

# New Low Carbon Industry Foundations

## Net Zero Industry and Innovation Program

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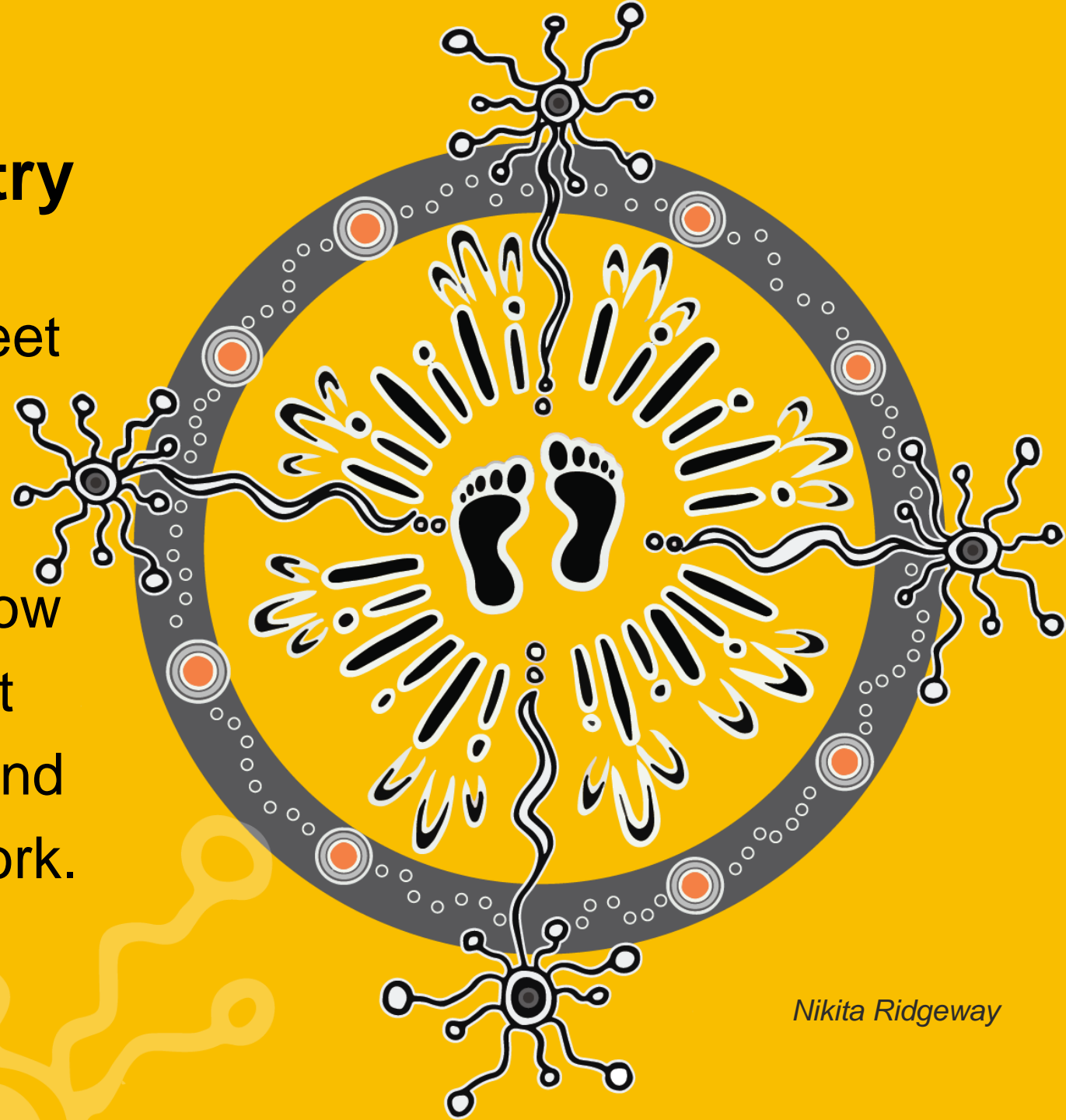
Presentation delivered during the Stakeholder Consultation Workshops:

- Hunter Valley (17 June 2021) and
- Illawarra (14 July 2021 and 4 August 2021)

# Acknowledgment of Country

We acknowledge that today we meet on many Aboriginal lands.

We acknowledge the traditional custodians of the lands and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work.



*Nikita Ridgeway*

# Why are we here

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- Identify the **challenges**, **opportunities** and **ideas** for industrial decarbonisation in the Illawarra and Hunter Valley.
- **Contribute** to the design of the New Low Carbon Industry Foundations (NLCIF) stream of the Net Zero Industry and Innovation (NZII) program.
- Explore the potential to **build strategic alliances** deliver regional decarbonisation.



Image by Paul Bradbury

# Agenda

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Time	Activity
9.15am	Welcome
9.30am	Program consultation – what we've heard so far
10.15am	Program design & approach
<b>10.45 am</b>	<b>BREAK</b>
11.00am	Q&A
11.15am	Possibilities for industrial region transitions
12.00pm	Coordination and collaboration in industrial region transitions
<b>12.45pm</b>	<b>LUNCH</b>
1.30pm	Roadmap development
2.15pm	Next steps
<b>3.00pm</b>	<b>Close</b>

# Meet and greet

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- What connects you to the region?
- What do you want to get out of today?
- What questions have you come with?



