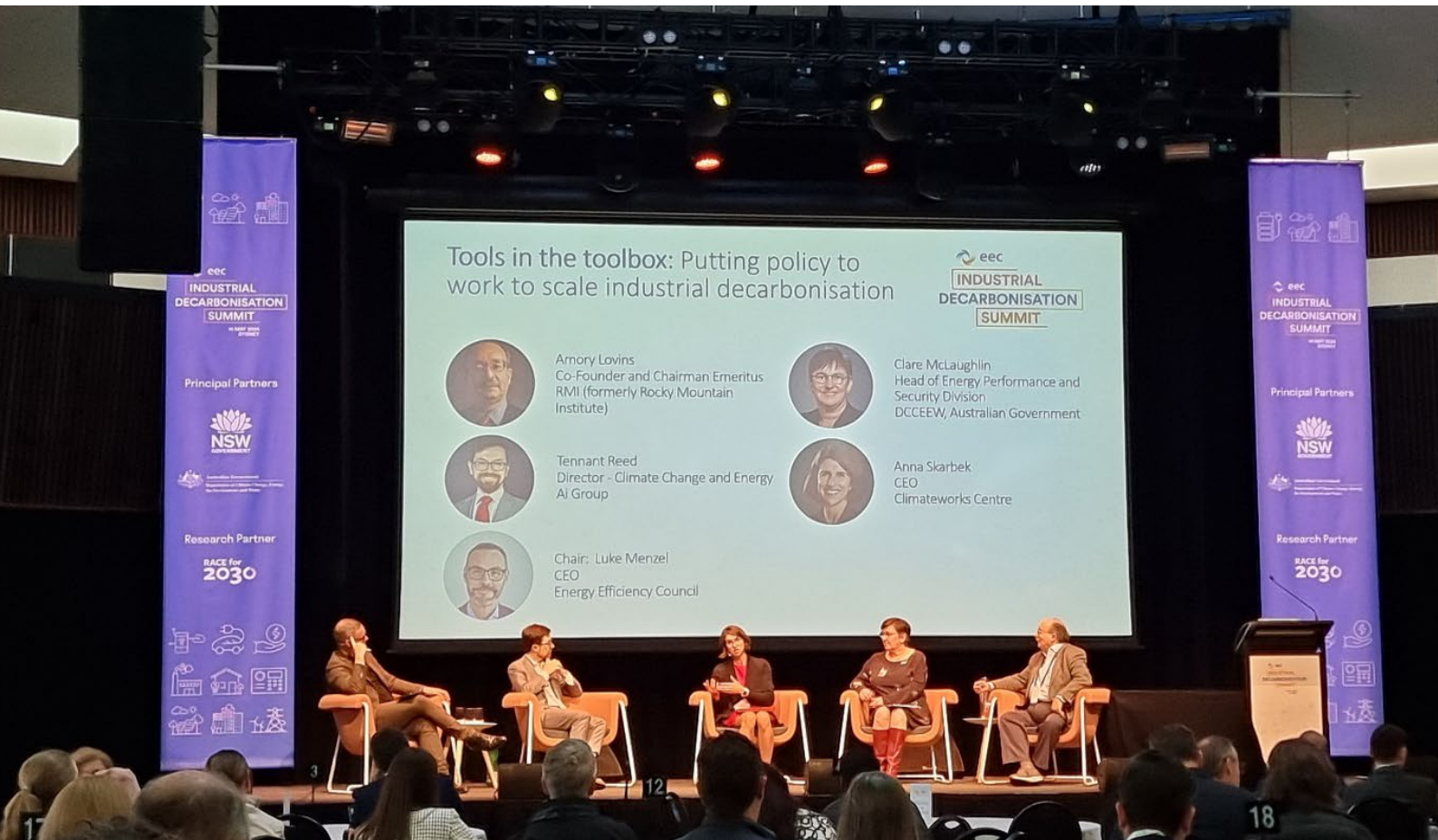Playback Report

Industrial Decarbonisation Summit

February 2025

Final report

Industrial Decarbonisation Summit Playback report

February 2025

Acknowledgement of Country

The authors of this report would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia and their connection to land, sea and community. We recognise their continuing connection to the land, waters, and culture and pay our respects to them, their cultures and to their Elders past, present, and emerging.

What is RACE for 2030?

Reliable, Affordable Clean Energy for 2030 (RACE for 2030) is an innovative cooperative research centre for energy and carbon transition. We were funded with $68.5 million of Commonwealth funds and commitments of $280 million of cash and in-kind contributions from our partners. Our aim is to deliver $3.8 billion of cumulative energy productivity benefits and 20 megatons of cumulative carbon emission savings by 2030. racefor2030.com.au

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The authors have used all due care and skill to ensure the material is accurate as at the date of this report. The authors do not accept any responsibility for any loss that may arise by anyone relying upon its contents.

Executive Summary

The purpose of this report is to playback to the organisations in attendance the main messages that were shared during the Energy Efficiency Council's Industrial Decarbonisation Summit (Summit) held on 14 May 2024. The intention is that the attendees and industry more broadly can use this report to work collaboratively to progress the ideas and generate alignment and focus around priority areas to progress industrial decarbonisation.

Summit overview

The Summit created an opportunity for the actors, key to industrial decarbonisation, to be in conversation with each other. It was a forum with an important purpose of charting a clearer path forward to accelerate industrial decarbonisation through collaboration.

There is enormous potential for industry to play a more prominent role in accelerating Australia's energy transition. The Summit brought together cross-sector leaders to define a path to progress the policies, programs and projects that could accelerate the thousands of small and medium-sized manufacturers and food processors towards their net zero path. These companies and their supply chains make up a significant portion of Australia's economy. Their energy demand and associated emissions is consequential for Australia's energy transition to net zero. The Summit provided an opportunity for dialogue regarding practical ideas on how to unlock the potential of industrial decarbonisation.

