of regions. Long-term funding strategies developed for shared infrastructure to support existing and new industries.	Australia's industrial regions are thriving and have a clear path forward to operate sustainably. Significant investment has produced long-term productive assets with a focus on value add industries with high-skilled jobs.
Offsets	Companies are using offsets to meet their short-term emissions outcomes while they develop emissions reduction projects. The price of ACCUs and certified international offsets are forecast to rise.	Growth in voluntary markets encouraging project development. Development of new and verifiable nature-based methodologies and engineered solutions. Co-benefit valuation methodologies established.	Regional economies benefitting from strong growth in nature-based abatement. Technology-based carbon withdrawal technologies well established. Verification and near real-time monitoring established.
Climate Resilience & Capability	Companies mostly focussed on transition risk rather than physical risk. Unchecked climate change will have a significant economic impact with climate action failure noted as the greatest risk for companies.	Transition and physical risks fully understood and regularly updated. Culture and capabilities assessed for future resiliency needs. Beneficial partnerships across regions, sectors and value chains developed.	All companies have current and integrated climate resilience plans as part of strategy. Data enables understanding, monitoring and planning for resilience across business and suppliers.

Questions for CEOs to ask...

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Energy Transition

- How is your energy sourced, stored, managed and used?
- What is the emissions intensity of each source?
- What are the current and forecast costs of low emissions alternatives?
- What are the contractual mechanisms that can avoid the capital costs of changeover?
- What decisions will lock you into assets or contracts that may limit your options going forward? When are those decisions likely to happen?

Supply Chains

- Do you know the full supply chains for all your products and services?
- What is likely timing of end products having to be carbon-neutral?
- Can you partner with your whole supply chain with regards to emissions targets?
- How will you secure verifiable emissions data for all of your suppliers?
- How will you provide your emissions data to your customers and their customers?

Regions in Transition

- Which regions of Australia are you or your supply chains exposed to?
- What climate risks exist in those regions and will that impact your current operations?
- What growth opportunities are available to you in regional areas that will need to transition?
- How can you access those opportunities by approaching value creation more holistically?
- How can you collaborate with stakeholders to accelerate regional transition?

Offsets

- Based on your announced targets and the economics of abatement, what is going to be your likely demand for offsets over the next 5, 10 and 20 years?
- Have you developed reliable forecasts of the future offset costs and the likely limitations on long-term usage?
- Are there ways you can access offsets through investment, partnership or long-term contracting?
- Are you optimising your need for offsets through internal carbon pricing or involvement in a carbon investment scheme?
- How can you also create co-benefits from the offsets to drive social and environmental outcomes and create value for the company and the communities in which you operate?

Resilience & Capability	Finance	Deep Decarbonisation Technologies	Collaborating to Lead
• How might your current business models, structure and processes constrain your organisation from adapting to manage risks or seize opportunities? • What capability gaps do you have across procurement, finance, operations, assets etc. that will mean transition is not delivered in an optimal manner? • What partnerships across regions, sectors or value chains will increase the resilience of your organisation to climate-related physical or transition risks? • What new ways of working will be needed going forward and how do you secure the skills to enable you to deliver? • What additional skills will you personally require to be the most effective leader through this change?	• Have you modelled how climate impacts will affect your costs and revenue under different scenarios of physical and transition risk? • How will the valuation of your assets and operations change as a result? • Have you looked at the cost of capital implications for your business under different emissions intensity pathways? • Have you explored ways to fund your organisation's transition with financiers? • Have you explored the opportunities emerging from the transition enabling you to benefit all of your stakeholders?	• What technologies are commercially viable today that could be deployed in your operations now? • What technologies are likely to be ready for deployment in between 2025 and 2030? What infrastructure or process changes will you need to be ready for these and when do you need to start that work? • What technologies are still early stage but will be needed by your business to fully decarbonise? Can you accelerate development through partnering with researchers? • What government bodies will help enable technology deployment in your business and how are you engaging with them? • What other businesses are facing similar technology challenges to you and how can you work with them to accelerate the technical and commercial viability of solutions?	• What lessons can you learn from looking at the decarbonisation journeys of others in different sectors and around the world? • What partnerships can you form along your value chain to accelerate the decarbonisation of end products? • Are there different ways of working, different business models or disruptive technologies that could deliver a step change to your business? • Can you collaborate with competitors on climate issues for mutual benefits? • How can you collaborate with your stakeholders in different ways to deliver greater value to all of them?

"Since studying Geography at university, I have been concerned about climate change and its devastating effects. I'm really happy to be working with so many like-minded people to leverage the collective power of business and play our part in decarbonising the planet."

Stuart Irvine
CEO, Lion

"The health impacts of climate change are real. Healthcare providers should not only prepare for the health emergency that will stem from climate change, we must also play a leading role in substantially reducing our own significant use of resources. Together, businesses across Australia can do a lot to reduce our impact and make the world a better place."

Carmel Monaghan
CEO, Ramsay Australia

1. The Challenge and Context

- Climate science is demonstrating the increasing pace of change and the likely impacts over the next two decades.
- Stakeholders including investors, governments, customers and communities are increasing pressure to decarbonise on all organisations.
- Economic losses from climate damages could see COVID-19 level impacts every year.
- The massive disruption of and investment in transition presents significant opportunities for companies that are forward looking.

The United Nation Framework Convention on Climate Change's (UNFCCC) Paris Climate Agreement is key to how many companies and governments are changing. The December 2015 agreement aims to keep global temperature rise this century well below 2 degrees Celsius above pre-industrial levels[2]. The average Australian temperature in 2020 was 1.15 degrees Celsius[3] above the long-term average. Many large corporations are already taking action: committing to 'net zero', renewable energy or to joining groups such as the CLC.

In addition, investor pressure is increasing. The 2017 Taskforce on Climate-related Financial Disclosures (TCFD) framework recommends large companies disclose their climate transition risk (market demand, carbon pricing, stranded assets) and physical risk from increasing severe weather events[4].

The IPCC AR6 Physical Science Basis[5] report released in August 2021 has further increased awareness and pressure on organisations to both decarbonise and build their climate resilience. This report explained how climate change and its impacts are accelerating: heatwaves, ocean warming, bush fires, storms, heavy rainfall and droughts are all increasing in many parts of the world including in Australia. It is now likely that the average global temperature will breach the 1.5°C target earlier in the 2030s without new commitments and actions. It also made it clear that the worsening impacts are 'baked in' to the climate system for the next two decades at least and that our economies and societies are going to have to adapt to these changes.

The economic paradox that has gripped Australia for the past decade endures: the economic fundamentals that make Australia strong today, are both what expose the economy to future disruption and create the basis for a successful transition. The members of the CLC are at the heart of this challenge.

How can members meet and exceed sustainability objectives, whilst being resilient and profitable as a business? How can they capture the wave of capital looking to assist in the transition?

In addition to the pressure mounting on climate, there is acceleration in the trends of the 'Future of Work', skills and education, cloud transition, the internet-of-things, and the sharing-economy.

"In addition to the pressure mounting on climate, there is acceleration in the trends of the 'Future of Work', skills and education, cloud transition, the internet-of-things, and the sharing-economy. "

Governments across the world have flagged their intention to drive more standardised and comprehensive climate risk disclosures and many of Australia's key trading partners are beginning to implement carbon taxes which could negatively impact on the Australian export market if businesses here fall behind. Global operations in Australia are going to need to satisfy their regulatory obligations in other jurisdictions.

This creates a challenging environment for business.

Deloitte Access Economics (DAE) analysis[6] shows that the Australian industries hardest hit by the pandemic are also the most vulnerable to the effects of a warming world and climate change. Australia's agriculture, construction, manufacturing, tourism and mining sectors all feature consistently in the top industries exposed to both the risks of COVID-19 and transition to a low carbon economy.

DAE estimates that, by 2070, the economic cost of climate damages will shrink Australia's GDP by 6 per cent (AU$ 3.4 trillion in present value terms) compared to current business-as-usual projections. This would also result in 880,000 fewer jobs. Under this scenario, Australia will experience economic losses on par with the COVID-19 crisis every single year by 2055, and then getting bigger thereafter.

Compared to this new base case, the analysis estimates a new 'green growth recovery' could grow Australia's economy by AU$ 680 billion and increase GDP by 2.6 per cent in 2070 – adding back over 250,000 jobs to the Australian economy by 2070.

Climate impacts are directly related to cumulative, as opposed to annual, emissions. According to the IPCC latest report[7], to have a 50% chance of limiting warming to 1.5°C, the world can emit a further 500 gigatonnes of carbon dioxide ($GtCO_2$). To have a likely chance (67%), the remaining budget drops to 400 $GtCO_2$. With current annual global emissions of approximately 39 $GtCO_2$[8] and taking into account current forecast growth and the existing country-level abatement commitments, this carbon budget will be expended by 2030. It should be noted, however, that country commitments are increasing and there are abatement pathway options still available to make the carbon budget last longer. There is however no time to waste in increasing the level of action. This supports the view that pressure is going to build exponentially through the decade.

Biden Infrastructure Bill

The Biden Administration's US$1.2 trillion Infrastructure Bill will drive investments in clean transportation infrastructure, clean water infrastructure, universal broadband infrastructure, clean power infrastructure, remediation of legacy pollution, and resilience to the changing climate. The legislation supports renewable energy, electric car charging, transmission power lines and public transit

The Bill would also impose new imposts on polluters and give tax breaks for wind turbines, solar panels and electric vehicles. It would also seek to electrify vehicles used by the U.S. Postal Service and other federal agencies and create a new Civilian Climate Corps to enlist young people in planting trees and other conservation work. Perhaps most crucially, the legislation would put new requirements on electricity providers to use cleaner forms of energy.

Globally, we have seen massive intervention to the COVID-19 pandemic. In total, it is estimated that the G20 countries have spent US$ 6.3 trillion in fiscal support, representing 9.3 per cent of their total 2019 GDP[9]. Delivering global decarbonisation and energy transition will require an even greater level of total investment. An OECD analysis[10] estimated that the transition will require an investment of around US$ 6.3 trillion per year until 2030 – the equivalent of the COVID-19 stimulus every year. For instance, in the US, the Biden Administration is pushing ahead with its US$1.2 trillion Infrastructure Bill (see box), that is just the start of what will be needed.

This level of investment presents huge opportunities for companies that are forward thinking. The energy transition represents an opportunity for Australia to become a clean energy superpower (see box).

A major challenge and one that sits outside the control of CLC Members is how the costs of this transition are distributed. This could be borne by consumers through the pricing of externalities or directly by taxpayers. Either way, the costs have been shown to be less than the losses that will be incurred as a result of inaction.

Case Study

Clean Energy Superpower

Australia can become a clean energy superpower and build sustainable economic prosperity in a low-carbon economy. The world has the need and we have the requisite clean energy resources, minerals, land and entrepreneurship. We are strategically placed at the economic growth centre of the world and have access to those markets. We as a nation have strong ESG credentials and a stable and democratic political system.

But we will not reach this superpower status by default, and there is a transitional journey to get there. We need to build respect as a clean energy nation that delivers, and has the businesses, human capability and culture needed.

Source: "From ambition to reality: Weaving the threads of net-zero delivery". Worley and Princeton University's Andlinger Center for Energy and the Environment

A pivotal step is transitioning domestically, a step we have started but which will involve huge capital investment and an unprecedented infrastructure challenge requiring new paradigms in thinking. This has been explored by Worley with Princeton University in their joint report, From Ambition to Reality, that concludes this change in paradigm includes shifting towards greater social and environmental value; keeping technology options open; standardising and doing more in parallel; building coalitions of the able; and driving the horsepower of digitisation.

Around this infrastructure we will need an economic construct of clean energy enablement, including market and regulatory evolution and buy-in from all sectors of the economy.

Business Stepping up

Recognising the economic imperative, many businesses are already working to decarbonize their products, supply chains and strategies. They are publicly committing to science-based emissions-reduction targets in line with the Paris Agreement and developing implementation plans to meet them. A growing number of organisations are committing to renewables and net-zero emissions by 2050 or sooner. Of the world's 2,000 largest publicly traded companies, at least 21% have net-zero commitments, representing nearly US$14 trillion[11] in sales.

In Australia, there is also a growing number of organisations committing to renewables and net zero emissions, including many of the CLC members. These actions are not altruistic but rather an indication of the benefits of leadership and in being proactive in designing the future of the economy.

Businesses are largely seeking to remain strong and resilient as the world changes. Investors are increasingly seeking companies with lower climate risk; customers and communities are starting to demand lower-carbon products; and governments are introducing regulatory regimes to accelerate the transition. The cost of finance, which can be seen as a proxy for investor risk, has increased for carbon-intensive industries at a greater rate than for low-carbon sectors.

"Climate change is the most pressing challenge of our generation and a once in a lifetime opportunity for economic growth and value creation that generates a better, cleaner, more sustainable world. We are taking strong action and we are calling on other businesses, global governments and the community to join us. This is our chance to make a difference."

Elizabeth Gaines
CEO, Fortescue Metals Group

"Climate change is the most important and enduring issue of our time.

The solution starts with each of us – the decisions we take and our willingness to make an impact. For me personally, it's time to move from thought to action and to work with like-minded leaders and organisations to drive positive and tangible outcomes for future generations."

Adam Powick
CEO, Deloitte Australia

2. CLC Member Snapshot

The members of the Climate Leaders Coalition are many of Australia's largest resources and industrial companies, along with leading companies from the property, consumer goods, finance, technology, research, civil society and advisory sectors. Combining this scale with collaboration is enabling the sharing of best practice and developing solutions beyond their operational boundaries.

Collectively the members have 669,000 employees and millions of customers, consumers, suppliers and shareholders, whom they want to work with to reach a low carbon future.

The snapshot of the members collective impacts is provided below.