Image by Chris Montgomery

# Program overview

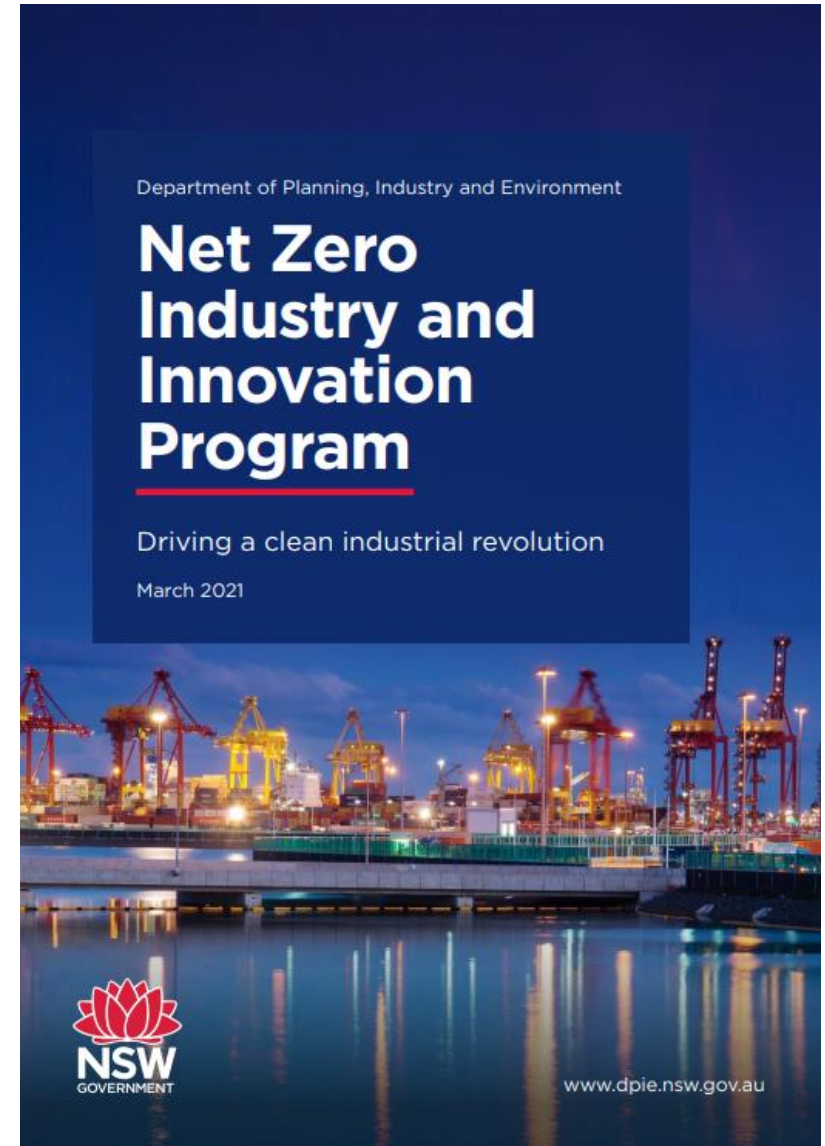
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# Net Zero Industry and Innovation

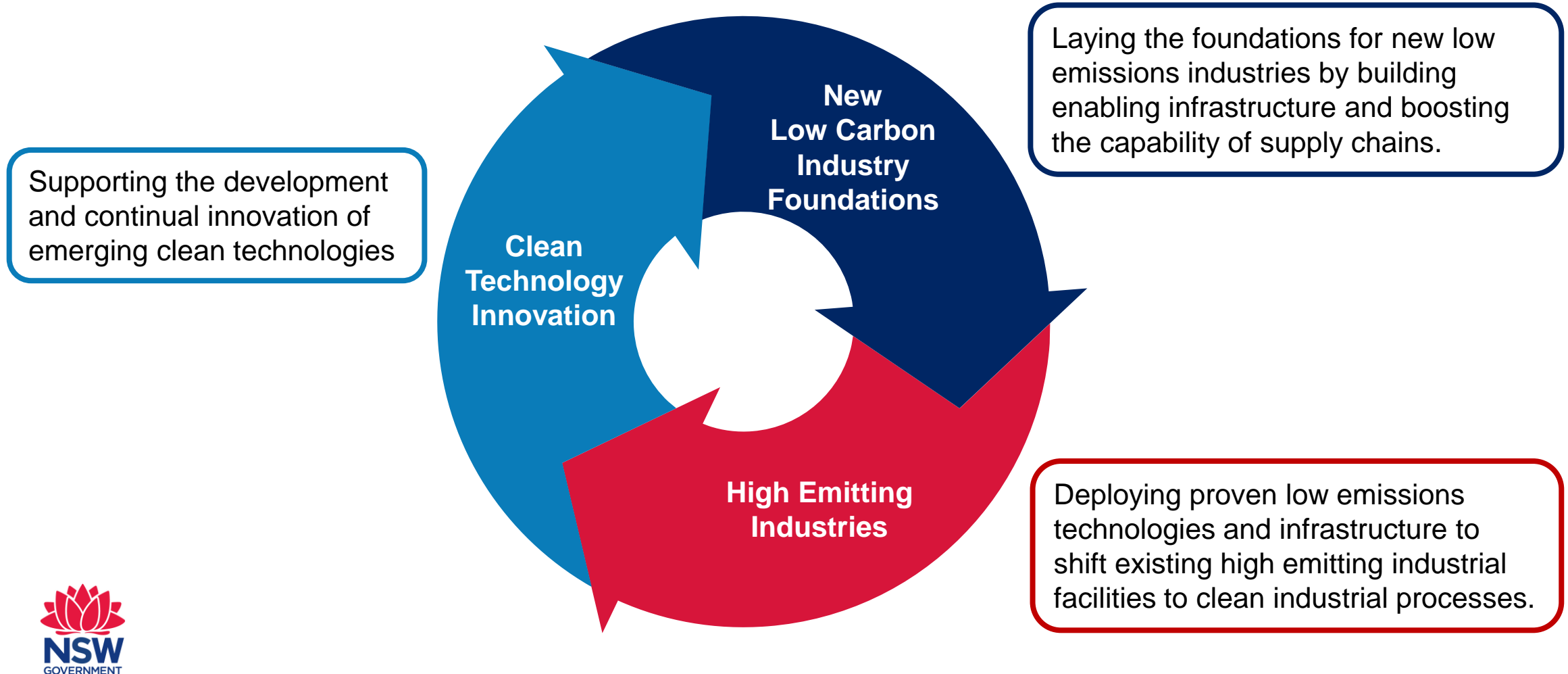
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- The NSW Government's plan to **support and partner with industry to reduce emissions** and help businesses prosper in a low carbon world.
- **\$750 million** will be invested by the NSW Government to 2030
- It sets out the **importance of private co-investment** to deliver NSW's targets
- Giving business the **confidence to invest** in a low carbon future.