Key findings

To accelerate industrial decarbonisation at scale requires an integrated system enabled by human centred digitalisation that delivers a clear value proposition for business to decarbonise.

Decarbonisation value proposition is not clear to industry

The key challenge is that the value proposition for decarbonisation is not clear to industry despite a win-win opportunity for business to increase productivity and reduce costs while supporting Australia's net zero objectives.

A critical barrier to widespread engagement in decarbonisation is that businesses do not see its full value. Energy efficiency and decarbonisation is not a core business activity and changing processes is often viewed as a risk to operations. While decision-makers generally accept that the transition to renewable energy sources is inevitable, generally they perceive this as being independent of the day-to-day challenges. The drivers for change are cost and reliability and given energy costs typically do not comprise a large enough percentage of overall business costs, energy savings alone don't typically drive decarbonisation efforts.

An integrated system approach to decarbonisation, enabled by human centred digitalisation is needed

A diverse range of suggestions were made by panellists, keynote speakers and participants. If there was implicit, and sometimes explicit theme of the conference, it was the need for an integrated systems approach to decarbonisation, enabled through human centred digitalisation.

During the Summit, it became clear that there are multiple individual actions that can be taken to improve various aspects of the system under a business-as-usual scenario. These are often implemented as siloed, fragmented actions. However, an integrated approach with creative thinking around new boundaries that embrace cross-sectorial approaches, applies integrative design principles and supports businesses to collaborate across the energy system, would enhance the value proposition for business.

A critical barrier for many industries is a lack of digital infrastructure and expertise to gain a comprehensive understanding of the technical challenges and opportunities of pursuing an integrative approach to decarbonisation. Decarbonisation changes the relationship of businesses to energy, shifting it from a simple input to being integrated into all aspects of resource management. Artificial Intelligence (AI) and digitalisation has enormous potential to meet the needs of demand response, interoperability, enhance visibility to inform decision making, provide transparency, and provide insights into different end uses and associated opportunities. However, digitalisation needs to embed human interactions and industry needs to embrace the process. Governments have yet to engage fully with industry bodies and businesses to articulate the vision for a digital landscape. Now is the time to have a joined-up approach to this.

The potential energy system benefits in terms of cost saving and efficiency gains that can be achieved by using integrative design can deliver significant increase to Australia's productivity.

Using integrative design principles can deliver whole energy system and end-user benefits in terms of cost savings and efficiency gains and could deliver a significant increase to Australia's productivity.

Industry bodies, businesses and governments must collaborate to find solutions that embrace new geographic or cross-sectoral approaches to realise new value and opportunities. Innovative ideas that emerge need to have clear paths to practical implementation.

A successful integrative systems approach requires a strong foundation made up of multiple coordinated factors, including:

- Accessible information: to support decision making
- Robust supply chain: equipped with fit for purpose skills and technology
- Policy/market drivers: cohesive, fit for purpose, and navigable policies, regulation, standards, targets, plans and programs as part of a least cost framework
- Support for industry innovation including funding.

If we embrace human centred digitalisation and take a more integrated systems approach to decarbonisation, it is more likely to lead to an acceleration of action by industry, with sustained multiplier benefits to businesses and the economy as a whole.

Next steps

The next step is to validate and expand on the findings in this report and prioritise, sequence and assign responsible parties to actions. Ultimately the aim is to develop a cohesive credible path forward to support industry decarbonisation.

Contents

1   Introduction and report overview

The Energy Efficiency Council's (EEC) Industrial Decarbonisation Summit (Summit), held on 14 May 2024, created an opportunity for the actors, key to industrial decarbonisation, to be in conversation with each other. It was a forum with an important purpose of charting a clearer path forward to accelerate industrial decarbonisation through collaboration.

The purpose of this report is to playback to the participants and their organisations the main messages that were shared during the Summit. The intention is that the Summit attendees, and industry more broadly, can use this report to build on this work to collaboratively further develop the ideas, generating alignment and focus around priority areas to progress industrial decarbonisation.

The Summit's focus was on the decarbonisation opportunities for small to medium sized businesses, specifically companies that are below the top 200 highest emitting entities that are captured by the Safeguard Mechanism.

The Summit brought together 200+ participants comprising Australia's leading decarbonisation experts as well as those in a position to influence the successful decarbonisation of industry in Australia:

1. Industry actors, including large, small and medium energy users.

2. Industry peak bodies including the Energy Efficiency Council, The Australian Industry Group (Ai Group), the Energy Users Association of Australia (EUAA), Energy Consumers Australia (ECA) and the Australian Alliance for Energy Productivity (A2EP).

3. Technical experts and service providers who offer innovative solutions to manage energy and carbon including the Energy Efficiency Council's members.

4. State and federal government policy makers and granting institutions such as ARENA who shape emissions reductions policies and incentives.

5. Energy market actors including representatives from distribution network providers and AEMO.

6. Research institutions including CSIRO, RACE for 2030 and Australian universities including UNSW and UTS.

7. NGOs who are supporting the sector transformation including Climate-KIC Australia, Powering Skills Organisation and the ClimateWorks Centre.

The main message from the Summit was that we need to enable, scale up and accelerate industrial decarbonisation using an integrated systems design approach, with a particular focus on human centred digitalisation as an enabler.

This report details:

- Why industrial decarbonisation matters
- Proceedings and method
- Detailed results and suggested actions
- Findings
- Next steps

2   Why industrial decarbonisation matters

There are thousands of small-to-medium-sized manufacturers and food processors that have a huge opportunity to reduce emissions and manage energy costs. The energy decisions that industry make matter. The win-win opportunity for industry is enhanced productivity at lower energy cost, with broader decarbonisation benefits for the wider economy.