Total CLC Member Reported Emissions ($Mt CO_2$-e)	**Latest Annual Figures**	**Prior 12 months**	**Prior Period**
Scope 1 & Scope 2	**111.1**	**118.0**	**122.4**
Scope 3 (where reported):	**1,307** (19 members)		
Emissions Targets			
Members with Absolute Emissions Reduction Targets	**26**		
Members with Emissions Intensity Targets	**15**		
Company Statistics			
Number of Employees ('000s):	**632**		
Total reported revenue (A$Bn):	**305**		

Notes:

- If Australian head quartered, global figures provided and if there is an international HQ, then figures are just for the Australian operations.
- Where figures have been published for FY21, these have been collated. Where public figures are yet to be released, the figures used have been for the most recent annual public data and the two prior reporting periods.

"Climate events in recent years have reinforced the importance of collective action to ensure a sustainable global economy.

Taking bold actions from an environmental perspective is not only vital but is the right thing to do for our future generations."

dexus

Darren Steinberg
CEO, Dexus

"We owe it to future generations to show leadership and act to create a greener, more sustainable world. As a leading manufacturer of products vital to grow food and build cities, this motivates me to explore how we can achieve net zero, creating and commercialising the technologies required to produce renewable hydrogen and blue and green ammonia."

Incitec Pivot Limited

Jeanne Johns
CEO, Incitec Pivot Limited

3. CEO Guide to Decarbonisation

- The case for businesses to act on climate change is compelling.
- Those that hesitate put at risk the commercial viability and valuation of their business.
- Those that act can unlock new market and business growth opportunities, whilst attracting employees, investors and customers that are increasingly demanding action on climate.
- The decarbonisation lifecycle stretches across every aspect of an organisation's operations and value chain.

Climate change not only impacts large companies, it is impacting businesses, organisations communities of all sizes and across all sectors. This Impacts the consequent actions of investors, communities, customers, consumers and employees. Changes to products and services, expectations on supply chains, loss of asset values, and market dislocation are already caused by more frequent and severe climate related events. The opportunities inherent in a low carbon future are already clear and businesses (both in Australia and globally) are investing strongly to secure them.

Where are you on the pathway to decarbonisation?

The decarbonisation lifecycle stretches across every aspect of an organisation's operations and value chain. It requires deep tactical and transformational change to the heart of the organisation's business models, structure, operations, relationships and culture. Only then can a business evolve to become economically sustainable in the very different business landscape driven by climate change.

To understand the process that every organisation needs to undertake and assess where you currently stand, the Decarbonisation Maturity Analysis provides a roadmap of activity that must be considered. Against this framework, you can assess how far progressed you are towards a comprehensive decarbonisation strategy and to plan out the next steps and future activities required.

The climate strategy development framework is not intended to be a linear series of activities and multiple feedback loops and iterations must be achieved on the pathway to net zero.

Having developed, agreed and communicated the strategy, the deployment of projects needs to be enabled. This requires internal communications and capability building across all aspects of the organisation.

The organisational model needs to be aligned with the strategy so that capital, operating and governance processes, systems and decisions are focused on delivering on the agreed climate change strategy. It also requires enhancing the organisational capability to enable strategy execution and transformation[12 13].

"Your leadership will need to be confident and accountable, with the ability to clearly communicate your climate change aspiration, and with incentives aligned with its realisation "

Your leadership will need to be confident and accountable, with the ability to clearly communicate your climate change aspiration, and with incentives aligned with its realisation. Organisational culture should be supportive of your aspiration and be regularly reinforced by leaders. Targeted education will be critical to ensure that all your people have the capacity to make the many decisions that will be needed to deliver your climate change targets.

Using scenario analysis and building flexible pathways will enable organisations to adapt by 2030 in a no-regrets and economically viable manner as the changes to the market, technology and the speed of action are settled. Organisations need to take action across three spheres of activity:

- **Short-term tactical projects** - actions that are clear today and can be deployed and scaled immediately.
- **Development and preparation for material medium-term projects** - solutions that appear likely to be ready for deployment in the 2025-30 window but require extensive preparation of infrastructure, systems or markets and it will be critical to start working on this preparation work immediately to ready the foundations.
- **Research and partnering for longer-term hard-to-abate solutions** - solutions that are unlikely to be commercially deployable at scale until after 2030. For these, it will be critical to collaborate with researchers, peers, suppliers and on pilots projects to progress development.

Only by starting today on delivering all of these activities will solutions deployed as they become ready, enabling organisations to successfully transition.

Case Study

Putting the foundations for net zero in place

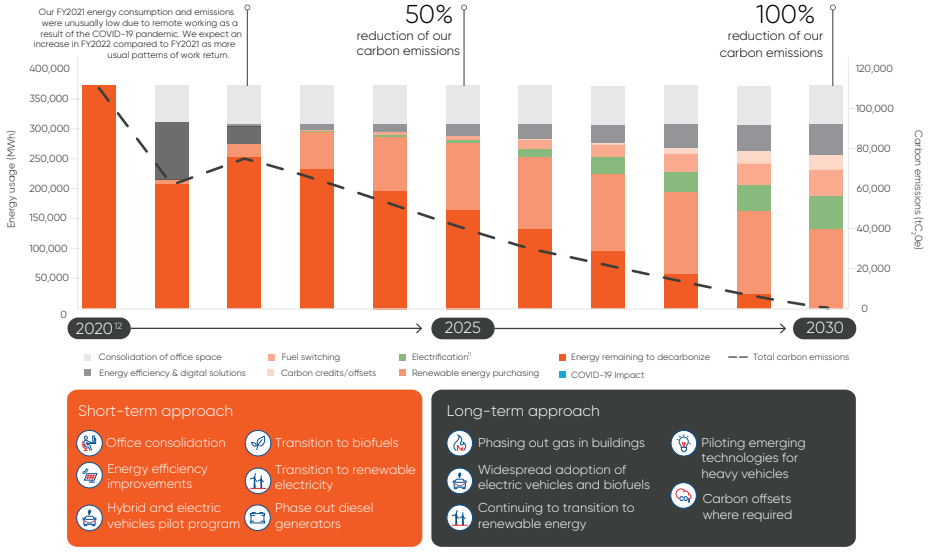
Worley

Through FY21 Worley did considerable work to put the foundations in place to support the achievement of its net zero 2030 commitment for Scope 1 and Scope 2 emissions and net zero by 2050 commitments for Scope 3 emissions. Worley has committed to the Business Ambition for 1.5°C through the Science Based Targets initiative. To deliver on this, Worley:

- Developed its Scope 1 and Scope 2 emissions reduction roadmap to 2030 and set an interim target of 50% reduction by 2025 (see Figure)
- Embedded carbon-related performance metrics in its remuneration framework
- Upgraded its energy management software
- Started transitioning to biofuels in vehicle fleet
- Switched to 100% renewable contracts in Houston and Perth offices
- Included carbon reduction targets in a EUR 500m sustainability linked bond debt facility
- Updated property leasing criteria to include consideration of sustainability factors
- Established energy management working groups across the business.

Our roadmap

We've developed our net - zero roadmap for Scope 1 and Scope 2 emissions.



[1] Combined with renewable energy.
[2] Our FY2020 energy and emissions were also impacted by COVID-19, but this has not been quantified as this was our baseline emissions year.

Case Study

Schneider Electric's Carbon Neutral Plan

Schneider Electric

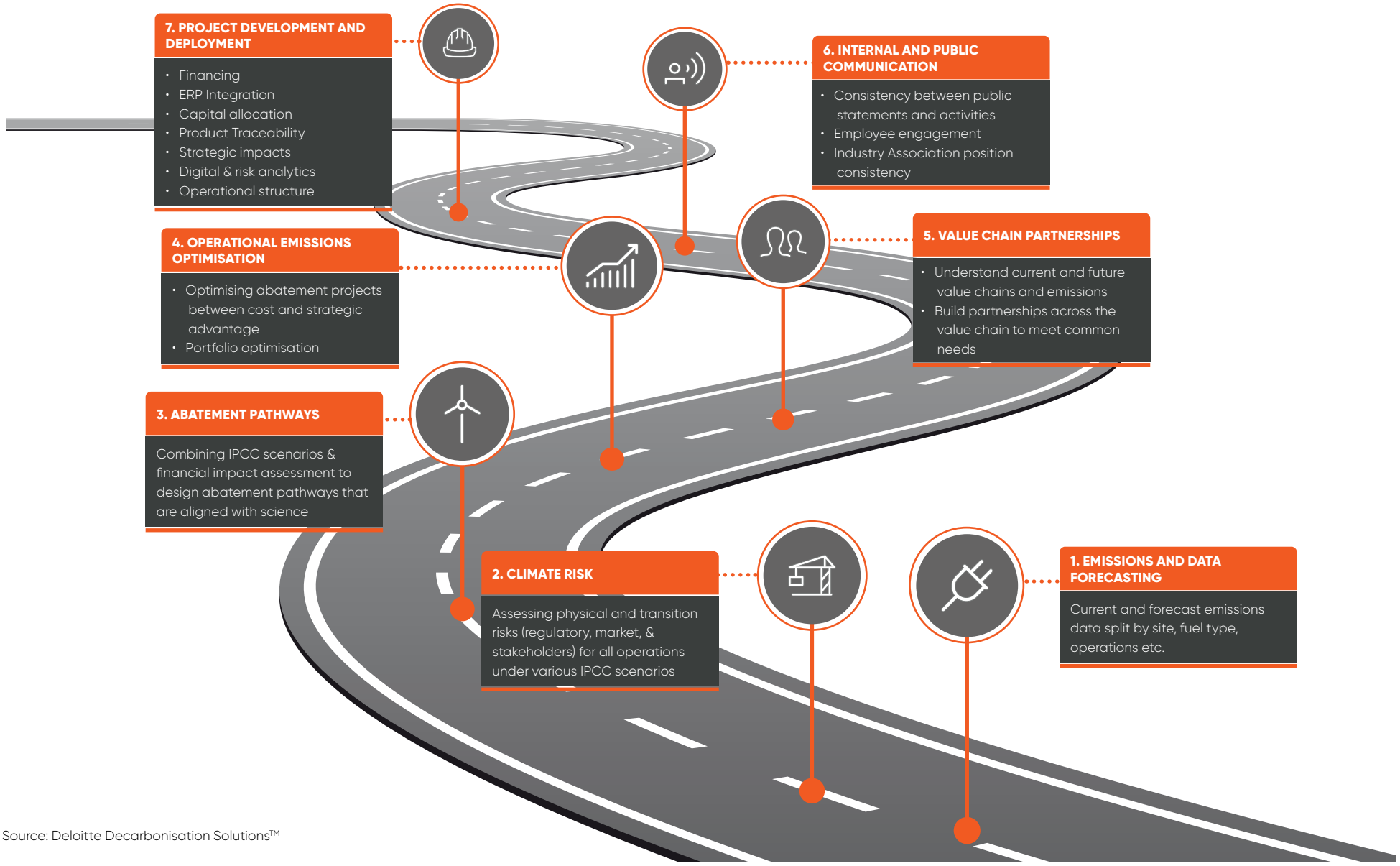
Schneider Electric's climate-positive ambition is to be carbon neutral in their operations by 2025. Schneider Electric is on track to meet their validated 1.5C Science-based target by 2030 and are encompassing a broad range of targets including:

- providing 50 million people with access to green electricity by 2025,
- switching to 100% renewable electricity and double energy productivity by 2030,
- material reduction of customers' and suppliers' emissions,
- water conservation and biodiversity program per site,
- and fleet transition to Electric Vehicles.

Schneider Electric has been recognised as the 2021 World's Most Sustainable Corporation by Corporate Knights.

Climate strategy development framework

CLIMATE LEADERS COALITION



Source: Deloitte Decarbonisation Solutions™

	1. Emissions data and forecasting	2. Climate risk	3. Abatement pathways
Why this is important	Emissions data establishes the baseline from which the organisation can forecast, measure and monitor progress against targets, as well as critically evaluate the areas of the business with the highest potential for decarbonisation.	Transitioning to a lower-carbon economy may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns may impact assets, operations and supply chains. A detailed understanding of both your physical and transition climate risks under a variety of future scenarios is critical to understand the risks that are embedded in your current business model.	Before organisations select their emissions targets, it is important to be informed on what implications future emissions trajectories might have for the business, and its ability to meet societal expectations. Aligning all analysis with climate science is critical. The current minimum expected contribution is that a business does 'its fair share' towards meeting 'a well-below 2 degree scenario' (Paris Agreement objectives). This expectation may change over time.
Key risks	If the data is underestimated, there is a risk that a financial penalty may be incurred from regulators, or investors may develop inaccurate valuation models. Decarbonisation strategies and investment decisions from incorrect data may miss the opportunity to reduce liabilities or secure strategic advantage as you change your business.	Failing to understand the full extent of risk exposes the organisation to a reduced climate resilience and potential losses. In the extreme, this could render future operations unsustainable.	Where a business uses a narrow focus to set targets, and looks only internally or at peers, it may miss key messages about the implications of these targets and the consequent reputational risks. NGOs and activists are increasingly demanding companies illustrate how their commitments are based on credible science-based data and meet or exceed the Paris goals, and you are likely to attract unfavourable attention where you cannot do this effectively.
Key tasks	• Current and forecast emissions data split by site, fuel type, operations. • Emissions profile and forecasts by region, operation and asset. • Understand emissions intensity across the entire value chain. • Communicate complex climate data through simplified dashboards underpinned by extensive scientific-based data.	• Complete and publish climate risk assessment in accordance with the Taskforce on Climate-related Financial Disclosure reporting framework.	• Consider emissions pathways options under a 1.5 and well below 2 degree Celsius future. • Understand historical, current and future emissions. • Determine the Abatement Challenge – gap between forecast emissions and the abatement pathway options. • Establish science aligned targets.