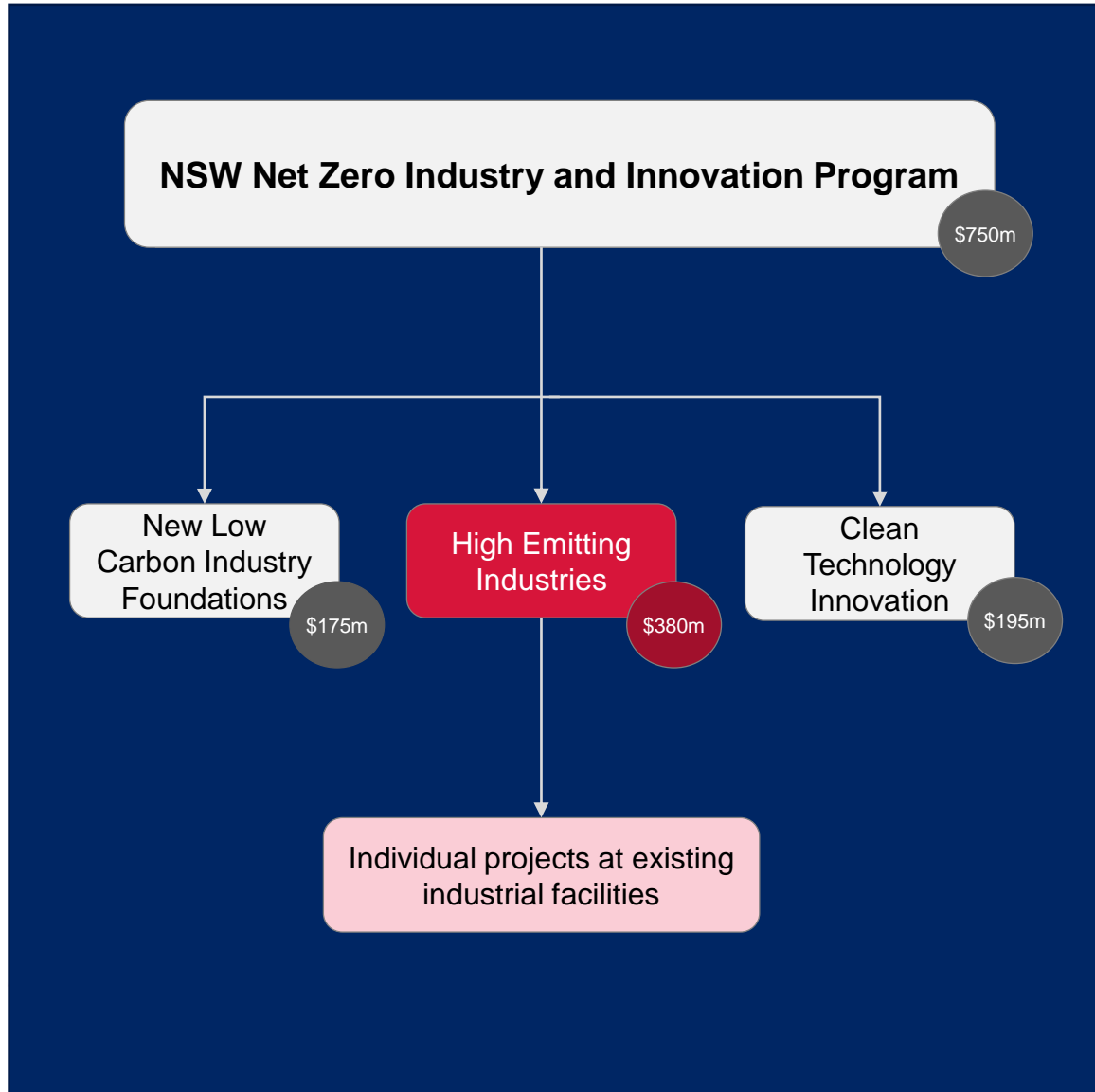
# Our areas of focus

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# High Emitting Industries



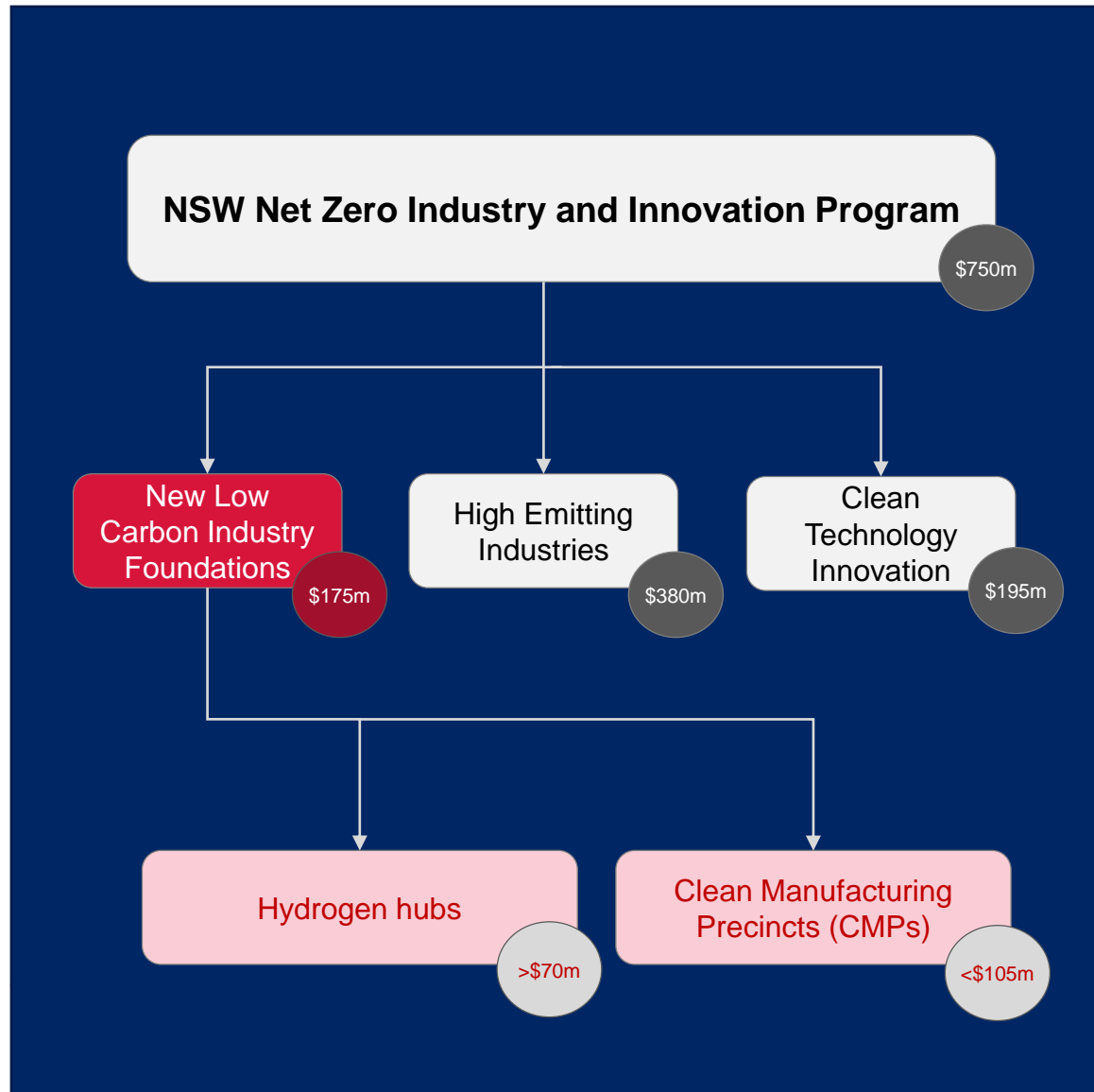
HEI objectives include:

- Supporting high-emitting facilities implement decarbonisation projects
- Reducing significant emissions by 2030
- Enhancing industries' capabilities to thrive in a low-carbon economy beyond 2030

Funding may be allocated to:

- Facilities looking to transition plant, equipment and other assets to low emissions alternatives.

# New Low Carbon Industry Foundations



NLCIF objectives include:

- Accelerate the deployment of enabling infrastructure and technologies needed to decarbonise industrial supply chains
- Creating new low-carbon industries
- Enhancing industries' capabilities to thrive in a low-carbon economy.

Funding may be allocated to:

- The deployment of hydrogen hubs
- Develop decarbonisation roadmaps, delivery plans and feasibility studies
- Demonstration and deployment of enabling infrastructure.

# Program consultation

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# What you told us

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Strategy



Technology



Industry  
structure



Investment/  
Finance



Markets



People/  
Communities



Policy/  
Regulation



Knowledge  
/ Research



# Strategy

- Shifting strategic priorities where *'business as usual is no longer an option'*
- Pressure to align corporate priorities with Net Zero Emissions targets: *'Shareholders and stakeholders want certainty that the business will be around beyond 2030'*
- Scoping changing market landscape to seize opportunities and manage risk
- Organisational commitments to decarbonisation goals
- Coordinated, planning approach vs. unilateral action opens up more possibilities
- *'New businesses will want to locate in low carbon industrial regions'*



Image by Kinwun\_istock#1130498419



# Technology

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Image by chinaface\_iStock-489735770