The scale of this opportunity is often underestimated. Amory Lovins, the co-founder and Chairman Emeritus of RMI and one of world's most influential voices on energy efficiency, set out just how big this opportunity could be for industrial businesses: *"Energy efficiency can deliver 10-time output at half the costs"*. Hakeem Haseeb, Marketing and Digital Leader at Schneider Electric supported this sentiment calling out the "*intrinsic value of the transformation - how do we achieve more from less*". Greater access to electrification and decarbonisation solutions will enhance Australia's productivity, attract a *Future Made in Australia* and deliver a more reliable energy system for industry and for citizens.

Lisa Zembrodt from Schnieder Electric reflected that what really struck her was that "*the technology already exists*" and that "*… 60% of all energy is wasted… it's really critical for us to understand what are the things that we can do to be more efficient, more productive, to eliminate that waste, or at least reduce it to an amount that is far more acceptable*".

Jon Jutsen, then CEO of RACE for 2030, highlighted the importance of replacing gas boilers noting that "*there are probably 10,000 boilers in industry used for process heating in Australia that we need to get off fossil fuels. We've barely started this task and we have to achieve it at scale in the next 5 to 10 years to meet our mitigation targets. It's a Herculean effort, and we really need to have a war effort on this thing*".

3   Proceedings and method

The day comprised a series of keynote speeches and panel sessions where experts provided information, opinions and engaged in dialogue together with questions from the Summit attendees. There were also two table sessions involving Summit participants.

Figure 1 and Figure 2 include the details of the two activities. Each table was tasked with one of the three sub questions. Each table was asked to email the main points of what was discussed to RACE for 2030 following the sessions.

The results were gathered using a combination of email records sent through from some of the tables and photos taken of working papers used during the sessions. The results were collated and synthesised as presented below.

Scaling solutions: The products, services, skills, supply chains and innovations that will deliver net zero industry

DISCUSSION QUESTION: What are the most important things we need to do, and what is it that we still need to know, to rapidly scale the products and services available to industrial businesses, in terms of:

1.   Ecosystem development: the support, knowledge, innovation, supply chain, skills, equipment available to industrial businesses

2.   Standards and regulation: minimum performance standards for equipment, and other regulatory measures that support the quality of products and services

3.   Digitalisation: Harness rapid advances in data, analytics, AI and beyond to drive emissions reduction, as well as productivity and process improvements

Bonus points: Order your recommendations in terms of priority (H,M,L), with consideration of sequencing: what do we need to do first (1,2,3)?

Figure 1 - 1st Table Activity

Driving decisions: The carrots, sticks and tambourines that will drive industrial climate action

DISCUSSION QUESTION: What are the most important things we need to do, and what is it that we still need to know, to support manufacturers and food processors to reduce risk (real and perceived) and reduce emissions, in terms of:

1.   Carrots – grants, finance and other incentives to decarbonise

2.   Sticks – regulatory measures that give business clear guardrails, from light touch (data collection and transparency) to more prescriptive requirements

3.   Tambourines – measures that build momentum through sharing information opportunities, and celebrating success

Bonus points: Order your recommendations in terms of priority (H,M,L), with consideration of sequencing: what do we need to do first (1,2,3)?

Figure 2- 2nd Table Activity

4 Findings

The value proposition for decarbonisation is unclear for businesses and many actions were put forward to address this barrier and create drivers for businesses to decarbonise. Many decarbonisation activities can be implemented under a business-as-usual scenario and in isolation to each other without an overall strategy in place. However, if businesses embrace digitalisation and take an integrated systems design approach to decarbonisation, it is more likely that accelerated action with sustained multiplier benefits to the business and to the economy will result.

4.1 The value proposition of decarbonisation is not clear to industry

For industry, the drivers for change are cost and reliability. Given energy costs typically do not comprise a large enough percentage of overall costs to attract significant attention, energy savings alone do not typically drive decarbonisation efforts.

Panellists and speakers noted this challenge throughout the day:

Jon Jutsen, CEO of RACE for 2030, "[for] a *huge majority of businesses, carbon mitigation is simply not core business, and support and innovation is crucial.*"

Lisa Zembrodt from Schneider Electric called for clarity and simplicity "*There needs to be a clear understanding of the outcome and a clear case. The technology already exists - it is how to make the case.*"

This was reiterated by Anna Skarbek from the ClimateWorks Centre who made the point that the sectors that were previously viewed as being *"hard to abate"* need to be reframed as *"late to abate"*.

These conversations fed into an overarching theme on how to clarify the benefits of decarbonisation to increase industry participation and investment.

While there are many success stories, there are also practical barriers to scale. Tennant Reed from Ai Group set out the key policies and programs including the funding opportunities, strategies and services that businesses can take advantage of now. Even with these enablers in place, many businesses struggle to prioritise decarbonisation among many pressures. Jane Butler from AGL noted that within a business, "*getting bandwidth and attention for energy efficiency is really hard*!"

4.2 An integrated system design approach, enabled by digitalisation, is needed

A range of suggestions were made by panellists, keynote speakers and participants. If there was implicit, and sometimes explicit theme of the conference, it was the need for an integrated system design approach, enabled through human centred digitalisation.

Decarbonisation can provide a suite of benefits, improving productivity while saving energy and delivering on net zero objectives. Making these benefits clear to industry is key.

4.2.1 Collaboration and Integration

Collaboration and connectivity are key to developing good ideas and putting them into action. Collaboration needs to happen across multiple fields - from data to regional precincts to policies and programs that operate outside traditional boundaries. When done well, this collaboration will engage a diverse set of skills and

capabilities and support change makers and leaders in industry. Gill Goldsmith (now Executive Director Energy) reiterated this sentiment with '*open minded collaboration is key*.'

Integration is about operating beyond traditional boundaries, removing silos and enabling connection of different actors in the system to unlock value and create scalability through thinking about whole of system design. Expanding systems boundaries could happen at different scales for example precinct, place-based, across financial systems, energy systems, government systems, sectors, states, national. There is much to be gained by redrawing traditional boundaries and thinking about the whole system and its design.