Source: Deloitte Decarbonisation Solutions™

	4. Operational emissions abatement	5. Value chain partnerships	6. Internal and public communication
Why this is important	Structuring the timeline, technologies and locations to deliver projects that reduce emissions is critical to meeting low-emission targets whilst still delivering on financial objectives. Many companies see they can achieve short-term positive NPVs and competitive advantages from selecting the right 'shovel-ready' tactical projects. These might include fuel switching, efficiency measures or process optimisation. Companies may also need to prepare for larger medium-term transformational projects and to work with research partners to develop abatement solutions for which there are no current economically viable options.	Organisations are increasingly being held accountable for their value chain emissions, both upstream and downstream. To achieve results in value chain emissions requires partnership and collaboration. Identifying others in the value chain that are under similar pressures and working with them to deliver joint initiatives can provide a solution. It may also be valuable to work in cross-sectoral groups to define voluntary reporting standards that are agreed to by all major players including any direct competitors.	It is becoming increasingly important to all stakeholders that companies need to contribute to an economically efficient transition to net zero emissions. Communicating to both the market and employees the many small and large projects across the organisation, is an important step. To be effective, this communication needs to be transparent, authentic and consistent with your demonstrable actions. Successfully delivering this will ensure that the organisation retains stakeholder support and its social license.
Key risks	Failing to decarbonise operations in alignment with expectations may result in a loss of social license or valuation. It may also mean an ongoing reliance on increasingly expensive carbon offsets to achieve emissions targets.	Downstream emissions are more difficult to reduce than operational emissions, as your power to influence customers' use of your products may be low. Ultimately there is a risk that if you do not engage and exert influence to support your value chain towards low-carbon operations then the end customer may select a different solution with consequent impacts on you.	Without transparency and authenticity in communications, stakeholders may begin to lose faith. Ultimately the danger is a disengaged workforce, an inability to attract the top talent, dissatisfied communities and an increasing cost of capital.
Key tasks	• Undertake assessment of the costs, benefits and implementation risks of abatement projects across all assets and operations. • Review the value chain for each product line to assess potential competitive advantage from rapid decarbonisation. • Optimisation analysis of abatement projects to reduce costs and unlock value and balance with desired abatement pathway selection. • Develop project deployment prioritisation to maintain optionality and deliver the greatest benefit for the least cost.	• Understand current and future value chains and emissions including detailed value chain emissions profiles. • Develop partnerships across the value chain to solve the more complex emissions challenges. • Initiate a dedicated value chain partnership development program to identify, nurture and manage partnerships with like-minded companies. • Review product traceability solutions to ensure value chain integrity. • Understand when end customers are likely to be demanding carbon-neutral products.	• Ongoing employee, customer and shareholder engagement plans, tailored as maturity increases. • Review the public positioning of industry associations of which you are a member. • Review whether your public targets are consistent with your action plans, incentive schemes and budget allocations. • Stakeholder mapping to understand interactions, possible detrimental actions and signals and signposts to provide warning of issues arising. • Review asset portfolio to ensure optimum construction and ability to maintain favourable valuation and cost of capital.

Source: Deloitte Decarbonisation Solutions™

4. Roadmap to 2030

The Roadmap to 2030 sets out the activities that our members are already taking, and will take before 2030 to lay the foundations for a prosperous and decarbonised Australia.

The Roadmap presents a positive picture of how the decade will unfold and how being proactive and engaged is going to provide the greatest benefits for business and the whole community.

The Roadmap shares key elements of the transition paths of CLC members to 2030 and what they need to do by 2025 to enable this future. It is not a detailed plan mapping all the actions needed, but rather guides a process for all business. It identifies common themes and cross-sectoral issues for all organisations, highlights case studies to demonstrate ways to accelerate decarbonisation, and provides a template of action for other businesses.

The sections are each presented as a summary of the goals and extensive activities under way, examples of specific areas of interest and member case studies. The key questions that every CEO should be asking are also highlighted.

"There are many challenges that are already apparent and will emerge and the CLC Members are under no illusion that the transition will be easy or straightforward. "

There are many challenges that are already apparent and will emerge and the CLC Members are under no illusion that the transition will be easy or straightforward. There are trade-offs that will need to be made on balancing the current and changing needs of all stakeholders. The end point is clear and flexibility in the pathway to get there is paramount.

The Roadmap has been developed with input from and consultation with all CLC members. It provides a clear and realistic pathway for business in Australia to adapt to the changing world of the 2020s and, in so doing, help to deliver a prosperous future for themselves, their communities and for the country as a whole.

"I feel a sense of responsibility to ensure my children live in a sustainable world, and it is energising to sense the community is aligning to push for innovation and creativity that will sustain the next generation."

Marc Luet
CEO Australia & New Zealand, Citi

"Reducing emissions cannot be achieved by one country or one company alone - it will require collective action. As an energy company we have an important role to play in reducing our own emissions, but also in supporting and encouraging our suppliers and customers take their own action.

I am personally committed to play our part in leading this critical energy transition."

Scott Wyatt
CEO, Viva Energy

4a. Energy Transition

The energy sector is undergoing an unprecedented transformation, requiring innovation and collaboration to ensure the best outcomes for people and planet.

Current Status

- The economics of renewable energy have rapidly changed – within just one decade, solar has gone from being one of the most expensive ways to generate a unit of electricity to now the cheapest.
- Australia is installing renewable energy faster than any other country in the world, on a per capita basis.
- The emissions intensity of our grid remains high compared to other developed countries due to the high portion of coal power.
- Many of our market rules and design are outdated and are undergoing modernisation to ensure that the decarbonisation of our electricity system is not impeded.
- Natural gas, heating and transport fuels have not yet made significant changes to their emissions intensities.

Where do we need to be in 2030?

- Fit for purpose electricity, gas and transport market rules and design.
- Successful retirement of coal power stations is well advanced.
- Significantly increased deployment of existing low-cost, low-carbon generation technologies, such as wind and solar, supported by enabling technologies such as wind, solar, short and long term storage, microgrids, pumped hydro, gas, demand response and interconnectors.
- Many end-uses that currently rely on fossil-fuels (e.g. gas heating), will either need to electrify or transition to low-carbon fuels such as bioenergy and carbon-neutral hydrogen.
- Gas network decarbonising through hydrogen and biomethane injection.
- Transport sector rapidly transforming through electrification, hydrogen, biofuel and other renewable fuels.
- Repurposing of assets and infrastructure for low-carbon technologies.

What needs to be happening by 2025 to reach these goals?

- Clear market enabling strategies in place to enable orderly transition by members.
- Demonstration projects operating, supplying low emissions fuels such as carbon-neutral hydrogen and scaling up of mature technologies such as biofuels.
- Refuelling and recharging infrastructure in operation to enable scale up of low emissions mobility.
- More effective integration of demand response and energy storage into operations.
- New product development to transition consumers and supply changes.
- Regulatory changes to enable innovation across electricity, gas and transport energy solutions.

What are members already doing?

- Taking a leadership position in their procurement of renewable energy through targets such as RE100 and renewable Power Purchase Agreements (PPA).
- Providing the software and hardware solutions to enable the energy transition.
- Advising government, rule makers and industry on the strategies to transition the energy sector in an optimal manner.
- Developing green and blue hydrogen projects to enable industrial transition.
- Roll out of enabling infrastructure e.g. EV charging stations.
- Partnerships between technology providers, energy suppliers and customers to pilot low emissions energy technologies.

Five Key Questions for CEOs:

1. How is all your energy sourced, stored, managed and used?
2. What is the emissions intensity of each source?
3. What are the current and forecast costs of low emissions alternatives?
4. What are the contractual mechanisms that can avoid the capital costs of changeover?
5. What decisions will lock you into assets or contracts that may limit your options going forward? When are those decisions likely to happen?

100% instantaneous penetration of renewable energy by 2025

In July 2021, the incoming CEO of the Australian Energy Market Operator (AEMO), Daniel Westerman, in his first public speech, announced the target for Australia's main grids to be able to handle periods of 100% renewable energy by 2025. This is a significant target as it puts Australia up there with the world leaders on decarbonisation of electricity – the UK, for example, has a similar commitment with its National Grid.

Australia has already proven that it can work on parts of Australia's grids. In October 2020, South Australia served all of its electricity demand with renewables for more than an hour. The next step is to have that capability across our grids. To achieve this target, there will be significant coordination and collaboration across rule makers, governments, industry and communities. There are lots of newer technologies to be integrated across our grids, from integrating our home energy and storage into the grid all the way through to new digital systems to manage and control the grid in real-time.

The role of bioenergy in hard-to-abate sectors

Australia's National Bioenergy Roadmap, highlights the enabling role that bioenergy has to play in three hard-to-abate sectors.

Bioenergy pathways for industrial renewable heat generation are both technically mature and cost-effective compared to incumbent fuels and other renewable energy sources.

Decarbonisation of aviation is more challenging with biojet fuels offering the only medium-term solution for all but small planes. Momentum is growing globally, with the recent announcements of biojet fuels blending mandates, such as in Norway and the Sustainable Aviation Buyers Alliance (which includes CLC Member Deloitte).

Biomethane, unlike hydrogen, has a chemical composition very close to natural gas meaning that it can be injected directly into the gas grid without requiring upgrades infrastructure or appliances.

National Hydrogen Strategy

Australia's National Hydrogen Strategy was launched in 2019 and sets a vision for a clean, innovative, safe and competitive hydrogen industry that benefits all Australians. It aims to position our industry as a major global player by 2030.

The hydrogen strategy:

- explores Australia's clean hydrogen potential
- considers future scenarios with wide ranging growth possibilities
- outlines an adaptive approach that equips Australia to scale up quickly
- includes showcases from each state and territory
- details nationally coordinated actions involving governments, industry and communities.

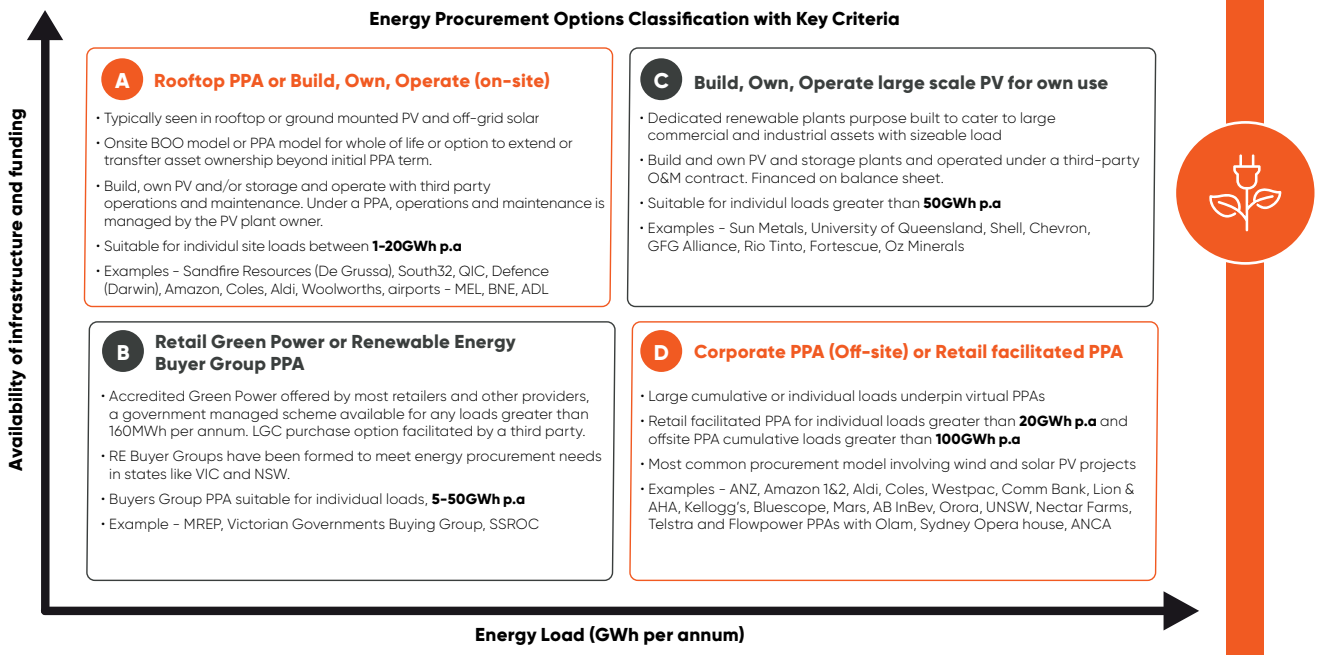
The report's development was supported by a range of analysis including Deloitte's demand scenario modelling.

Since the launch, ARENA has run funding rounds to support demonstration projects and a range of other regulatory and infrastructure assessment and development work is underway.

Procurement of renewable energy

Renewable energy procurement is increasingly becoming an essential part of a corporate's energy strategy. For energy users pursuing carbon abatement and net zero targets, it entails a comprehensive analysis of their current and future energy demand, evaluating long-term renewable energy procurement options to mitigate their exposure to wholesale market prices through retail contracts and unlocking value from renewable solutions.

The energy procurement models that are increasingly being utilised across numerous industries, universities and government entities in relation to the key criteria are shown in the chart below.



Source: Deloitte

Case Study

Energy Supply Agreement

Mirvac, with the help of an external energy market specialist and after close consultation with energy retailers, negotiated a renewable Energy Supply Agreement (ESA) with Red Energy, to supply the majority of their operational portfolio in NSW, ACT and Vic with 100 per cent, fully firmed renewable electricity.

Key benefits

Across the assets, renewable supply agreements have helped deliver an approximately 80 per cent reduction in Mirvac's carbon emissions. This reduction accelerates progress against Mirvac's target to be net positive carbon by 2030, and is clear support for Mirvac's recent commitment to the RE100 program.

Mirvac achieved a reduction in Scope 3 emissions through the on-selling of renewable energy to tenants within their embedded networks. This represents a significant reduction in Scope 3 emissions, an area that has been increasingly flagged by investors as a key point of influence for the property industry.

The agreement provides certainty of pricing during which electricity pricing is expected to remain volatile.

Case Study

Power Purchase Agreement

Lion Australia consumes approximately 61GWh of electricity per year, of which 20GWh is consumed in Qld and 20GWh consumed in NSW; the remainder is consumed across SA, Tas, Vic and WA.