- Unique pathways
- *'Full suite of technologies will be required'*
- Bullish on hydrogen, bioenergy, material substitution, CCUS, renewable energy and storage
- Process optimisation and energy efficiency
- Mixed positions on natural gas
- *'Decarbonising the grid is a key priority'*
- *'Supporting demonstration projects crucial'*
- *'NSW has good clean tech sector...problem to scale up'*





# Industry structure

- Relationship between parent companies and subsidiaries is an enabler/constraint
- Operational limitations: *'other risks to consider (e.g., safety)'*
- *'Limited resources but strong capabilities'*
- *'Don't have the bandwidth to make sense of all the opportunities'*
- Many orgs have business units mandated to scope and implement decarb projects
- *'Full integration remains an issue'*
- *'Business models are evolving to take advantage of emerging opportunities'*





# \$ Investment

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Image by yoh4nn\_istock#530743548

- *'Payback periods for decarbonisation projects do not stack up...pure cost'*
- Look beyond simple hurdle rates: *'size up the potential opportunity'*
- Different hurdle rates for decarb projects
- Balance *'quick-wins'* with *'long-term prospects'*
- *'Program needs to account for investment cycles and corporate decision-making processes'*
- *'These investments take a long time to recover costs for capital...need a different business model to compare competing priorities'*



# Markets

- *'Chicken and egg dance...hard to be the first-mover'*
- *'Difficult to move away from well-entrenched and reliable energy systems and industrial systems'*
- Little experience with large scale energy transformations
- Green premium dilemma: *'price- takers with tight margins in competitive markets'*
- *'Great opportunity for companies to come together and establish zero-carbon industrial' precincts'*
- Existing industries vs. new manufacturing base
- Repurpose and mobilise idle assets (e.g., land)



Image by SlobodanMijevic\_iStock#1097843582



# People vs communities

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- *'Place people and communities at the centre of energy and industrial policy'*
- *'It's all about jobs...take workers along or face resistance'*
- *'Opportunity to reinvigorate legacy industrial regions'*
- *'Communities will be left behind if industries do not move to a low carbon economy'*
- *'Companies will have to compete for skilled workers who want to work for visionary companies'*





# Policy and regulation

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- Strong support for a *'coordinated approach'*
- *'Difficult for businesses to collaborate outside of Clean Manufacturing Precinct concept'*
- *'Government is key to catalyse strategic coordination'*
- *'In the absence of a carbon tax, there's a cost premium for low carbon alternatives'*
- *'Need clear market signals to move projects'*
- *'Which sectors/technologies will be prioritized?'*
- *'Balance short and long-term opportunities'*
- *'Engage early and often to seek alignment'*



Image by DPIE\_Quentin Jones



# Knowledge and research

- Testing, piloting and demonstration
- Importance of incubators – ideation to commercialization
- Impressive research and advisory capabilities
- Far reaching collaborative projects
- Integral partner in a net-zero world

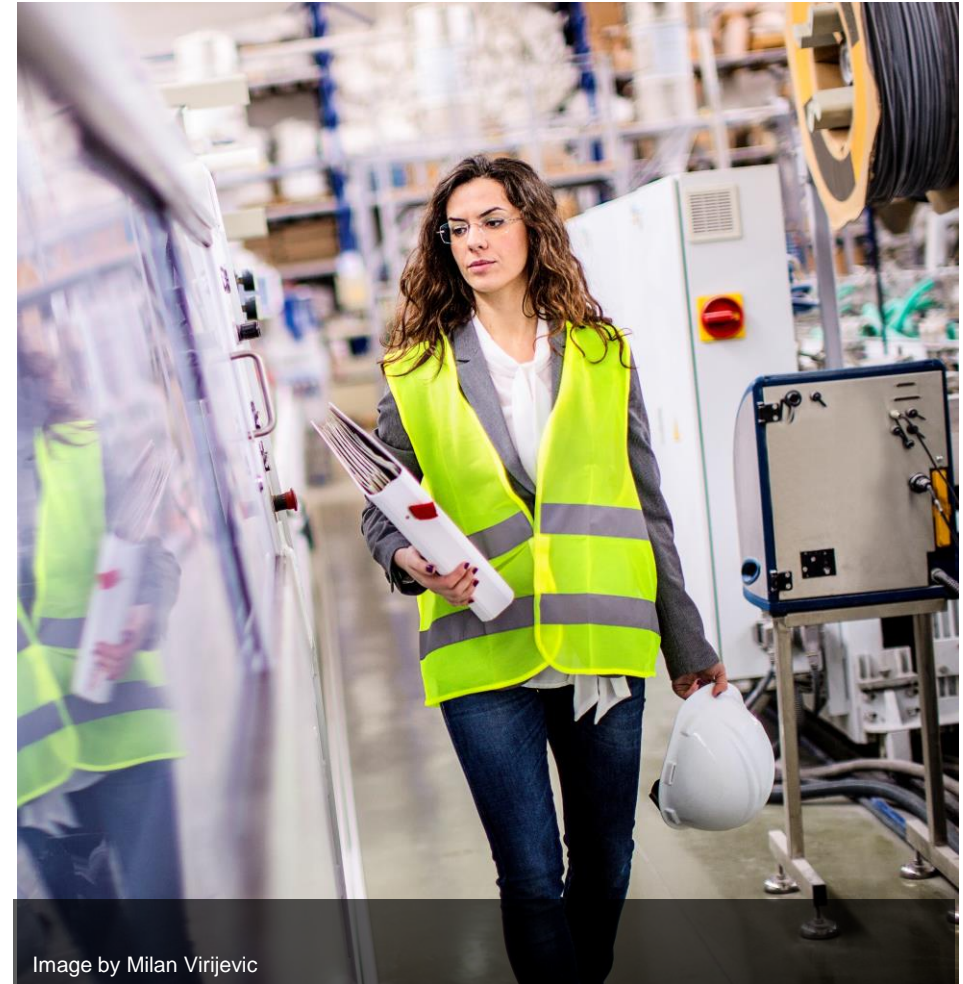


Image by Milan Virijevic

# Discussion

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- What is surprising or unexpected?
- What rings true?
- What questions do you have?