Industry decarbonisation requires multi-faceted approaches which are guided by an overarching coherence. As Anna Skarbek, CEO of ClimateWorks said *"We've committed to net zero, but we haven't finished the job of planning for that goal"*. An enabling environment or 'ecosystem' is needed to fully activate the potential. This enabling environment include the policies, services, incentives, research projects, funding and finance structures that drive industry decarbonisation towards its full potential.

Net zero planning needs to be carried out that is both tailored to individual businesses and to sectors as well as to the economy as a whole. This will affect the framework of drivers for decarbonisation, the supply chain and information requirements to inform continual improvement in this system. There was some discussion around the need for planning and the pace at which the system is changing making plans redundant the minute they are written. Amory Lovins noted that the only uncertainty was between *"fast and faster… that it is going to be terribly hard to catch exponentials from behind"*. Anna Skarbek from Climateworks highlighted the need for outcomes-based metrics rather than activity metrics to drive design innovation. For example, planning metrics should be emissions intensity driven by the carbon budget associated with the Paris Agreement, rather than being technology-specific technologies. This should keep plans relevant, even as the pace of innovation ramps up.

4.2.2   Digitalisation as an enabler

Digitalisation was positioned as a key opportunity with a central question - how can we weave in digital and AI capability as a benefit for all. Digital and AI systems need to be more interoperable, more transparent, more people centric.

Bill Lilley, then CRO of RACE for 2030, highlighted the potential of digital capability and AI for efficiency, grid balancing and demand response. But he cautioned that increasing digitalisation needs to be done in a way that embeds humans and the needs of industry back into the system and back into the process. Hakeem Haseeb from Schneider Electric echoed this sentiment, commenting that the link between the digital world and the physical world is key and that a control system is needed to transfer value into the real world. He also commented that a paradigm shift in the control systems side is needed to deliver that end-to-end value.

Developing real time digital twins, user friendly artificial intelligence and global benchmarks were put forward as key areas of focus. To do this there will need to be work across scales – from technical to social aspects of integration and connectivity. A2EP's Jarrod Leak spoke to the crucial role of metering and monitoring, and the need for both a shift in thinking around how data is used, and tools showing the value of leveraging it. The discussion in this Summit emphasised that greater focus is needed not just on digitalisation, but on how this is implemented in a smart way which puts human needs front and centre.

Benefits for business of comprehensive and smart digitalisation of data are extensive, including the identification of areas where efficiency can be improved (like minimising energy and water use in the food and beverage industry) and realising the associated monetary savings. Increasing verification, compliance and disclosure requirements opens the door for digitalisation opportunities to add value beyond operations and into easing reporting requirements.

It was recognised that there is a range of maturity relating to data capture and use and that solutions need to be cognisant of context. The government has a key role in leading by example and supporting innovation and sharing case studies/learnings. The table discussions presented the following ideas as important next steps for digitalisation.

4.2.3   Tensions

Tensions occur when two suggested interventions seem in contradiction with each other.

The Summit participants noted that substantial progress towards decarbonisation can only be made by resolving the tension between local creativity (unique, tailored, place-based solutions) and the centralised framing of system-wide standards and metrics that enable scale and integration.

Every business is different. Professor Amory Lovins encouraged us to have a "beginner's mind". Industrial decarbonisation will require emphasis on context, uptake, place and integration. However, we also need standards and verifiable, auditable, shareable metrics to scale.

The tensions referred to throughout could be alleviated through adopting an integrated systems design approach.

5   Detailed results and actions

This section details what was discussed by the speakers, during the panel sessions and by the Summit attendees during table discussions.

Specific actions identified during the table discussions fell into four key areas:

- Accessible information: to support decision making
- Robust supply chain: equipped with fit for purpose skills and technology
- Policy/market drivers: that are cohesive, fit for purpose, navigable, least cost framework comprising policies, regulation, standards, targets, plans and programs
- Support for innovation.

The ideas shared were multifaceted, but it became clear at the Summit that using an integrative systems design approach to industrial decarbonisation will be more effective and will contribute quicker adoption than if a siloed approach is taken (for example, standards cannot be set in isolation for a site without considering the impacts to the grid or the supply chain). An integrated systems design approach could be enormously effective and unlock new opportunities.

Tensions emerged across each of the four areas. These tensions are areas that will need careful consideration to ensure a robust integrated least cost way forward is established.

Tables 1-6 detail a list of suggestions from the table discussions.

Note that the action items are numbered; the numbering is not representative of sequence or prioritisation, it is more for ease of reference when using this document to collaborate on next steps.

5.1   Accessible, robust information to support decision making

Information is critical for businesses to understand:

- Opportunities for increasing productivity through efficiency and implementing decarbonisation measures
- How best to meet any applicable reporting obligations
- What comparative industry players are doing and benchmarking their performance
- Current best practice to inform their approach to decarbonisation
- Future trends that may inform strategic decision making.

There was a call for metrics that are useful for and easily integrated into business. Scott Edwards from Coca Cola shared his experience that *"Industrial decarbonisation had to be tailored to metrics that are of interest to the business"*. He emphasised that for business that take the initiative, there needs to be a positive investment return.

Having the right data available to support meaningful timely decision making is key.

It was noted that information sharing can be accelerated when everyone has a stake to communicate with each other and that regulation and/or macroeconomic policy can fuel this shift.