Lion has entered into an aggregated PPA which pools their energy needs in the state, including their largest brewery Tooheys and the needs of participating hotels.

A key point of differentiation with a standard PPA was the aggregation of demand across pubs and venues who were AHA members in NSW and ACT. Lion as the anchor partner in this deal legitimised the offer and provided the AHA members confidence around the commercial terms. In the simplest terms, it allowed small energy users access to PPA arrangements.

The deal generated goodwill with customers by using Lion's high-power consumption to negotiate lower electricity prices for their operations; one of Lion's key leadership principles is "customer at the heart".

The Lion partnership also helped underwrite the construction of ENGIE's new Silverleaf Solar Farm in Narrabri in regional NSW.

Case Study

Power Purchase Agreement

CSIRO entered into a 10-year PPA with Zen Energy Retail, for renewable energy supply to 26 CSIRO-managed research sites across ACT, NSW and VIC. The contract halves CSIRO's electricity-related emissions. CSIRO's advice for other organisations:

- Be clear about your organisation's motivations for contracting a PPA. Is it for emission reductions, renewable energy supply only, or long term financial stability?
- Get specialist advisors engaged early
- Involve internal stakeholders early
- Do not underestimate the opportunity to either extend existing supply contracts or to approach the market more than once to achieve the desired outcome
- Ensure the requirements are well specified and tight enough to avoid a broad range of responses that become difficult to assess and compare…
- …but that the specification is open enough to provide enough proposals/model types for you to assess the benefits and negative impacts of each model on your operations/requirements

Case Study

New Energy Opportunities (NEO) Network

The NEO Network is a collaborative peer to peer network of corporates and solution providers in the renewable energy space facilitated by Schneider Electric.

Developers benefit from:

- Use of the Exclusive PPA pricing tool
- Detailed advice on RFP responses
- Exclusive access to qualified corporate members with over 10TW of demand
- Ability to run target campaigns and make unique offers

Corporate benefits:

- Detailed intelligence on more than 50 renewable energy markets
- Regular webinars, market reports, price indices
- Client case studies and success stories
- Participation in NEO Network events
- Exclusive purchasing and partnership opportunities
- Ability to engage directly with other purchasers and project/ product developers eliminating market noise

Case Study

Accelerating the transition to Net Zero

Net zero emissions refers to achieving an overall balance between greenhouse gases emitted in operation and greenhouse gases removed from the atmosphere. Getting Dexus to net zero is an opportunity to align with changing consumer sentiment and meet the increasing investor appetite for low-carbon investments.

Since we made our original commitment to achieve net zero emissions by 2030 in 2018, we have made great progress on our goal, enabling us to revise our commitment to achieve net zero emissions across our managed portfolio by 30 June 2022. Accelerating our net zero ambition delivers strong climate action for our planet, enhances our vision and customer proposition for smart, sustainable workplaces, and ensures we will be ready for other opportunities - including supporting our customers on their own journey.

Our commitment to deliver net zero emissions by 30 June 2022 will be achieved by:

1. Our transition to 100% renewable electricity for base building operations from July 2021, purchasing renewable energy credits as required (Large Generation Certificates or accredited GreenPower)
2. Continuing to invest in certified offsets for our remaining emissions. We will purchase accredited nature-based offsets to account for emissions from natural gas, wastewater, refrigerants, and waste/recycling
3. Verifying we are net zero and maintaining this status through Climate Active

In parallel with this transition, our focus remains on improving energy efficiency and accelerating the deployment of on-site renewables.

Case Study

Green ammonia feasibility study

Incitec Pivot Limited (IPL) will partner with global green energy company, Fortescue Future Industries (FFI) on a feasibility study into industrial-scale production of green ammonia at IPL's Gibson Island fertiliser manufacturing facility.

The study will assess whether industrial scale manufacturing of solar ammonia at Gibson Island is technically and commercially feasible. It will investigate building a new water electrolysis facility on the site to produce around 50,000 tonnes of renewable hydrogen per year, which would then be converted into green ammonia for Australian and export markets.

Incitec Pivot Managing Director & CEO Jeanne Johns said the study was a crucial step in contributing to Australia and Queensland's potential as a green ammonia powerhouse.

"The combination of FFI's drive to develop a globally competitive green hydrogen industry, and our leadership and technical skills in ammonia production, will play an important role in developing Australia's capability in this growing international market," Ms Johns said.

The partnership is considered one of Australia's best near-term opportunities to produce green ammonia at an industrial scale.

"As a scientist, I'm passionate about making the world better through solutions from science. The global energy transition to net zero will require a fundamental reimagining of everything we do, and Australia has a lot to offer. Only through deep collaboration with industry can science turn energy disruption into opportunity."

Larry Marshall
CEO, CSIRO

"As the energy transition accelerates, I am proud to be leading an energy infrastructure business that will play a vital role in the decarbonisation of Australia's economy and support global efforts to mitigate the impacts of climate change on our planet. We all have a responsibility to work together to drive a sensible and orderly transition towards a more sustainable world and to create a positive legacy for the future."

Rob Wheals
CEO & MD, APA

4b. Supply Chains

As the transition to a low carbon economy accelerates, there will be an increasing focus on the emissions intensity of supply chains. Solutions that may be implemented could include onshoring/near-shoring, changing the provenance of materials or products and minimising waste. All of these will require transparent reporting of emissions throughout supply chains to be able to verify the claims of final products.

Current Status

- Supply chain emissions are starting to be effectively measured by larger companies.
- Methodologies are being developed to allow verification by external parties.
- Limited knowledge of Scope 3 boundaries and emissions factors are often conservative.
- Limited emissions data transparency protocols specifically for supply chains.
- End products in Australia claiming full carbon neutrality still limited.
- Trading partners starting to indicate potential border tariffs or similar regulatory mechanisms.

Where do we need to be in 2030?

- Members will all be part of supply chains that lead to many carbon-neutral end products or services.
- Transparent reporting of emissions intensity along supply chains and implemented systems to allow automated collation of data.
- Public reporting of Scope 3 emissions and 2030 targets met.
- Product labelling of emissions intensity fully operational.
- Emissions reduction progress across each supply chain.
- Partnering on emissions reductions has developed stronger and more resilient supply chains.

What needs to be happening by 2025 to reach these goals?

- Demonstrated emissions accounting systems enabling automated transfer of data along supply chains with financial information.
- Companies aligning along supply chains with others that have similar emissions reduction targets.
- Public benchmarking of product emissions intensity being trialled.

What are members already doing?

- Members have identified primary sources of Scope 3 emissions in their supply chain and have developed calculation methodologies.
- Members have announced Scope 3 emissions reduction targets.
- Members already offsetting some or all of their Scope 3 emissions.

Five Key Questions for CEOs:

1. Do you know the full supply chains for all your products and services?
2. What is the likely timing of end products having to be carbon-neutral?
3. Can you partner with your whole supply chain with regards to emissions targets?
4. How will you secure verifiable emissions data for all of your suppliers?
5. How will you provide your emissions data to your customers and their customers?

CLC Member Supply Chain Mapping

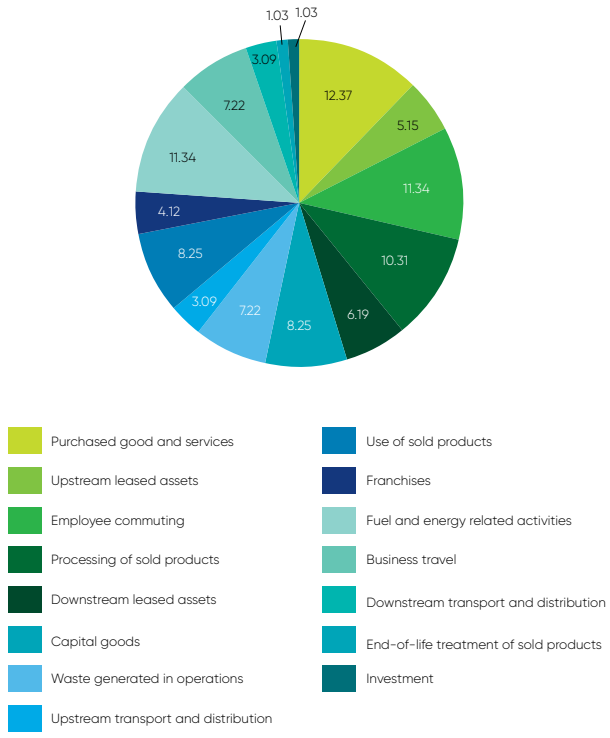
In a survey of CLC Members, it was established that all members were in the supply chain of at least one of the other members with many having multiple business relationships. This presents a unique opportunity for the CLC to catalyse the Australian norms for reporting emissions along value chains. One of the CLC Deep-dive Projects is specifically focused at how to securely access, transfer and verify emissions data between members and this may serve as the foundation of how business is conducted in Australia by 2030.

Scope 3 Calculation & Reporting

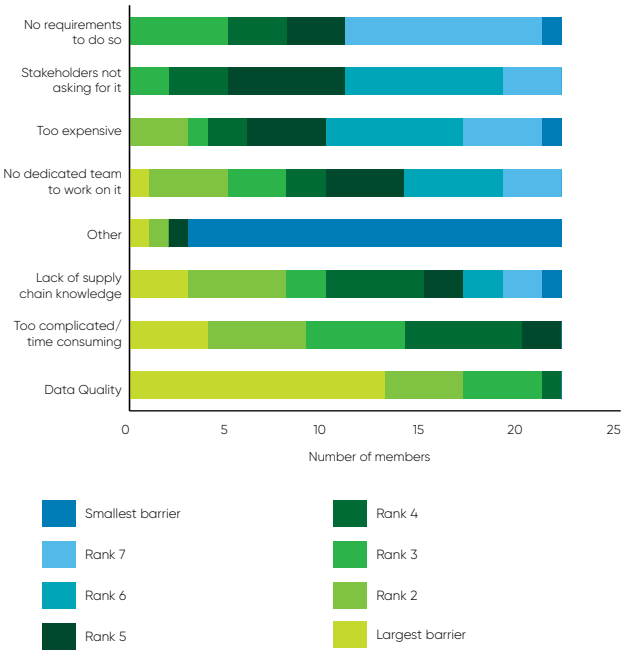
In the same survey, approximately 70% of responding members noted that they currently calculate some or all of their Scope 3 emissions and 60% report these publicly.

Members noted materiality of Scope 3 emissions with purchased goods and services, fuel and energy related activities, use of sold goods and upstream transport and distribution as the most common contributors. Data quality was seen as by far the biggest barrier to reporting and default emissions factors were used most commonly for most categories.

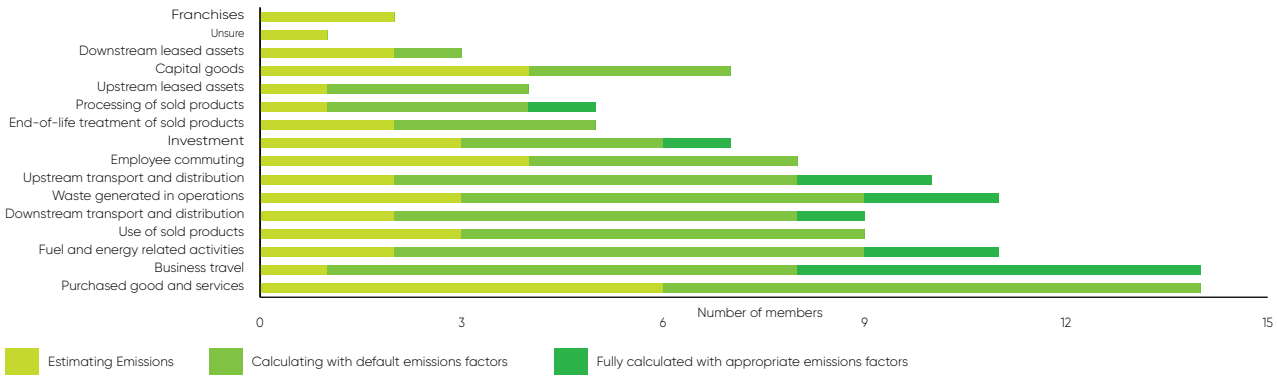
GHG protocol categories of Scope 3 emissions that were identified as material for CLC members (%)



What are the greatest barriers to reporting scope 3 emissions?



Categories of Scope 3 emissions calculated and confidence in calculations



Case Study

Fresh food supply chain study

In FY20, Coles worked with the CSIRO to understand the security of some key products in its fresh food supply chain. Thirty-one categories across meat, seafood, produce, dairy and bakery were quantitatively assessed to identify critical supply nodes, highlight key supply risks, and quantify supply chain resilience.

This work with the CSIRO provides Coles with a better understanding of the resilience of its fresh food supply chain and its potential exposure to current and future environmental risks, as well as pathways to navigate those risks, including better informing continuity planning.

Case Study

Clean Future: cleaning up detergents

In 2020, Unilever announced its ambitions to "clean up" the laundry and cleaning industry, with the commitment to replace 100% of the carbon derived from fossil fuels in our formulations with renewable or recycled carbon by 2030.

It's a commitment that will transform some of the most popular cleaning and laundry brands in the world to become lower carbon and lower waste, with the same or even better performance.

Unilever's unique Carbon Rainbow™ approach will see the business diversify their carbon sources. Non-renewable sources of carbon (known as black carbon) will be replaced using CO^2 capture (purple carbon), plants and biological sources (green carbon), marine resources such as algae (blue carbon),

In ANZ, Unilever's first articulation of Clean Future was seen in the OMO/Persil liquid reformulation, boasting plant-based polymers, naturally-derived stain boosters, and 100% recyclable packs, made with 25%-50% post-consumer recycled plastic.