- 3 mins in pairs
- 10 mins as a group
- Write down your reflections and questions

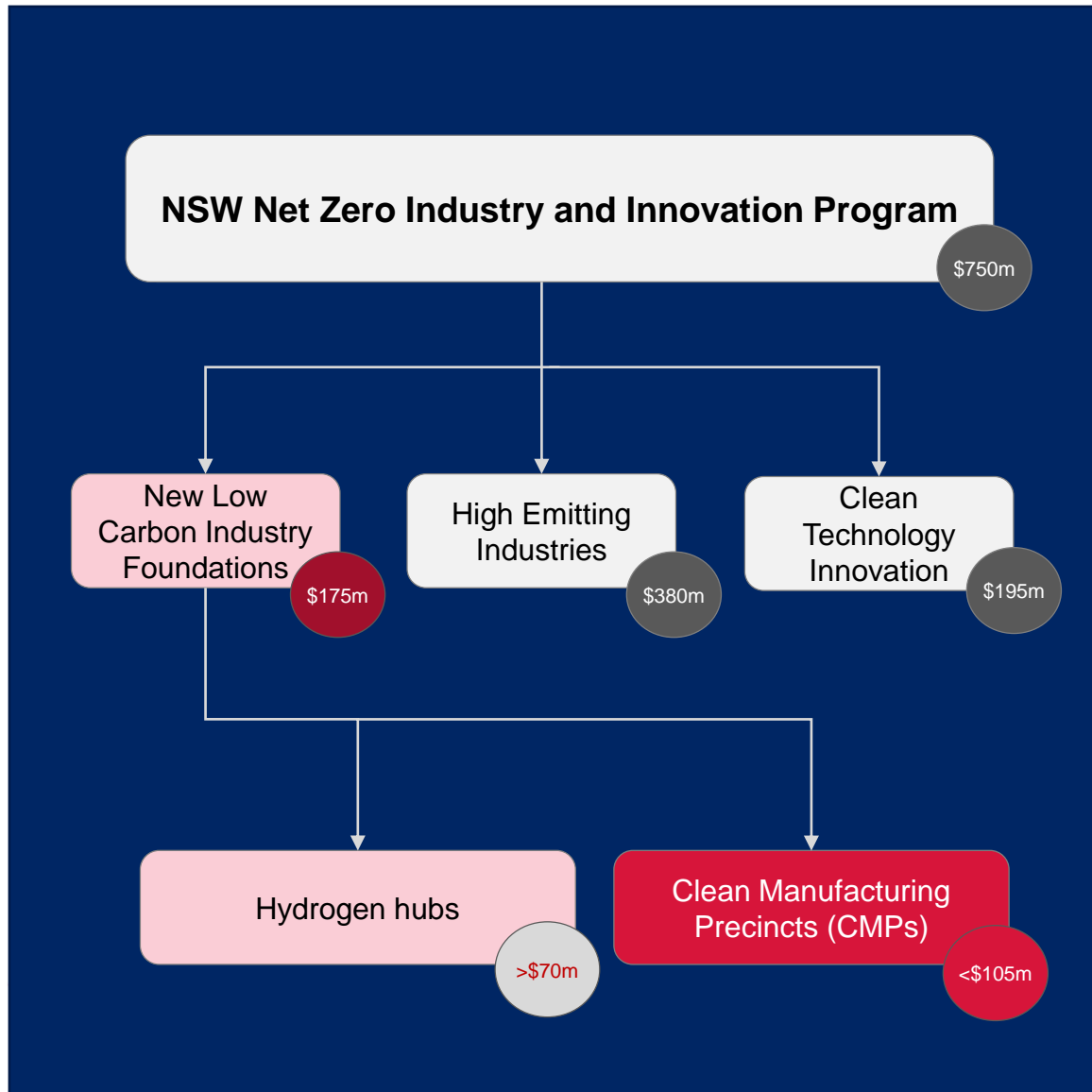


# Program design and approach

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# Clean Manufacturing Precincts



- The Department plans to support the emergence of Clean Manufacturing Precincts (CMPs)
- Key enabler to accelerate the deployment of low-carbon, enabling infrastructure
- Focus will be on decarbonising industrial supply chains in the Hunter and Illawarra regions
- Consider greenfield, industrial precincts at later stages of program

# Clean Manufacturing Precincts

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## What is a CMP?

- Geographic areas where industries are co-located
- High emitting facilities and their supply chains identify, plan and deploy the most appropriate low carbon technologies
- Emphasis on an integrated approach across sectors
- Provide opportunities for scale, sharing of risk and resources, aggregation of demand.