The following tensions emerged:

- To establish relevant energy performance or emissions baselines there is a tension between site specific issues negating the ability to create a common benchmark vs. the need to create a common benchmark to drive performance and reduce emissions across the economy.
- Energy data needs to be integrated fully into site data to give a complete picture and to support individual business decision making. Moreover, meter data needs to be shared to enable the identification of economy wide opportunities and associated decision making to support decarbonisation efforts in targeted areas. However, whilst sharing metering data is important, there are silos that prevent data sharing from occurring; for example, multiple submetering businesses which do not work collaboratively. In addition to these silos, competitive tensions can be a barrier to data sharing. These barriers need to be addressed to ensure available (de-identified) data is gathered and shared appropriately. We need to better value the economic opportunity for all businesses to grow through digitalisation enabled decarbonisation opportunities, so that the national benefits can be realised whilst addressing individual competitive concerns.
- Knowledge sharing is essential, but competition and protectionism are real barriers for businesses. There needs to be facilitation of the creation of a safe space to share learnings and best practices. There would be benefit in creating communities of practice for businesses to share information and case studies and prioritise collaboration over competition.
- Knowledge sharing is also needed between service providers; for example, contractors maintaining equipment to promote best practice within industry.

Table 1 lists out the recommendations under three categories:

- Information required
- Infrastructure to support the information gathering, analysis and sharing
- Digitalisation.

Table 1: Accessible, robust information to support decision making

Item	#	Suggested actions- Accessible information
Information needed	1	Robust scope 3 data (data gaps, monitoring and reporting, data analysis)
	2	Establish relevant baselines.
	3	Heating and cooling data between 75-100°C would help build business cases
	4	Metrics and KPIs for service providers and business and energy productivity, for example: - intensity metrics, sum$ output/sum$ input, product unit/energy unit such as L beer/GJ or bird/kWh (for poultry industry) - co-benefits like equipment safety, employee health and well being - benchmarks to encourage diverse workforce - goals (e.g. energy productivity, energy efficiency, decarbonisation) - business case cost indicators and values, how energy contributes to business value
	5	Robust smart meter and sub metering data (behind the meter), to capture 5-minute interval data
	6	Consistent measurement for climate disclosure, monitoring, verification and reporting
	7	Understanding boundaries
	8	Common understanding for the future trends and challenges
	9	Relevant Australian case studies and trials re. best practice, pre-post results, turning barriers into opportunities, sharing solutions, addressing risks, demonstrating sound business cases, where else momentum worked e.g. safety, impact on the industrial end products change. Understanding what others are doing- whole value chain visibility

Item	#	Suggested actions- Accessible information
	10	Knowledge of the supply chain, technologies, visibility of what organisations are doing in the whole value chain, what are the big opportunities. Build awareness across the whole economy so that there is a shared understanding of the shared opportunity – among customers, industry, governments, stakeholders and investors.
Infrastructure to support numerical information collection, analysis and sharing	11	More smart meters including on gas connections to facilitate better understanding of gas usage patterns to inform long term electricity planning.
	12	A metering framework is needed to make electricity and gas data available for industry, research community and customers
	13	A regulatory framework requiring ongoing data capture to meet verification requirements leads to opportunities to drive digitalisation.
	14	Forums and conferences and trade shows
	15	Media, and other broad communication channels, knowledge sharing platforms
	16	Tours e.g., A2EP heat pump tours
	17	Creating an innovation hub with monitoring and verification that enables industry to raise issues, set goals, initiate trials, engage with stakeholders and then to implement.
Digitalisation	18	Information on innovative AI trials within industry and research community
	19	Software that enables data to be presented in an easily digestible format and enables decision making, e.g. in graphical format options.
	20	Software and hardware enabling integration of data across ecosystems through improving interoperability. Available and affordable interoperable systems are needed.
	21	A mechanism to create the market for sharing data.
	22	Could chat GPT or other platforms be used to answer questions based on a data feed?

5.2   Robust supply chain to support decarbonisation

It is essential that a skilled ecosystem of workers and technology, including digitalisation, is available to support accelerated industrial decarbonisation. It was recognised that supply chains will only respond to demand. The next section on 'Drivers for industrial decarbonisation' highlights that it is critical to create the demand. The risk of losing workers offshore was recognised.

There is a huge challenge in raw number terms, as framed by Anthea Middleton, CEO at Powering Skills Organisation, who emphasised that an additional 32,000 electricians and 20,000 heating and refrigeration mechanics (approximately) will be needed to achieve the 2030 net zero targets. She also identified the opportunity that decarbonisation has brought forward for key jobs and skills industry organisations, which can work together across sectors and collaboratively address these challenges, rather than working in silos. Recognition of the collaboration needed across the policy and funding landscape is essential for scaling industry decabonisation.

The silo between the sustainability team and the rest of the business was flagged as an issue. Capacity building includes all areas of the supply chain beyond the sustainability team; from manufacturing operational staff, through to equipment sellers, marketing personnel, financial decision makers, investors, teachers, incumbents, new apprentices and everyone in between.

Building a business case for decarbonisation measures was a key skill that was highlighted during the discussions. Energy efficiency opportunities are often not supported due to energy cost savings being a relatively small business cost. More often, visible projects like those associated with reduction in waste or packaging are prioritised. For example, it was flagged that heating and cooling opportunities with a 5-to-8-year payback are not getting implemented in the food and beverage industry.

It was also noted that engineers and shareholders usually require a set return on investment (ROI) to approve project proposals, which is often presented as a discrete project based on individual equipment. Businesses would benefit from adopting a more wholistic approach to identifying decarbonisation projects. When assessing the cost benefits of projects across the entire system of decarbonisation, project efforts may yield a more attractive Return On Investment.

There is also a need to expand the boundaries incorporated in a typical business case. Amory Lovins cautioned how "*we are missing a big bet if the payback time is based on a narrow business case metrics*". These values, beyond energy cost savings, can be worth 1 or 2 orders of magnitude more than the energy savings and continue to be a strong driver for industry investment. However, they are missed when a boundary is too narrowly defined. Professor Lovins made the point that decarbonising a whole system often yields a better result rather than looking at each piece of the system sequentially.

The table discussions noted that there is generally a lack of awareness of these opportunities within businesses. The marketing value of decarbonisation should not be undervalued.