Case Study

Partnering to reduce value chain emissions

BHP believes building a pathway to net zero requires collaboration and cooperation across the value-chain. To pursue BHP's decarbonisation goal for its value chain, it cannot just support the development of single technology pathways. Instead, BHP has listened to the needs of its customers, suppliers and other stakeholders, and are investing actively in these partnerships. BHP's approach is multifaceted: fostering a number of technological pathways towards decarbonisation to help increase the probability of its value chains achieving net zero outcomes. These include:

- **Investing in next-gen technologies** - BHP has announced partnerships with major steelmakers including an investment of an initial amount of up to US$65 million in partnerships with China Baowu, JFE Steel and HBIS Group, which together produce around 10 per cent of global steel, to research and pilot various steel decarbonisation technologies including optimising iron ore and coke quality, carbon capture storage and utilisation, and hydrogen-based direct reduction technology.
- **Accelerating maritime transition** - BHP has set a target of net zero greenhouse gas emissions by 2050 for the maritime shipping of its products, subject to the widespread availability of carbon neutral solutions . To support this target, BHP has committed to join the Global Centre for Maritime Decarbonisation in Singapore and participated in marine biofuel trials with Oldendorff Carriers and GoodFuels.
- **Partnering on supply chain traceability** - BHP has completed traceability pilots with two key customers, copper cable and wire manufacturer Southwire and EV manufacturer Tesla. This traceability work enhances transparency and accountability in global supply chains utilising future facing commodities.

"I want to accelerate decarbonisation because its central to the economic and societal future of Australia and the sorts of jobs and opportunities our kids will have access to."

Microsoft

Steven Worrall
Managing Director, Microsoft Australia

"We have a compelling opportunity to modernise our economy and create new, sustainable opportunities for our people and industries – especially in regional Australia. We can use the great Australian traits of ingenuity, persistence and teamwork to tackle climate change together and make our nation more resilient."

BHP

Edgar Basto
President Minerals Australia, BHP

4c. Regions in Transition

Regional Australia faces both opportunities and threats from climate change and the global transition to net zero. As an export-intensive economy with some of the most variable agricultural growing conditions in the world and a reliance on inbound investment for development, regional Australia has much to gain by aligning to global net zero commitments and a lot to lose if we do not.

Current Status

- Regional Australia is home to over 8 million people, contributes 30 per cent of GDP and 60 per cent of export earnings through agriculture, resources, tourism, retail, services, and manufacturing.
- Australian regions such as the Pilbara, Hunter, Gladstone, La Trobe Valley and Spencer Gulf are among the most vulnerable to the impacts of climate change – both physical risk and changing markets.
- Communities and local councils are already taking action in many areas. There are also some transition strategies, agencies and advisory bodies established to support some regions.
- Other initiatives underway to map transition pathways for regions including the Million Jobs Plan[14], the Australian Industry Energy Transitions Initiative[15], and the Net Zero Australia project[16].

Where do we need to be in 2030?

- Australia's industrial regions are thriving in the new low carbon economy.
- High-emitting industries are transforming their business models and operations to have clear pathways forward.
- Significant capital investment into industries building long term productive assets.
- Inclusive economic opportunities for the whole community with workers having transitioned to, or having a clear pathway to, jobs in the low carbon economy.
- Increasing focus on higher value-add industrial and service sector activities creating more high-skilled jobs.
- Measurement of holistic value to the community from the transition in place and monitored.

What needs to be happening by 2025 to reach these goals?

- Establishment of collaborative groups including government, business, research organisations and the community to chart regional futures and enable significant investment in transition.
- Full, broad and honest engagement with all stakeholders underway. Engagement should be participatory, allowing communities to co-design their future and include the concept of redefining value for the whole community.
- Shared infrastructure investment underway to enable transition for existing industries and growth of new industries.
- Long-term funding strategies established to facilitate full regional transformation.

What are members already doing?

- **CSIRO** will soon launch a national Towards Net Zero mission which is working together with partners across Australia to support Net Zero goals of our regions and the business value chains that define them.
- **Worley** worked with Andlinger Centre at Princeton University on the report From *Ambition to Reality*[17] on the practicalities of transition and the scale of investment and infrastructure build that is going to be required.
- **Orica** has set an ambition to achieve net zero emissions by 2050, covering scope 1 and 2 greenhouse gas (GHG) emissions and its most material scope 3 GHG emission sources1. The ambition builds on Orica's previously announced medium-term target to reduce scope 1 and 2 operational emissions by at least 40% by 2030, from 2019 levels.
- CLC Members are currently researching other joint projects that can be developed and delivered in one or more regions.

Five Key Questions for CEOs:

1. Which regions of Australia are you or your supply chains exposed to?
2. What climate risks exist in those regions and will that impact your current operations?
3. What growth opportunities are available to you in regional areas that will need to transition?
4. How can you access those opportunities by approaching value creation more holistically?
5. How can you collaborate with stakeholders to accelerate regional transition?`

Community Transition Principles

In relation to community transition, principles should include:

- Upskilling workforces towards the 'jobs of the future'
- Improving the sustainability of privately owned buildings and homes
- Promoting 'greener' business and consumption choices, including the use of electric vehicles
- Circular economy and resource efficiency principles
- Supporting community application of the waste hierarchy – reduce, reuse, repair, recycle, recover
- Sponsoring community energy and carbon farming initiatives.

Stakeholder Engagement

Full and honest engagement with all stakeholders is critical for successful regional transition. Engagement should be participatory, allowing communities to co-design their region's future. Positive community engagement would be enhanced through the delivery of coordinated communications by industry and government, as well as complementary public consultation approaches.

Coordinated planning is required to reduce potential negative social impacts of clustered renewable developments and of transitioning regions, including:

- New workers moving into the area, impacting housing affordability and availability
- New workers and their families overloading existing social services, such as childcare, healthcare, and education
- Reduced amenity, increased noise, traffic congestion and road degradation
- New developments draining local workers from existing industries with a flow-on impact to the diversity and sustainability of local businesses and community services
- Clustered development impacting local landscapes and or seascapes, with subsequent impacts to community identity.
- Traditional Owners connection to Country, and the protection of Country
- Increased demands on Traditional Owners to engage with various project proponents.

The opportunity is now for industry, the government and research organisations to work together to facilitate an inclusive and positive transition to net zero and a better future for our communities

Building Thriving Resilient Regions

Industry and government could apply a suite of management measures to address potential cumulative impacts and contribute to thriving resilient communities, including, but not limited to:

- Government master planning, such as industrial zones and coordinated infrastructure corridors
- Government policy, including to address potential workforce and social infrastructure impacts
- Education and capacity building to pivot work skills and workforces
- Participation in industry information exchanges, forums, networking groups to enhance collaborative efforts and coordinated advocacy on common issues
- Pooling of resources to support specific initiatives and programs. For example – joint social investment initiatives could be established, similar to the Gladstone Foundation, which manages the voluntary contributions made by infrastructure project proponents in Gladstone towards social infrastructure in the region.
- Proactive coordinated management of project logistics, such as the timing of workforce rosters, and location of workforce accommodation
- Multi-stakeholder environmental and social impact management monitoring programs.

Case Study

CSIRO Missions

All across the world, governments, businesses and communities are increasing their efforts to get to net zero emissions. It will take a combination of existing and novel technologies to get there. It will be equally important to address barriers to adoption and co-create pathways to scale the deployment of low emissions technology.

Developing, demonstrating and rapidly deploying this technology with industry partners will equip Australia to reduce its emissions while capitalising on our many natural advantages to export technology, low carbon products, carbon offsets, and help our trading partners to reduce global emissions.

For instance, Australia is perfectly positioned to tap into the global hydrogen market. CSIRO's Hydrogen Industry Mission has been created to help focus research and development on accelerating the development of Australia's domestic and export hydrogen industries, creating urban and regional jobs and economic growth based around this emissions-free energy source.

Similarly, CSIRO's Towards Net Zero Mission, currently in development, is working with partners across Australia to support Net Zero goals of our regions and the business value chains that define them. The mission will partner with State and local governments, community groups, universities, established businesses and startups to develop and demonstrate the technology needed to support the transition and the social and business systems into which that technology is adopted.

Case Study

Moomba CCS and zero-emission hydrogen

In 2021 Santos continued to progress its globally significant Moomba CCS project which has now completed all technical and commercial milestones. Following finalisation of the methodology for CCS by the Federal Government in October, Santos is seeking to have the project registered with the Emissions Reduction Fund to generate Australian Carbon Credit Units (ACCUs). Once the project has been registered, Santos will then be in a position to make a Final Investment Decision.

CCS is recognised as a safe, well-established solution for permanent, large-scale emissions reduction and clean hydrogen production, one of the keys to economy-wide decarbonisation.

The current lowest-cost and most common way to produce hydrogen today is by splitting natural gas molecules (carbon and hydrogen). When used in conjunction with CCS, the hydrogen produced can be carbon neutral.

The front-end engineering design is complete for the capture, compression, dehydration (removing any water) and storage of CO_2 from the Moomba plant. Appropriate policy settings will accelerate further CCS deployment in the Cooper Basin, which has the capacity to store up to 20 million tonnes of CO_2 per annum and become a large-scale, commercial CCS hub.

The Cooper Basin will be able to offset emissions not only from oil and gas, but from other industries such as power generation, steel, cement and chemicals and enable clean hydrogen production at significantly lower cost than currently produced via electrolysis.

"The impact of climate change on our communities is getting stronger. Businesses are a key part of our society. As business leaders, we have a responsibility to use our positions – to be bold – and move towards a transition to a net zero economy that is sustainable and just for all."

LIGHT WARRIOR

Radek Sali
Chairman, Light Warrior

"Being a responsible, sustainable business is how we fulfil our purpose and deliver on our ambition to grow. We've committed to a target of net zero emissions by 2030 and achieving at least 50% of this target by 2025. Businesses are moving rapidly and we're curious to learn from others and consider their insights and technologies as part of our own pathway."

SCENTRE GROUP

Peter Allen
CEO, Scentre Group

4d. Offsets

The carbon offset market both in Australia and globally is set to grow substantially over the next decade to meet the increasing demand from governments and corporates. As the market grows, new methodologies will be required and increased longer term planning will enable regional Australia to reap the benefits.

Current Status

- High-integrity Australian Carbon Credit Units (ACCUs) are used to meet voluntary targets, comply with the Safeguard Mechanism, as voluntary offsets under the Climate Active program or can be sold under the Emissions Reduction Fund (ERF).
- The price of ACCUs at ERF auctions currently sits at A$16-18/tCO2-e but is forecast to rise.
- The cheapest international certified offsets cost around US$2/tCO2-e but this is also increasing.
- Companies are using offsets to meet their short-term emissions outcomes while they develop emissions reduction projects.
- Incorporating co-benefits from nature-based solutions is supported by the Land Restoration Fund in Queensland and the Western Australian carbon farming and land restoration program.

Where do we need to be in 2030?

- Australian carbon farming providing over 100 Mt CO2-e of annual abatement through nature-based solutions while generating material regional revenue and creating thousands of regional jobs.
- Technology-based carbon withdrawal technologies well established and strongly financed, and storage or utilisation methodologies established and financeable.
- Verification and monitoring standards established for near real-time reporting of sequestration.
- Co-benefit value understood and quantified

What needs to be happening by 2025 to reach these goals?

- Growth in voluntary markets encouraging increasing project development funding availability.
- Development of new nature-based methodologies to allow a wider range of production options.
- Introduction of verifiable technology-based solutions.
- Co-benefit valuation methodologies established to consider biodiversity, natural capital, resilience and social and community outcomes.
- Annual estimate published of the planned contribution the ERF is projected to make to emissions reductions to 2030 to provide certainty for project developers.

What are members already doing?

- **Microsoft** has invested primarily in nature-based solutions through their first tranche of carbon removal projects but have also set a goal of growing investment in engineered solutions in parallel with decarbonisation efforts.
- **Deloitte** has globally purchased high integrity offsets from Natural Capital Partners to offset all of its operation and business travel emissions.
- **Ampol** is piloting a carbon neutral fuel option for its business customers. While continuing to explore lower emissions transport solutions, this option provides an interim solution for customers to offset emissions from their consumption of fuel.
- **Viva Energy** conducted its first fully carbon offset flight in July 2021 – conducting a flight from Cairns to Weipa. This is part of Viva Energy's wider program to provide offset fuel to commercial customers.

Five Key Questions for CEOs:

1. Based on your announced targets and the economics of abatement, what is going to be your likely demand for offsets over the next 5, 10 and 20 years?
2. Have you developed reliable forecasts of the future offset costs and the likely limitations on long-term usage?
3. Are there ways you can access offsets through investment, partnership or long-term contracting?
4. Are you optimising your need for offsets through internal carbon pricing or involvement in a carbon investment scheme?
5. How can you also create co-benefits from the offsets to drive social and environmental outcomes and create value for the company and the communities in which you operate?

Appropriate use of offsets

Offsets are an important part of most current climate change strategies for both business and governments. Reaching net zero emissions will, by definition, require some level of drawdown of greenhouse gases from the atmosphere through either:

- "nature-based solutions" which use natural processes such as growing plants or enhancing soil carbon, or
- "technology-based solutions" which make use of industrial chemical processes such as amines and carbonates.

Net zero implies a zero emissions system whereby residual hard-to-abate emissions are balanced out by negative GHG emissions processes, in much the same way as the natural environment includes both sources and sinks of carbon in a balanced cycle.

Given the importance of cutting emissions in this decade and the time it will take for organisations to cut some of their operational emissions through investment and new technology development, carbon offsets are an important tool to help achieve the maximum near-term rate of abatement.

Historical offset challenges

Historically, many low-cost international offsets have had numerous issues. These issues are summarised by the Taskforce on Scaling Voluntary Carbon Markets (TSVCM):

1. Inconsistency across carbon credits, particularly with respect to co-benefits
2. Lack of reliable daily price signals due to small volumes
3. Lack of reliable trading infrastructure and associated data on carbon projects (most carbon trading remains in OTC trades)
4. Lack of accepted principles for the use of carbon credits
5. Issues related to double-counting, fraud, monitoring, measurement and verification (MMV), project failure, genuine abatement and additionality

In response to these issues the TSVCM is pursuing a range of initiatives to build a reliable global carbon trading environment that will efficiently allocate resources to the most effective short- and long-term carbon abatement activities.