## Why a CMP?

- Industrial emissions are the most difficult to abate
- Opens decarbonisation pathways by coordinating planning and investment
- Crowds-in capital investment
- Regional dissemination of knowledge
- Optimises program funding by better integrating NZII streams
- Provides certainty to invest in short term and longer-term opportunities

# Clean Manufacturing Precincts

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## Characteristics

Tailored solutions that reflect place-based characteristics:

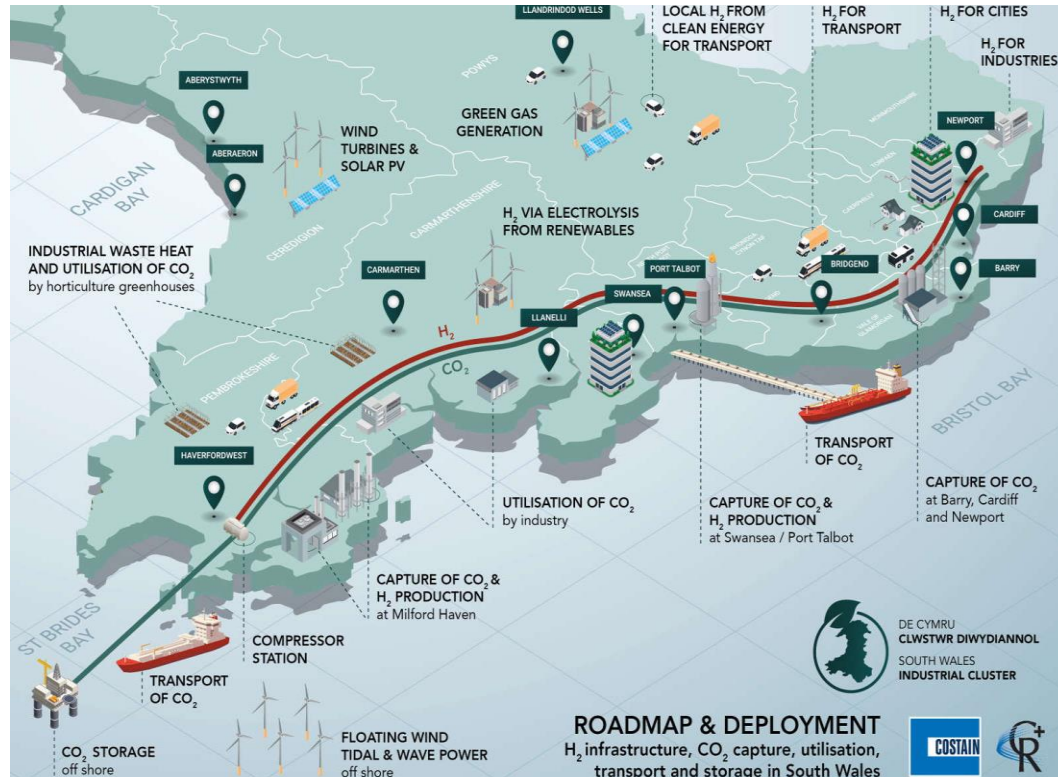
- Industry composition
- Geography and climate
- Existing infrastructure
- Energy costs and reliability
- Resources and capabilities

## Qualities

- Leadership and vision
- Cooperation between several business
- Represents regional organisations
- Support from the community
- Ensure a holistic approach to maximise abatement potential
- Realise wider regional benefits
- Create value across the supply chain

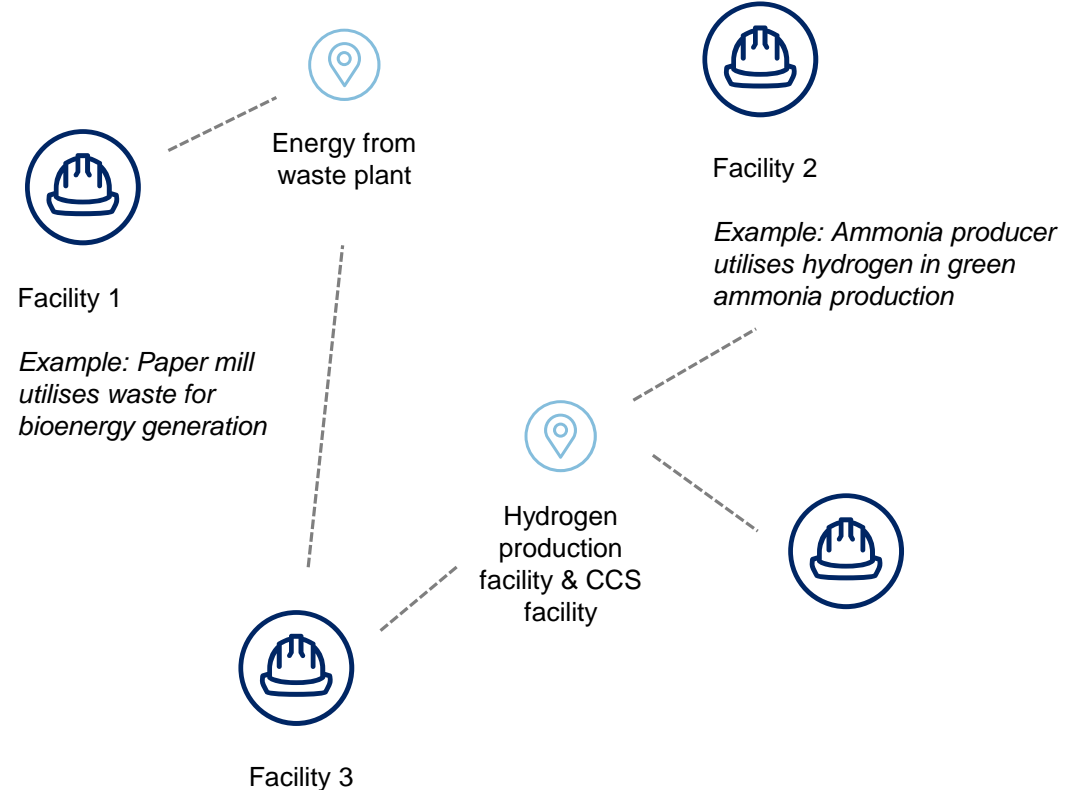
# What a CMP could look like

## UK South Wales Industrial Cluster detailed example



Source: UK Government Industrial Clusters Mission – [South Wales Industrial Cluster](#)