It was also highlighted that there needs to be capability in more effective cross functional communication to break down organisational barriers, utilise a common language, and increase influence, awareness, cooperation and buy-in for decarbonisation activities across the business. Communication skills are needed across the ecosystem, from governments providing clear simple instructions regarding regulatory frameworks to businesses, through to staff providing internal messaging within businesses.

The following tensions emerged:

- Industry demand for skills and equipment to create supply vs. reliable supply chain to spur demand.
- Whose responsibility is it to provide the education and the resources? It was flagged that potentially this is a role for the government, also the electricity companies.

Table 2 lists out the recommendations under two categories:

- Skills required
- Infrastructure to support skills development.

Table 2: Robust supply chain equipped with fit for purpose skills and technology

	#	Suggested actions- Supply Chain
Skills needed	1	Developing building business cases for decarbonisation opportunities: e.g. Heating and cooling 75-100°C
	2	Being agile and adept to adjust to rapid changes – particularly in compliance
	3	Clear effective cross functional communications to achieve broad buy-in for initiatives
	4	Improve understanding of energy use and flows, design, processes and potential technologies and services
	5	Leadership skills - how to build and maintain momentum across the business
	6	Improve understanding of relevant legislative requirements and how to implement standards
	7	Pathways to net zero/ transition planning, fit for purpose decarbonisation decision making
	8	Data analysis and capture for decision making
	9	Better understanding of whether to import equipment or manufacture it in Australia (for example high temperature heat pumps)
	10	Integrated planning approaches for example linkages between optimisation plans and decarbonisation plans
Infrastructure to support skills development	11	Improvement in apprentice wages to attract more apprentices, whilst increasing decarbonisation relevant modules in curricula as well as increasing industry placement opportunities and practical experience with new technologies as part of these vocational educational offerings. This will yield more highly skilled apprentices and reduce the burden on the business to train on the job
	12	Increase number of skilled teachers with relevant decarbonisation knowledge
	13	Training should offer practical experience with new technology for increased confidence
	14	Training opportunities and awareness to attract more people to contracting positions to address contractor scarcity
	15	Update curricula to include the breadth of decarbonisation knowledge and skills needed including multi-disciplinary expertise
	16	Government needs to lead in making clear to industry what are the current skills shortage assessment to inform future requirements, trends skills and solutions as the basis for ecosystem development
	17	Need long term planning for vocational training and career advice re. the vision for Australia.
	18	Understanding how can industry collaborate to enable skills
	19	Equipment to meet the demand (meters, heat pumps, high efficiency motors etc.)
Digitalisation	20	Developing business case for digitalisation to address business needs
	21	Greater understanding of AI and digitalisation opportunities
	22	Digitalisation skills and knowledge: understand the different benefits of digitalisation and available capability as relevant to industry. For example, to help inform long term planning, to meet short term reporting obligations, to provide efficiency and competitiveness insights and to help inform day to day decisions.
	23	Update existing training (courses, degrees) to include AI, data science and analytics
	24	More training for existing employees to increase ubiquity of digitalisation skills and knowledge across industry
	25	Need long term planning for vocational training and career advice re. for Industry 4.0
	26	Accessible software that enables data to be presented in ways humans can interact with to easily digest it and make decisions for example graphical format options

5.3   Drivers for industrial decarbonisation

This section is about creating the right balance of incentives, and that the sticks, carrots and tambourines need to be aligned to ensure long term goals are met. The incentives need to be:

- Well-thought-out so that the price gap is right
- Dynamic so as not to undermine the perceived value,
- Able to deliver low risk and high value.

The Summit called for a clear policy and regulatory framework. It needs to be a cohesive, fit for purpose, navigable, affordable framework comprising policies, plans, regulation, standards, targets and programs. Perverse incentives like fuel tax credits and subsidies for fossil fuels need to be removed. Trade-exposed industries require careful consideration, along with a thorough assessment of international competitiveness, when developing standards and regulations. This includes measures such as establishing a carbon border adjustment mechanism (CBAM). It was noted that embedded networks create a perverse incentive, discouraging organisations from managing infrastructure, leading to a more costly approach. The Summit also called for a data driven compliance regime.

Integration and alignment are key features of the decarbonisation pathway. Anna Skarbek commented that "*Industrial decarbonisation is a major revitalisation opportunity and can lead to prosperity, but this requires government, finance and industry alignment*".

Amory Lovins strongly advocated for the need to "s*tart with why and what questions - before it gets to how?*" Asking questions in a different design order can yield huge savings.

Integration and coherence between incentives, strategy, standards and implemented actions was also a dominant theme. Clare McLaughlin from the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) reiterated the need for "*efforts to remove barriers between industry and government collaboration*". Helen Wilson - Deputy Secretary, Science and Technology from the Department of Industry, Science and Resources, called for "*Clear, consistent and coherent policy. The Future Made in Australia plans and Sector Plans currently underway are part of this coherent strategy.*"

The role of government in managing the risk was recognised. There were questions raised around who decides what. For example, there needs to be a wholistic supply chain linked by minimum standards to enable products into Australia, ensuring no misinterpretation or misappropriation.

Regulation was flagged as a way to ensure businesses focus on decarbonisation, noting that the cost of the requirements need to be factored into the impact on businesses. Regulation is required to drive investment needed to build scale. For example, the sugar industry needs circular design thinking to redirect current waste products (to useful products like fertiliser production) to replace gas usage. It was recommended that we learn from the RET and credit schemes as part of setting a roadmap and strategy. Generally, there was not support for hydrogen from participants at the Summit.

The Summit called for defining the standards that would force/trigger action. It was noted that the demand for standards would be raised through:

- Implementing legislative rewards on implementation of better standards
- Reducing costs of compliance with standards so costs don't outweigh benefits:
  - make standards available free of charge - the fee associated with purchasing standards can be a barrier to widespread application.

- remove accreditation barriers, for example green star and climate active were seen as too expensive.