Growing the Australian carbon market

The 2017 Carbon Market Institute's Australian Carbon Farming Roadmap estimates that Australia can provide 360-480 Mt CO_2-e of abatement through nature-based solutions by 2030 while generating $10b-$24b in revenue and creating 10,500-21,000 direct and indirect jobs.

A 2020 review of the Emissions Reduction Fund by the Climate Change Authority included 23 recommendations. Addressing these issues will be critical for the domestic carbon market to meet its 2030 potential:

- Signalling demand for emissions reductions and boosting supply
- Maintaining integrity
- Optimising governance
- Method and tool variation risk sharing
- Risks of under-delivery and physical risks to contracted abatement

A key recommendation for strengthening the demand signal for ACCUs is for the government to publish an annually-updated estimate of the total contribution the ERF is projected to make to emissions reductions to 2030 to provide certainty for project developers and financiers.

Co-Benefits

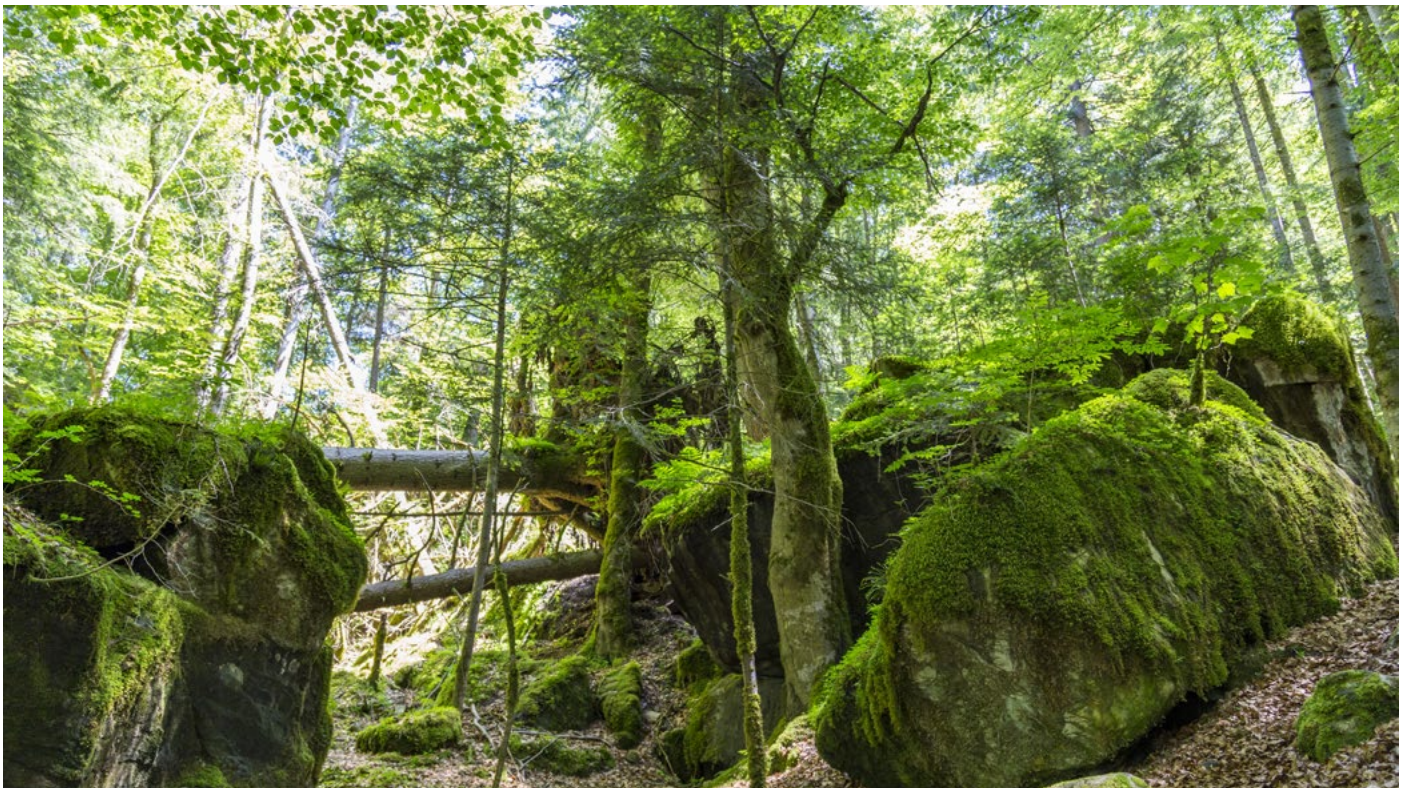
The investment in nature-based solutions can also drive broader co-benefits and CLC members highlighted the demand among corporate Australia for high-quality offsets that represent broader value for society.

Many organisations are willing to spend more on offsets that deliver biodiversity, natural capital, social and community benefits beyond the carbon abatement potential.

Incorporating co-benefits from nature-based solutions is an emerging trend globally, and in Australia is supported by State-based initiatives such as the Land Restoration Fund in Queensland and the Western Australian carbon farming and land restoration program.

New methods and platforms can deliver value to landscapes, riparian zones, nearshore marine environments including the Great Barrier Reef, indigenous communities and farming systems. Such co-benefits often involve a balance between the overall carbon sequestration potential and additional benefit.

There is a need to develop new methods, monitoring and trading platforms and reliable validation and verification protocols.



Case Study

Internal Carbon Pricing: The Carbon Investment Scheme

The Carbon Investment Scheme is a policy that companies can implement, which applies a fee to emissions within a company. The fees are aggregated and added to a 'carbon fee pool', which a company can use to fund green initiatives, deliver carbon abatement, or purchase emissions offsets.

LIGHT WARRIOR

- The benefits of the Carbon Investment Scheme are:
  1. A simple way for a company to implement a sustainability initiative – does not require a dedicated team or resources.
  2. Communicates a carbon focus throughout a company, internalising the external cost of carbon pollution into the P&L of a company, division, or team. Makes the costs and consequences of carbon tangible to team members within the company, helping to align them with the company's objectives and encouraging them to modify their behaviour and cut emissions.
  3. Creates investment capital to invest in emissions reductions.
- Light Warrior has developed a framework for the Carbon Investment Scheme, which has included policy design, stakeholder interviews and testing, and scheme development.
- With a robust framework for how the scheme can operate, Light Warrior is incorporating the Carbon Investment Scheme within their operations.
- The aim is to demonstrate that the Carbon Investment Scheme is easy and resource-light to implement, has a positive effect on team member awareness of climate, and can reduce emissions

Once incorporated within Light Warrior operations, this will be rolled out to portfolio companies, providing them support to implement the Carbon Investment Scheme within their own businesses, and supporting scheme growth.

Case Study

Offset Purchasing Strategy

Deloitte.

- As Deloitte moves towards full carbon neutrality by removing or offsetting its full value chain including emissions from Purchased Goods & Services, the company is progressively increasing the boundary of its emissions reporting and the coverage of its offsetting program.
- The FY21 boundary for the Australian business covers all operational emissions (Scope 1 and Scope 2) and all business travel.
- By FY25 at the latest, the company plans to fully offset or remove its value chain emissions and be certified carbon neutral.
- All offsets purchased are certified by a generally accepted standard such as Gold Standard, VCR, ACR, etc. and the vintage is no older than three years.
- Increasing the co-benefits from offset purchases is a priority and methods to co-invest with ecosystem partners in Australia and beyond are being developed.
- The most recent offsets purchased included:
  - Rimba Raya Biodiversity Reserve REDD+ from Indonesia
  - Solar water heating in India
  - Afforestation projects in China

"Climate change is the biggest humanitarian challenge our society is facing. We have a responsibility to act now by reducing our greenhouse gas emissions. If we are unable to collectively rise to this global challenge, we will face much greater humanitarian needs across our society in the near future."

Australian Red Cross

Kym Pfitzner
CEO, Australian Red Cross

4e. Climate Resilience & Capability

Guidance from the Taskforce of Climate-related Financial Disclosure (TCFD) describes the critical concept of climate resilience as being "*organisations developing adaptive capacity to respond to climate change to better manage the associated risks and seize opportunities, including the ability to respond to transition risks and physical risks.*"

Current Status

- Many companies are presently focused on their transition risks in terms of markets, regulations and finance.
- Physical risk from the changing climate, whether event-driven (acute) or longer-term (chronic), can also be significant.
- If climate change goes unchecked, then Australia's economy will be 6% or $3.4 trillion smaller and have 880,000 fewer jobs by 2070[18].
- Effective action to build resilience into the economy and its companies could avoid losses of $680 billion and save 250,000 jobs.
- The World Economic Forum reports climate action failure as the greatest risk for companies[19].

Where do we need to be in 2030?

- All companies have current and integrated climate resilience plans as part of strategy.
- Resilience planning seeks to identify opportunities as well as risks from physical and transition risks.
- Capabilities across all functions of the business understand the connections with resilience and make decisions knowing the impacts on climate outcomes.
- Resilience data for both internal metrics across the business and from suppliers enables complete resilience monitoring.
- Enhanced data literacy to enable effective understanding of and monitoring of resiliency.
- Organisations have more collaborative partnerships with regions and along value chains to ensure resilience in their full operating environment.

What needs to be happening by 2025 to reach these goals?

- Organisational culture established to look at capability and resiliency through transition.
- Transition and physical risks fully understood and regularly updated.
- Capability gaps for full implementation identified and training plans commenced.
- New beneficial partnerships across regions, sectors and value chains identified and being developed.
- Stakeholder trends monitored and trigger points for accelerated action identified.

What are members already doing?

- Many CLC members have undertaken climate scenario analysis to better understand the risks and opportunities associated with climate change, and have reported publicly on this in accordance with TCFD requirements.
- **Deloitte** has launched a global climate training program for its 330,000 employees to increase knowledge of what they can do individually, at work and with clients.
- **Brisbane Airport** fully integrated potential future climatic conditions into the design of its new runway. This work included consideration of sea level rise, temperature impacts and storm surges.

Five Key Questions for CEOs:

1. How might your current business models, structure and processes constrain your organisation from adapting to manage risks or seize opportunities?
2. What capability gaps do you have across procurement, finance, operations, assets etc that will mean transition is not delivered in an optimal manner?
3. What partnerships across regions, sectors or value chains will increase the resilience of your organisation to climate-related physical or transition risks?
4. What new ways of working will be needed going forward and how do you secure the skills to enable you to deliver?
5. What additional skills will you personally require to be the most effective leader through this change?

What is climate resilience?

Organisations that have adaptive capacity to respond to climate change will better manage the associated risks and seize opportunities. Transitional risks and opportunities are influenced by governments and markets while physical risks and opportunities refer to the impacts from changes in the climate.

Climate resilience moves beyond operating assets to broader value chain impacts. How climate resilient is your value chain? How exposed are your off-takers or end consumers? How do you compare to your peers and competitors? Will buyers compare the emissions intensities of products? Will decarbonisation positively or negatively impact your overall climate resilience?

Climate impacts and the need for resilience are driven by major scientific reports. The IPCC AR6 report is being published in parts through 2021 and 2022 and will further narrow the timing and impacts of change and the adaptation and mitigation required. It will be utilised by financial markets and investors, customers and communities to understand climate-related exposures and fundamentally inform strategic responses.

Physical Risk

Many companies are presently focused on their transition risks in terms of how climate-related changes to markets, regulations and finance will impact their operations. Physical risk, however, is growing as the frequency of extreme weather events increase. Physical risks can be event-driven (acute) or longer-term (chronic). In either case, companies need to consider both adaptation and mitigation strategies.

Adaptation is acting to minimize the impact of the changing climate, including the increasing likelihood of extreme weather events, on a business through operational or supply chain disruptions.

Managing this risk requires forward-looking tools, such as scenario analysis to adapt operations and business models before a crisis occurs. The likelihood of heatwaves, rainfall, droughts, hurricanes, and floods occurring under different emissions scenarios can be examined using global climate models. Understanding what the future might look like is critical to effectively designing ongoing and future operations.

Building Climate Resilience

Action area	Assessment
Risk and opportunities	• Have you completed a full risk and opportunity assessment of your operations, value chain and operations that will be impacted by the world's transition to low or zero carbon?
Physical and transitional scenario analysis	• Have you developed scenarios for your assets and operations that demonstrate how these risks will play out and what your optimum responses will be? • Have you 'war-gamed' your planned responses to scenarios to test their resilience to unexpected events?
Financial impact assessment	• Have you assessed the specific financial impacts for your company under different scenarios in terms of share registry composition, cost of capital, alternative sources of sustainable finance, and revenue impacts?
Value chain assessment	• Have you assessed your value chain both upstream and downstream to understand where weaknesses or issues may emerge under different scenarios? • Have you started to align your value chain with companies that have similar climate targets so that your Scope 3 emissions are positively impacted by their actions?
Tell your story	• Have you built a strong narrative for all your stakeholders of how you have developed your resilience strategy? • Is your narrative robust, based in science and comprehensive market analysis? • Have you clearly articulated options you might consider under different scenarios?