The Summit dialogue included an observation that sound standards formation requires clear and consistent data. This created some tensions that are discussed below.

The Summit called for effective enforcement and verification of compliance regimes for regulation and standards to ensure a level playing field in relation to quality and credibility. For example, compliant usable equipment should be installed (an example of abandoned metering was flagged). Other examples include verification of green claims through certifications / ratings; assigning penalties for not meeting internal and external priorities; verification of ratings to see if efficient technology has actually been installed.

Incentives such as financial and program support are needed to reduce the costs associated with prudent measurement and capture and analysis. Government funding and blended finance were identified to scale uptake over time. It was raised that businesses can start now, by paying attention to the data available and build from there.

The following tensions emerged:

- Performance and safety standards for electrical equipment is needed, but acknowledgment that this can stall progress. There is a need to find the right balance between regulation and promotion/ roll out of new equipment.
- Standard and regulation formation: Regulations, standards and policy should be collaboratively set between government and industry (and other supply chain actors) and that standards should be driven by industry/ the sectors. That there needs to be consistency and policy support. To do this there are some challenges in that government needs to better understand how to connect with industry. In addition, effective collaboration across industry or between industries can be difficult to achieve. An example was cited where there might be 5 different providers of a product, and they will not come together due to competition issues. Competitiveness focused on increasing one's own share of the pie vs. collaboration to increase the overall size of the pie.
- Standards for whole of system vs. components of system - component standards cannot deliver all energy efficiency systems well.
- Target setting – industry vs. government setting targets. A business setting a voluntary target through SBTI may be reaching at a higher benchmark than another business that is not operating to a target which creates an uneven playing field. Another view is that government needs to regulate and enforce performance against targets with the view that it is not enough for industry just to set their own goals.
- More standards vs. less standards. It was noted that standards introduce red tape and the impact of this needs to be considered carefully.
- More verification and enforcement vs. less. It was noted that verification and enforcement costs are high and trade-offs need to be considered.
- What should be a regulation and what should be voluntary standard?
- State based schemes vs. national schemes for example whether the Energy Savings Scheme (ESS) in NSW should be rolled out across states and/or a national scheme created to replace the ESS.
- Boundaries for regulation: State vs. sector vs. federal vs. alignment with international vs. aligned to focus on Australian sector performance and specificities.
- Regulation driven by industry vs. by government.
- Mandatory disclosure:
  - regulation fit for purpose for business size: stick to the top 200 vs. including smaller organisations acknowledging cost

- Scope 3: Industry needs guidance but it doesn't need to be too prescriptive.

- Standards and regulations to be sector vs. process specific vs. geographic vs. end use specific and outcomes focussed
- Fit for purpose standards - standards are needed as they provide a common language. For instance, asset management should align with ISO55001, but this may not be appropriate for smaller organisations.

Table discussion suggestions are detailed in the tables below:

- Regulation (Table 3)
- Standards (Table 4)
- Financial and program support (Table 5)

Table 3: Drivers for decarbonisation- Regulations

#	Suggested actions- Regulations
1	CBAM is needed to avoid carbon leakage.
2	Embed energy requirements into existing approvals for example development consent and environmental approvals and environmental licences which evolve over time. Real time electricity metering and monitoring to be put into planning requirements for new builds and retrofits over time and that these requirements be enforced
3	MEPS should be mandated for use in government procurement
4	Regulate cost of carbon (with clarification on carbon pricing and methodology)
5	Regulate emissions reduction through biogas delivery to the network to accelerate rates of injection of biogas
6	Emissions reduction by sector
7	Mandatory Scope 3 emissions accounting and reporting- linked to energy efficiency (accompanied by guidance and a simpler, lower cost methodology), linked to energy efficiency reporting
8	Mandatory financial disclosure will create momentum for industrial decarbonisation across the supply chain.
9	Mandatory Scope 1,2,3 reporting on a product basis for industry with turnover more than $50m.
10	Reintroduce EEO style reporting
11	Mandatory energy audits
12	Mandatory energy management (systems)
13	Feedstock and waste management export limit restrictions (scrap steel, biofuels feedstocks)
14	Penalties for non-compliance ($ and reputation)
15	Carbon solutions levy
16	Equipment mandates for example, every process requiring heating below 95C should be done by a heat pump.
17	Safeguard 2.0 to apply to NGER reporters (in consideration of operational and capital costs) and consideration of what drives companies below those captured by Safeguard
18	Expand NGER requirements: reduce NGER thresholds, expand NGER to aggregate sites, Expand NGER to include waste heat (requires waste mapping, biomass, bagasse, data mapping and boiler mapping)
19	Require commitments to net zero coupled with a plan on least cost to achieve.
20	Require targets to be set by industry. Tension between industry setting voluntary targets (for example using SBTI guidance) at a higher benchmark than another that isn't operating to a target, it is not a level playing field. Also tension between industry setting the targets and Government needing to regulate on targets with the view that it is not enough for industry just to set their own goals
21	Expand and simplify White certificates- introduce a national scheme, or introduce across all states
22	Sub-metering data to be made available for the research community, Resolution of meter ownership issues. For example, if the Gas company owns the gas meter, then industry needs to put in a pulse meter and if the Gas company already has the pulse meter, industry cannot access it. The NCC to require gas and electricity submetering to be connected to the CSIRO data lake.
23	More targets are needed: - Coordinated government of setting targets, including national targets - Targets can gradually improve, for example don't need 100% biofuels straight away in the aviation industry
25	Place based regulation could be effective, and is an interesting way to test regulations. For instance, in Kwinana, the precinct is partly trade exposed
26	Regulate players big enough to collaborate and regulate their interactions