Source: https://www2.deloitte.com/au/en/pages/energy-and-resources/articles/building-climate-capability-resilient-mining-sector.html

Climate Resilience Capabilities

Function	Areas of Capability Build	Contribution to Climate Resilience
Finance	• Understanding the trends playing out across the global financial sector and how that is going to impact the company	• Ensuring competitive cost of capital, robust valuations and strong support
Procurement	• Understanding the emissions profiles of major goods and services procured by the company, how that will impact the company's Scope 3 emissions and what options are available at what cost. • Understanding supply chain vulnerabilities from climate impacts	• Providing optionality to the company to change its upstream value chain profile • Ensuring supply chain resilience
Commercial	• Understanding of the pressure on customers and their downstream customers and how product options might help resolve emerging issues	• Ensuring strong buyer support for products as the company seeks to meet customer needs as they change
Operations	• Having a clear plan to decarbonise all aspects of operations at a variety of speeds • Understanding the potential needs to decarbonise some products ahead of others to meet market needs even if not least cost • Understanding potential risks of severe or chronic climate changes on operability and develop contingency plans	• Enables the company to react to unfolding pressures to reduce Scope 1 and Scope 2 emissions • Ensuring operations drive productivity regardless of changes to the operating environment
Asset Management	• Understanding how asset planning will need to adjust to facilitate both decarbonisation and resilience to changing climate patterns	• Building in climate resilience to design, expansion and construction decisions to ensure flexibility in future operations
Strategy & Portfolio Management	• Building a deep understanding of global decarbonisation pathways under different scenarios and how that will impact demand for products – both positively and negatively	• Building portfolio resilience that can thrive regardless of the scenario that is followed • Having clear trigger points at which to make portfolio realignment decisions

Source: https://www2.deloitte.com/au/en/pages/energy-and-resources/articles/building-climate-capability-resilient-mining-sector.html

Case Study

Global Climate Training program for 330,000 employees

- The first organisation of its scale to roll out climate learning for all its people globally.
- Developed in collaboration with a leading international environmental organisation.
- Builds on Deloitte's WorldClimate strategy and commitment to achieve net-zero greenhouse gas emissions globally by 2030.

Deloitte.

Deloitte is rolling out a climate learning program for all 330,000 of its people worldwide. A first-of-its-kind among major global organisations, the program was developed jointly with the World Wildlife Fund and aims to inform, challenge and inspire Deloitte people to learn about the impacts of climate change and empower them to confidently navigate their contribution to addressing climate change by making responsible choices at home and at work, and in advising our clients.

In order to reduce carbon emissions and mitigate the worst effects of climate change, the world needs an ecosystem of public and private actions that can help mobilize and enact collective change, which includes the business community and their employees.

By increasing climate literacy and building the skills required to address climate change, this new learning program is designed to engage all Deloitte people around the world on the impacts of climate change, inform them about how Deloitte is responding to the climate crisis, and inspire Deloitte people to take action.

Case Study

New Parallel Runway Project

Brisbane Airport developed a new parallel runway and associated infrastructure on a low lying coastal area, 2km west of the existing runway. With close proximity to Moreton Bay, future climate change vulnerabilities such as storm surge, sea level rise and local/regional flooding events and increase in average temperatures were addressed through:

- Hydrological modelling to include sea level rise and increased frequency of cyclonic events.
- Increased temperature considerations in the runway length and planning for future upgrades.
- Runway height to accommodate tide levels, storm surge effect and wave propagation.
- Construction of tidal channels and the installation of a new sea wall.

5. Enablers

The Roadmap themes discussed above are just some of many that will need to be addressed for CLC Members to successfully transition and thrive in a low carbon world. These are, however, the issues that are the most complex and challenging for the organisations and ones that have had the greatest focus in the meetings and work groups of the CLC since its official launch in August 2020.

There are also some cross-cutting themes that have received significant attention. These underpin the success of all the individual areas discussed so far. In this section, a more detailed analysis is provided for **finance** and **deep-decarbonisation technologies** and how they enable the achievement of all the other roadmap themes. There are also other cross cutting themes that are enablers and accelerators of action and these include:

- **Communications** - How to build the narrative to help our communities, our businesses and our political leaders understand that change is going to happen and we will benefit significantly if we are proactive and design our future rather than having it imposed on us from overseas.
- **Working with others** - Working with communities to understand the barriers to uptake of lower emissions solutions and work with them to design effective initiatives and incentives that overcome these barriers.
- **Addressing societal issues** - Given the scale of the required change across society, make sure that solutions encompass a broader view to help to ameliorate other societal issues and make cities, industries and communities more functional for all stakeholders. Look for mutual opportunities which benefit all involved.
- **Climate governance** – Ensure that governance structures in all organisations are structured to effectively assess climate risks and opportunities in a timely manner.
- **Regulatory frameworks** – Whilst beyond the control of CLC Members, the speed of economic transitions will be determined by the ambition and structure of regulatory frameworks and the certainty they can provide to enable accelerating investment and innovation.
- **Standardisation and interoperability** – To enable the fastest dissemination of technology solutions will require industry to establish standardised sustainability and industry data models. This will allow for the open data solutions and interoperability that allow innovations to be developed and rapidly deployed.

The CLC Members recognise that it will only be by taking an holistic approach and ensuring all of the enabling factors are in place to enable them to transition in the most effective way.

"Managing our businesses in a sustainable way, which includes addressing the risks of climate change, is aligned with our objective of delivering superior returns to shareholders over the long term. At Wesfarmers, we are using our capability and financial strength to accelerate decarbonisation and address climate change. We manage our businesses with a deep carbon awareness and this includes capital allocation decisions, improving the energy efficiency of our operations, transitioning to new technologies and our engagement with customers and suppliers."

Rob Scott
CEO, Wesfarmers

"Our ambition of net zero emissions by 2050 shows our commitment to playing a part in achieving the goals of the Paris Agreement. This is a strong signal that the decarbonisation of Orica will, and must, continue beyond 2030 and requires a collaborative approach across all of our stakeholders."

Sanjeev Gandhi
CEO, Orica

5a. Finance

The finance sector is transforming quickly and will have most of the needed global frameworks in place in 2021. This will then allow financiers to set targets and start to reduce the emissions profile of portfolios through optimising cost of capital and encouraging lower emissions investments.

Current Status

- APRA has set expectations for banks in its Climate Vulnerability Assessments[20] information paper of September 2021.
- The UNEP Finance Initiative[21] is seeking commitment, setting standards and convening global alliances of asset owners, asset managers, insurers and the banks.
- The Partnership for Carbon Accounting Financials (PCAF)[22] has established the global standard for measuring and reporting of Financed Emissions across six assets classes.
- Investors Group on Climate Change (IGCC) called on companies to disclose a net zero transition plan.

Where do we need to be in 2030?

- Cost of capital implications on climate and ESG will be fully transparent and reported.
- Major financial institutions will have reached 2030 emissions reduction targets for their portfolios.
- Alignment across the financial markets with bond, debt, insurance and equity participants aligned on financing measures and priorities.
- Non-financial reporting metrics fully integrated with financial systems to provide overall company ratings with respect to impacts on all stakeholders,
- Natural capital used as bankable assets, and aligned with regulatory stress tests.

What needs to be happening by 2025 to reach these goals?

- Clear guidelines established for how companies report their climate risk consistently to financiers, shareholders and community.
- APRA frameworks for financed emissions and asset stress testing fully implemented.
- Members have positioned themselves effectively to access increasing pools of capital available for decarbonisation and resilience.
- Natural capital valuation methodologies agreed.
- All major financiers issued and implementing interim and long-term net zero targets.
- Emissions intensity benchmarks established across peers and products to enable differentiated financing.

What are members already doing?

- **Citi** is offering corporate groups globally products such as sustainability-linked loans to secure an efficient cost of capital from the bond markets.
- **CBA** is offering Green Loans to homeowners to install clean energy technology at rates as low as 0.99% p.a. secured fixed rate loan.
- **Worley** established the first sustainability-linked bond for an Australian company with its €500million Eurobond, accessing reduced cost of capital for meeting its greenhouse gas reduction targets.
- **Deloitte** has worked with the World Economic Forum on standards for Stakeholder Capitalism Metrics, and will continue this work with the International Sustainability Standards Board (ISSB).
- **Wesfarmers** has accessed a sustainability linked loan that has reduced its cost of capital for meeting its sustainability targets.

Five Key Questions for CEOs:

1. Have you modelled how climate impacts will affect your costs and revenue under different scenarios of physical and transition risk?
2. How will the valuation of your assets and operations change as a result?
3. Have you looked at the cost of capital implications for your business under different emissions intensity pathways?
4. Have you explored ways to fund your organisation's transition with financiers?
5. Have you explored the opportunities emerging from the transition enabling you to benefit all of your stakeholders?

APRA Climate Vulnerability Assessment Information Paper

In April 2021 APRA released draft guidance for banks, insurers and superannuation trustees on managing the financial risks of climate change. An aspect of this guidance was the value of using scenario analysis to underpin the quantitative analysis of the potential impacts of different future climate scenarios on the performance of financial entities in Australia.

The Climate Vulnerability Assessment (CVA), released in September 2021, has adopted this scenario analysis approach for large banks. The objectives of the CVA are to assess potential financial exposure to climate risk; to understand how business models may adjust; and to foster improvement in climate risk management capabilities.

Financed emissions

The Partnership for Carbon Accounting Financials (PCAF) is an industry-led initiative setting the global standards for Scope 3 financed emissions reporting by financial institutions. Measuring financed emissions allows financial institutions to make transparent climate disclosures on their GHG emissions exposure, identify climate-related transition risks and opportunities, and set the baseline emissions for target setting in alignment with the Paris Agreement.

The Standard provides detailed methodological guidance for six asset classes: Listed equity and corporate bonds, Business loans and unlisted equity, Project finance, Commercial real estate, Mortgages and Motor vehicle loans.

UNEP Finance Initiative

United Nations Environment Programme FI is a partnership of 400 members and over 100 supporting institutions to help create a financial sector that serves people and planet while delivering positive impacts. Initiatives aligned with net-zero emissions portfolios by 2050 and a 1.5°C scenario include:

- Net-Zero Asset Owner Alliance - 40 global institutional asset owners with $6.6tn AUM.
- Net-Zero Asset Managers - 128 asset managers with $43tn AUM.
- Net-Zero Insurers Alliance - eight of the world's leading insurers and reinsurers.
- Net-Zero Banking Alliance - 55 banks covering 25% of global banking assets (over US$37tn).

Sustainable Bonds

The most common themed bonds in the sustainable bond market are labelled Green, Social and Sustainability Bonds. However, recently there has been the emergence of several other labels including Transition Bonds and Sustainability KPI-Linked Bonds.

	Green Bonds	Social Bonds	Sustainability Bonds	Sustainability KPI-Linked Bonds	Transition Bonds
Bond Qualification **Use of Proceeds directed to:**	Climate and / or environmental **sustainability purposes**	**Social projects**, e.g. SME Lending, Social Housing, Education where the service is freely accessible	Can be both **climate / environmental projects as well as specific social projects**	**General Corporate Purpose Bond** characteristics linked to Sustainability related KPIs	Projects that help "green" processes and companies to align with the sustainable benchmarks
Alignment with external guidance	ICMA Green Bond Principles EU Green Bond Standard	Social Bond Principles	Sustainability Bond Guidelines	Sustainability Linked Bond Principles	Climate Transition Finance Handbook
Market Issuance in 2020	$250.0bn	$144.6bn	$148.1bn	$8.5bn	$2.4bn
Common Eligible Projects	• Renewable Energy • Pollution Prevention & Control • Climate Change Adaptation • Clean Transportation	• Access to Essential services (e.g. Healthcare and Education) • Affordable Housing • Affordable Basic Infrastructure	• Combination of Green and/ or Social projects • Frameworks linked to the UNSDGs	• Common KPIs: GHG Reduction, Renewable Installed Capacity	• Energy efficiencies in manufacturing processes • Gas related projects • Shipping industry • Metals and Mining • Cement
Precedents	• Vodafone • Apple • Iberdrola • Citi • EIB	• Danone • African Development Bank • IFC • Citi	• Telefonica • Starbucks • ANZ • BNG	• Enel • Suzano • Novartis • Chanel • Lafarge • Tesco • Schneider Electric • Wesfarmers • Woolworths • Worley	• Snam • Cadent Gas

Case Study

Ramsay Sustainability Linked Refinance

Ramsay Health Care successfully refinanced a $1.5 billion multi-currency syndicated sustainability-linked loan representing the first and largest such facility by a health care provider in the Asia-Pacific. The debt facilities embedded sustainability targets aligned with the Ramsay Cares strategy to drive a more intense focus on sustainability across the business, including on the mental health and wellbeing, reducing energy intensity and greenhouse emissions, and responsible sourcing within medical supply chains. The Ramsay Santé Group also refinanced its €1.650 billion facility as a syndicated sustainability-linked loan.

Ramsay Health Care

Case Study

Queensland Airport Sustainability-Linked Loans

In July 2019, CBA structured the first sustainability-linked loan in the Australian market linked solely to carbon emissions reductions for Queensland Airports, the operator of the Gold Coast Airport.

50% of the $150m loan is subject to margin discounts (or premiums), dependent on the airport's carbon emissions performance.

Commonwealth Bank

Case Study

IPL Sustainability Linked Loan

Incitec Pivot Limited has secured a three-year facility with approximate aggregate volume of A$750 million, comprising A$490 million and US$200 million tranches. The loan demonstrates how this type of financing can be relevant even for companies in hard-to-abate sectors by targeting performance on metrics which incentivise IPL toward its net-zero pathway beyond the life of the facility.

Incitec Pivot Limited

Case Study

Wesfarmers Sustainability Linked Loan

Wesfarmers secured a $400m sustainability linked loan through CommBank that provided a reduced cost of capital. The loan incentivises performance on both Indigenous Employment Parity and emissions reductions at the group's highest-emitting division. Wesfarmers is eligible for a reduction in margin for achievement of their sustainability performance targets. .

Wesfarmers

Commonwealth Bank

Case Study

Woolworths Sustainability Linked Loan

In September 2021 Woolworths established a Sustainability-Linked Bond Framework (SLB).
This provided a consistent target aligned to Woolworths 2030 sustainability strategy of reducing emissions in line with 1.5 degrees Paris Agreement Scenario as verified by SBTi with a 25bps p.a. coupon step up for the last two years of the bond in the event Woolworths is unable to meet the target. Following the SLB announcement Woolworths issued an inaugural €550bn sustainability-linked offering via a ~7.2 year senior unsecured transaction that was met with significant demand from over ~140 investors. Soon after the EUR transaction Woolworths issued its inaugural A$ bond market SLB via a dual tranche 6.2 and 10.2 year A$700m transaction, which also received strong support across ~150 investors and achieving a cost of funds ~5-7 basis points inside Woolworths's conventional bond curve. Citi was proud to be a joint lead manager of this inaugural SLB.

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"Coles' purpose to sustainably feed all Australians to help them lead healthier, happier lives is aligned with and supports the achievement of the UNSDGs. As part of our ambition of Together to zero emissions, we will work with all stakeholders towards net zero greenhouse gas emissions.

It is through our relationships with our team members, shareholders, farmers, suppliers, partners, customers and communities that we drive our sustainability agenda forward."

Steven Cain
CEO, Coles Group

5b. Deep Decarbonisation Technologies

To complete the task of decarbonising requires massive transformation across the economy. Some of the technology solutions needed are already mature and are becoming increasingly commercial, such as wind, solar and batteries. There are other technologies that are either still very expensive or are not yet sufficiently developed technologically or commercially. These deep decarbonisation technologies must be brought to market to enable transition to progress.

A rational path to decarbonisation for industry follows the same basic logic as that for decarbonising regions and households – parallel efforts in the following four technology types:

- **Priority 1: Energy and emissions efficiency** – the most cost-effective and immediate gains can be made by improving efficiency across all operations.
- **Priority 2: Low emissions generation** – attracted by the falling costs, businesses are switching to renewable energy often through Power Purchase Agreements (PPAs).
- **Priority 3: Fuel switching** – where technically feasible, emissions can be further reduced by electrifying as many processes as possible in parallel with Priority 2.
- **Priority 4: Non-energy emissions and offsetting** – hard-to-abate processes using fossil fuel feedstocks cannot yet be eliminated by the above. The development of additional technologies is also required and offsets provide viable options until these solutions become available.

Decarbonisation technologies can also be categorised in terms of their stage of development (Technical Readiness Level or TRL) and their commercial viability (Commercial Readiness Index or CRI). Technologies at all stages continue to be improved and there is immediate, if differentiated, activity that business needs to take across all categories. The CLC Members have developed a framework to assess technologies at all stages.

- **Maturing technologies** are technically proven and commercial today. They are demonstrated, risk assessed, bankable and come with an emerging supply and service ecosystem.
- **Importing technologies** are those that are technically proven and in widespread commercial use internationally but their adoption in Australia has been slow. This category of technologies offers a relatively quick path to decarbonisation because the technology is well-known, risks are well understood, there are mature suppliers and service providers and they can access finance readily.
- **Emerging technologies** are technically proven at lab-scale and are entering full-scale pilots and demonstrations with early adopters. These are proven technologies with significant potential but are not commercially mature. For mainstream Australian businesses to invest, they require further development, rigorous demonstration and investment in underpinning infrastructure.
- **Developing technologies** are still to be technically proven and still require investment in research and development before they can be demonstrated effectively. This category of technology will be critical for meeting net zero commitments beyond 2030.

Decarbonisation Technology Mapping

Maturing Technologies

- Solar PV
- Wind
- Short duration storage
- Grid firming
- EVs, EV charging and smart charging systems
- Nature-based offsets
- Microgrids

Importing Technologies

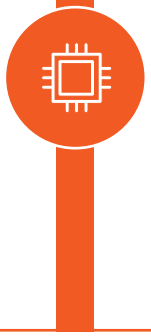
- Waste-to-energy
- Heat pumps
- Biomass
- Electric boilers
- Co-generation

Emerging Technologies

- Long-duration storage
- Hydrogen
- CCUS

Developing Technologies

- Technology-based offsets
- Long-duration storage
- Green steel
- Sustainable aviation fuel



Electric vehicles

If electrical power is supplied by low emissions sources the conversion of vehicle fleets to electric or hydrogen power is an effective decarbonisation step. The current rate of EV adoption is accelerating but slow. The high cost combined with relatively low supply for commercial applications is constraining adoption. Feedback from CLC Members has highlighted a strong demand for competitively priced battery and fuel cell electric vehicles and the associated recharging and refuelling infrastructure. If uptake can be incentivised, it is clear that Australian business will drive rapid adoption of low emissions transport.

Hydrogen

Hydrogen presents a major opportunity for Australian industry through decarbonisation of our current processes and transport (particularly heavy vehicle and long-distance applications). There is also as a major export opportunity either as a fuel itself or as value-added products such as upgraded iron ore or manufactured goods.

Near-to-market Technologies

Examples of near-to-market technologies include anti-methanogenic livestock feed additives such as future feed, fugitive methane destruction or co-generation, virtual power plants, batteries for grid-scale storage, and digital platforms for demand-response

Deployable technologies

Examples of technologies in full-scale use internationally but lagging in Australia include waste-to-energy plants, power-to-gas, biomass systems and co-firing. Technologies of particular value to Australia that require further development include solar-thermal energy integration, sustainable aviation fuel, biochar for industrial applications, widespread deployment of carbon capture and storage (CCS), development of engineered Direct Air Capture, mineral carbonation and green building products.

Cost targets for priority technologies

Recognising the importance of technology to support Australian business decarbonisation, the Australian government has published a Technology Investment Roadmap, and annual Low Emissions Technology Statements (LETS) to track progress and refine price targets for priority technologies. CLC Members have highlighted the critical need for these technologies—not just their availability but they must also be demonstrated, at scale, cost-effective and fit for purpose in order to drive finance and adoption. Five priority technologies are identified in the first LETS:

- Clean hydrogen (at $2 per kg)
- Energy storage (under $100 per MWh)
- Low carbon materials (steel under $900 per tonne and aluminium under $2,700 per tonne)
- CO2 compression, transport and storage (under $20 per tonne)
- Soil carbon measurement (under $3 per Ha per year)

As discussed in the Guide to Decarbonisation section, when considering technology solutions, companies need to consider their deployment across three time horizons. These flexible pathways will enable organisations to adapt by 2030 in a no-regrets manner as the dynamic technology changes become clear.

- **Short-term tactical projects** - actions that are clear today and can deployed and scaled immediately.
- **Development and preparation for material medium-term projects** - solutions that appear likely to be ready for deployment in the 2025-30 window but require extensive preparation of infrastructure, systems or markets and it will be critical to start working on this preparation work immediately to ready the foundations.
- **Research and partnering for longer-term hard-to-abate solutions** - solutions that are unlikely to be commercially deployable at scale until after 2030. For these, it will be critical to collaborate with researchers, peers, suppliers and on pilots for deployment post-2030.

Only by starting today on delivering all of these activities, will solutions be deployed as they become ready, enabling organisations to successfully transition.

For businesses there is an additional critical backdrop – transitioning to low emissions operation cannot come at the cost of competitiveness. Businesses must remain commercially viable and the rate of decarbonisation will depend greatly on the cost trajectories of low emissions technologies as they mature.

Australian industry also has some major opportunities in a global low carbon environment; notably as a hydrogen or renewable energy superpower and primary producer of low emissions minerals to support the global transition and agricultural products.

Once technically proven, technologies must also then become fit for purpose, cost-effective and demonstrated at scale to enable adoption by Australian businesses. In addition, supply chain ecosystems must be established – from research to producers, installers, sales and post-sales service, and support to enable successful adoption. To drive all of this requires attention to the multi-sectoral system of use and incentives to support a whole-of-economy response.

To seize these opportunities, partnerships with public bodies, researchers and private entities across all stages of development and sectors are critical. These will help drive the development of technology from early stage through to commercial deployment. The CLC Members are willing and highly motivated partners in this journey.

Key Questions for CEOs to ask:

1. What technologies are commercially viable today that could be deployed in your operations now?
2. What technologies are likely to be ready for deployment in between 2025 and 2030? What infrastructure or process changes will you need to be ready for these and when do you need to start that work?
3. What technologies are still early stage but will be needed by your business to fully decarbonise? Can you accelerate development through partnering with researchers?
4. What government bodies will help enable technology deployment in your business and how are you engaging with them?
5. What other businesses are facing similar technology challenges to you and how can you work with them to accelerate the technical and commercial viability of solutions?

Case Study

Hydrogen-powered Off-grid Clean Energy Solution in Partnership with Endua

Ampol is focused on delivering energy storage solutions for customers and sees hydrogen edge-of-grid back up power as a good first application with a broader ambition to move into residential and other light industry applications.

Ampol has joined Main Sequence, manager of the CSIRO Innovation Fund, and CSIRO to support the launch of a new Australian clean energy storage start-up Endua, to develop and deliver a hydrogen-based microgeneration and storage technology solution.

The technology has potential to deliver energy solutions that are economically and functionally competitive with diesel generators. Endua will build clean power generation and storage in a modular power bank that can drive power loads of up to 150kW in a single pack. The company will use new electrolysis technology developed at CSIRO to produce hydrogen within the device to deliver renewable energy in a cost-effective way when compared to diesel generators.

Case Study

Decarbonising Mine Transport

Decarbonising the mining fleet, locomotives and ships that transport ore to customers is one the biggest challenges facing mining. Fortescue Future Industries, the 100 per cent renewable energy and industry initiative of Fortescue Metals Group, has established a research and testing facility in Perth, and this facility will become the focal point of innovation and collaboration to accelerate the commercialisation of low emissions solutions. Progress so far includes:

- Successful combustion of ammonia in a locomotive fuel, with a pathway to achieve completely renewable green fuel.
- Completion of design and construction of a combustion testing device for large marine (ship) engines.
- Finalised design of a next generation ore carrier (ship) that will consume renewable green ammonia.
- Testing of battery cells to be used on Fortescue haul trucks.
- Design and construction of a hydrogen powered haul truck for technology demonstration is complete, with systems testing underway.
- Design and construction of a hydrogen powered drill rig for technology demonstration is complete, with systems testing underway.
- Successful production of high purity (>97 %) green iron from Fortescue ores.

Case Study

Hydrogen in Mobility

Viva Energy is focussing its efforts in the hydrogen industry on net zero solutions for heavy vehicle transport. With hydrogen-for-transport one of the closest parity uses of the fuel, Viva Energy is focussed on building demand in the industry, by bringing together its distribution and refuelling expertise, its national network, customer relationships and strategic alignment with key OEMs.

The initial focus is on "back-to-base" refuelling at its site in Geelong, building a facility with commercial-scale operations, and servicing local freight, public transport and community services. The proposal builds on its broader vision for Geelong to be an energy hub into the future.

"There is nothing you can achieve in an airport alone, and this is certainly the case in addressing climate change. The solutions to decarbonisation exist, as does the leadership from our sector, and I'm excited by the potential of the CLC to accelerate our progress to net zero emissions through collaboration and courage."

Gert-Jan de Graaff
CEO, Brisbane Airport

"Leadership on our decarbonisation pathway can come from multiple sources – voters, shareholders, customers, communities, policy makers and governments all have an important role to play. It is my strong view that leadership from the business community should be a combination of acting, but equally as important, enabling others to act as well."

Augustin Honorat
CEO, ENGIE ANZ

6. Collaborating to Lead

The Climate Leaders Coalition was founded in August 2020 with the aim to help Australia's largest companies to accelerate their decarbonisation work. This has been done through a range of activities all built on the principle that by working together and forming linkages across sectors, along value chains and internationally, the task at hand for all members may become a bit easier.

To date, the CLC has facilitated five CEO forums for the member CEOs.At these meetings, we have heard from leading international speakers to provide the global context. At each meeting one or more of the CEOs also shares their strategies, challenges and solutions to implementing a successful transition.

In addition, there have been a range of specific projects managed and delivered by the members and sponsored by one or more of the CEOs. Projects have looked at renewable energy, deep-decarbonisation technologies, cross-sector partnerships, Scope 3 reporting, finance and internal carbon pricing schemes.

All of these inputs and work have informed this roadmap to ensure that the content and direction is based on the latest thinking and information and can be used by members to underpin their own work decarbonising their operations and value chains.

What has become clear to the members is that to build a less emissions-intensive system of production and to create the behavioural and cultural changes around consumption is going to be a challenge that requires change at all levels.

This is not just a technology challenge. To enable the technology solutions to be deployed will require complete systems to evolve. If we do not take a broader approach, the inevitable and necessary transition of our economy will be disorderly and untimely – dragging on economic growth, efficiency, employment, and income in the meantime.

CLC CEO Meeting Guest Speakers

- Paul Polman, ex-CEO of Unilever
- Jesper Brodin global CEO of IKEA
- Jean-Pascal Tricoire, global CEO of Schneider Electric
- Secretary of the International Trade Union Congress
- Vicki Hollub, CEO of Occidental Petroleum
- Nigel Topping, the UK's High-Level Climate Action Champion for COP26

CLC Deep-dive Projects

- Accessing renewable energy
- Deep-decarbonisation technologies
- Partnerships
- Scope 3 reporting and data sharing
- Finance and decarbonisation
- Carbon pricing schemes.

With a holistic approach that considers communities, businesses and governments and how each can facilitate benefits for the others, we have a chance to create a thriving future for our country. More than that, Australia could build the model of how a successful transition is delivered and establish the country as a powerful voice in a decarbonised world.

To deliver on this promise requires a new culture of working and collaborating across public, private and civil society. It also requires an acceptance that the exact pathway is unknown but that the end point is agreed.

With a view that the perfect is the enemy of the good, waiting for the exact pathway to be mapped will cause value-destroying delays. Change is inevitable. If we are proactive and collaborative, then we can ensure that our fragile continent is economically resilient and that our communities will thrive.

The CLC is enabling collaboration between Australia's leading and most proactive organisations and this will be of benefit to both the members themselves and their employees and communities. This roadmap is designed to share these learnings and to enable other businesses to also accelerate their decarbonisation journey.

The Climate Leaders Coalition is providing leadership and demonstrating the way towards creating a thriving low carbon Australia.

Key Questions for CEOs to ask:

1. What lessons can you learn from looking at the decarbonisation journeys of others in different sectors and around the world?
2. What partnerships can you form along your value chain to accelerate the decarbonisation of end products?
3. Are there different ways of working, different business models or disruptive technologies that could deliver a step change to your business?
4. Can you collaborate with competitors on climate issues for mutual benefits?
5. How can you collaborate with your stakeholders in different ways to deliver greater value to all of them?

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