Table 4: Drivers for decarbonisation- Standards

#	Suggested actions- Standards
1	SMART energy standards are need for example energy ratings, NABERS. Businesses need the ability to measure their output by standards, both locally and internationally
2	Safety standards to support role out of new products
3	Equipment standards- noting these would be more effective and powerful if they were integrated and linked to those that relate to its supply chain (for example lithium batteries- minimum standards – impact, manufacturing regulations, mining and processing regulations)
4	Minimum standards and benchmarks
5	ISO standards needed – for example Asset management should align with ISO55001, they provide a common language - though noting they are not fit for purpose for smaller organisations
6	Energy efficiency (Australian energy efficiency performance is too low compared to the rest of the world)
7	Energy management system standards need to be tighter
8	Design standards
9	Fuel efficiency standards
10	Systems standards (the current focus is on closed systems e.g. kilns)
11	Equipment upgrades standards
12	Emissions reduction by sector standards
13	Carbon performance indicator standards
14	MEPS
15	Need to lift standards for electric motors: expand size and ratchet up the minimum requirements- the manufacturers are the target
16	GEMS - need greater transparency of efficiency of packaged equipment for example energy labels
17	GBCA, industrial design standards to incentivise right sizing and good design
18	Standardisation of data accessibility is needed across control systems- to enable data interoperability. It was suggested that government funded projects around data interoperability and availability is needed.
19	Removal of conflicting incentives in conflicting management systems like HACCAP in the food and beverage industry.

Table 5: Drivers for decarbonisation- Financial and program support

Item	#	Suggested actions- Financial and program support
Programs including direct support and easy to access incentives	1	Make available kickstarter programs and ensure programs work together
	2	Accessible loans to decarbonise (coupled with support to access)
	3	Programs that: set up programs that build networks (for example matching businesses with each other and with service providers) and capacity for example, Sustainability Advantage
	4	Celebrate success to improve visibility and attract a diverse workforce e.g. awards ceremonies like Banksia Awards and BusNSW, as well as other sustainability ambassador awards
	5	Set up programs that offer official recognisable skills development pathway for decarbonisation skills with rewards, focussed on filling gaps and building capacity
	6	Successful programs like: the US DOE Industrial Assessment Centres for SMEs which have been so successful in the US.
More grants	7	Make grants easily accessible and navigable: - easily navigated so it is clear to industry when and how to access them (for example making available a roadmap) - noting it some large businesses employ a grants specialist because it is so complex to navigate and some need to apply multiple times, it needs to be easier for small business to participate. - Make available a central platform for all grants with visibility of state and federal opportunities and classification to help navigate (for example validity dates, temperature range) - Make grant alerts available
	8	Well designed and a comprehensive offering to business, Grants: that - are cognisant of costs (for example downtime costs could offset or outweigh the grant award)

Item	#	Suggested actions- Financial and program support
		- are consistent across states with clear links to decarbonisation savings accompanied by specific guidelines regarding the process. - are available to all business sizes, for example ARENA grants are better suited to larger businesses, smaller businesses may need tax break or seed funds. - take into account learning from good grants programs, for example other states could replicate the NSW compressed air grant (compressed air is a huge cost to manufacturing) and the current NSW metering grants in NSW. - are well targeted to what needs to be done- e.g. carbon reduction vs electrification, energy audit / appraisals grants, monitoring (coupled with know how) The federal government should provide guidance for the states in terms of what they should focus on. - Remove perverse incentives, e.g. state based grants pose challenges for national organisations
Accessible direct advice to businesses	9	Provision of self-guided excel based tool kits
	10	Net zero guide, showing both success and failure
	11	Tailored free advice services to help a quick start, for example, emission reduction advice/ goals, real decarbonisation pathways
	12	Information on understanding legislation
	13	Information on how to implement standards
	14	Government guidance on choices for example Vic Gov's electrification from gas
	15	Accessible guidance on emissions data estimation guidance
	16	Support to write grant applications and navigate grant systems
	17	Support dynamic business planning

5.4 Support for innovation

Creativity and innovation are key to being able to achieve accelerated industrial decarbonisation at scale. Bill Lilley from RACE for 2030 called for Australia to "*embrace innovation*" explaining that Australia is "*too worried about risk and the opportunity if we enhance the curiosity factor is huge*". The future policy to enhance Australia's unique opportunity to be innovative. Amory's Lovins presentation provided the principles to put this into practice when he shared the ten pillars of integrative design.[1] These pillars included engaging vision across boundaries, avoiding disciplinary silos, recognising the downstream compound upstream and the need to optimise systems, not isolated parts. All these require collaboration to unlock the value and hence building connective tissues will unlock greater benefits.

Luke Menzel from the EEC called for Government to reward creativity and leadership *"Government can't fund everything. But if they fund the businesses prepared to stick their chin out and go first, it makes it easier for the ones who come 20th."*

The table discussions called for the following:

- Demand for innovation must come from industry
- The products should be developed for the anticipated need - once demand is there it is too late
- Governments need to play an important role in supporting innovation and that innovation is needed to de-risk change
- Government support for innovative trials is needed
- It is critical we create an innovation culture that stays on shore

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[1] Integrative Design: A Disruptive Source of Expanding Returns to Investments in Energy Efficiency - RMI

- Support for research and development is needed in both the business and government spheres to successfully decarbonise industry.

Table 6 provides the detailed suggested actions raised during the Table discussions in relation to innovation.

Table 6: Support for innovation

#	Suggested actions
1	Solutions need to be developed that require less skills (will help solve for the lack of skilled workers)- innovation to simplify skills and training requirements to meet decarbonisation needs
2	More pilots and case studies are beneficial to prove business case.
3	Trials of AI driven improvements in energy efficiency and associated sharing of learnings and outcomes.
4	Innovative ways to address challenges around dealing with scope 3 and cyber security issues.
5	Innovative ways to incorporate digital twins to support asset management
6	Innovation aimed at reducing cost and emissions

5.5   Next steps

The next step is to, prioritise, sequence and assign responsible parties and ultimately develop a cohesive credible path forward.

RACE for
2030
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