## Hypothetical high-level example



# Indicative scope of NLCIF

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**The Department may provide partial funding for:**

- Precinct coordinating bodies to lead the development of decarbonisation roadmaps
- Feasibility studies
- Demonstration projects
- CAPEX for deployment projects

***Funding may be contingent on alignment with roadmaps***

Department may consider projects within regions of NSW that align with:

- NSW or federal technology roadmaps
- NSW policy programs (*e.g., Special Activation Precincts and Renewable Energy Zones*)

# Discussion

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- What are your reflections and feedback?
- What questions do you have?

- 3 mins alone
- 10 mins as a group
- Write down your reflections and questions



# Possibilities for industrial region transition

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# Australian Industry Energy Transitions Initiative

To accelerate informed action by Australian industry towards the achievement of net zero emissions supply chains by 2050 while managing the transition to thrive in a decarbonised global economy

# Australian Industry ETI Partners

## DELIVERY PARTNERS



## WITH SUPPORT FROM



## PARTNERS



# Our focus is on five supply chains



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Steel



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Aluminium



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LNG



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Other key  
metals



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Chemicals

This summary analysis is part of a scoping study carried out by the Australian Industry ETI program team into how and when industrial activity in the Hunter and Illawarra regions can be decarbonised.

It was completed with support from the NSW Department of Planning, Industry and Environment and informed by interviews with key organisations located in those regions.

This work aimed to inform the NSW Government's Net Zero Plan Stage 1: 2020-2030 and in particular the Net Zero Industry and Innovation Program.



	Bauxite mining	Alumina refining	Aluminium smelting
Material efficiency	Upstream impacts from increased secondary production		Secondary production from scrap
Energy efficiency	Mine site and plant optimisation Uptake of best available technologies		Demand response, improved cell design
Zero emissions electricity	Trolley assist, battery-electric trucks	Electrified Bayer process*	Decarbonise existing electricity use
Other zero emissions fuels	Biodiesel truck haulage	Biomass use in Bayer process heat	
	Hydrogen truck haulage	Green hydrogen use in Bayer process heat*	
Process improvements			Carbon anode alternatives*
Zero emissions feedstocks			
CCS of process emissions		Bayer process with CCS*	
Negative emissions technologies	Mineral carbonation (mine tailings)*		

Immaterial or uncertain role

Potential role in transition to zero or near-zero emissions options

Important role in near term abatement but insufficient for net zero emissions

Long term, zero or near-zero emissions potential

\*These technologies are currently classified as having a TRL of 1-6 and require further research, development and demonstration.

	Ammonia	Explosives and fertilisers
Material efficiency	Efficiencies in downstream products	Reduced demand for primary metals extraction, optimised fertiliser use
Energy efficiency	Haber-Bosch improvements	Optimised waste heat recovery
Zero emissions electricity	Haber-Bosch process heating	
Other zero emissions fuels		
Process improvements	Switch from SMR to novel ammonia production process*	Abatement catalysts for nitric acid production
Zero emissions feedstocks	Hydrogen via 100% renewable electrolysis	CO <sub>2</sub> from biomethane based ammonia production or DAC (considered carbon neutral)*
	Biomethane SMR	
CCS of process emissions	SMR with CCS	
Negative emissions technologies		

Immaterial or uncertain role

Potential role in transition to zero or near-zero emissions options

Important role in near term abatement but insufficient for net zero emissions

Long term, zero or near-zero emissions potential

\*These technologies are currently classified as having a TRL of 1-6 and require further research, development and demonstration.



	Iron ore production	Steelmaking
Material efficiency	Mine site and plant optimisation Uptake of best available technologies Increased scrap-based production in EAF	
Energy efficiency		
Zero emissions electricity	Iron ore haulage	Decarbonise existing electricity use EAF run on scrap or DRI Green hydrogen production* Ore electrolysis*
Other zero emissions fuels	Iron ore haulage (biomass)*	Biomass or hydrogen use in BF-BOF process
	Iron ore haulage (hydrogen)	Green hydrogen use in DRI-EAF process*
Process improvements		
Zero emissions feedstocks		Biomass or hydrogen use in BF-BOF process
		Green hydrogen use in DRI-EAF process*
CCS of process emissions		BF-BOF with CCS*
Negative emissions technologies	Mineral carbonation (waste rock)*	

	Immaterial or uncertain role	Potential role in transition to zero or near-zero emissions options	Important role in near term abatement but insufficient for net zero emissions	Long term, zero or near-zero emissions potential
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\*These technologies are currently classified as having a TRL of 1-6 and require further research, development and demonstration.

# Regions and industrial precincts – Key decarbonisation opportunity



# Energy system transformation is the most critical aspect of a net zero transition for Australian industry - including in NSW

ALUMINIUM

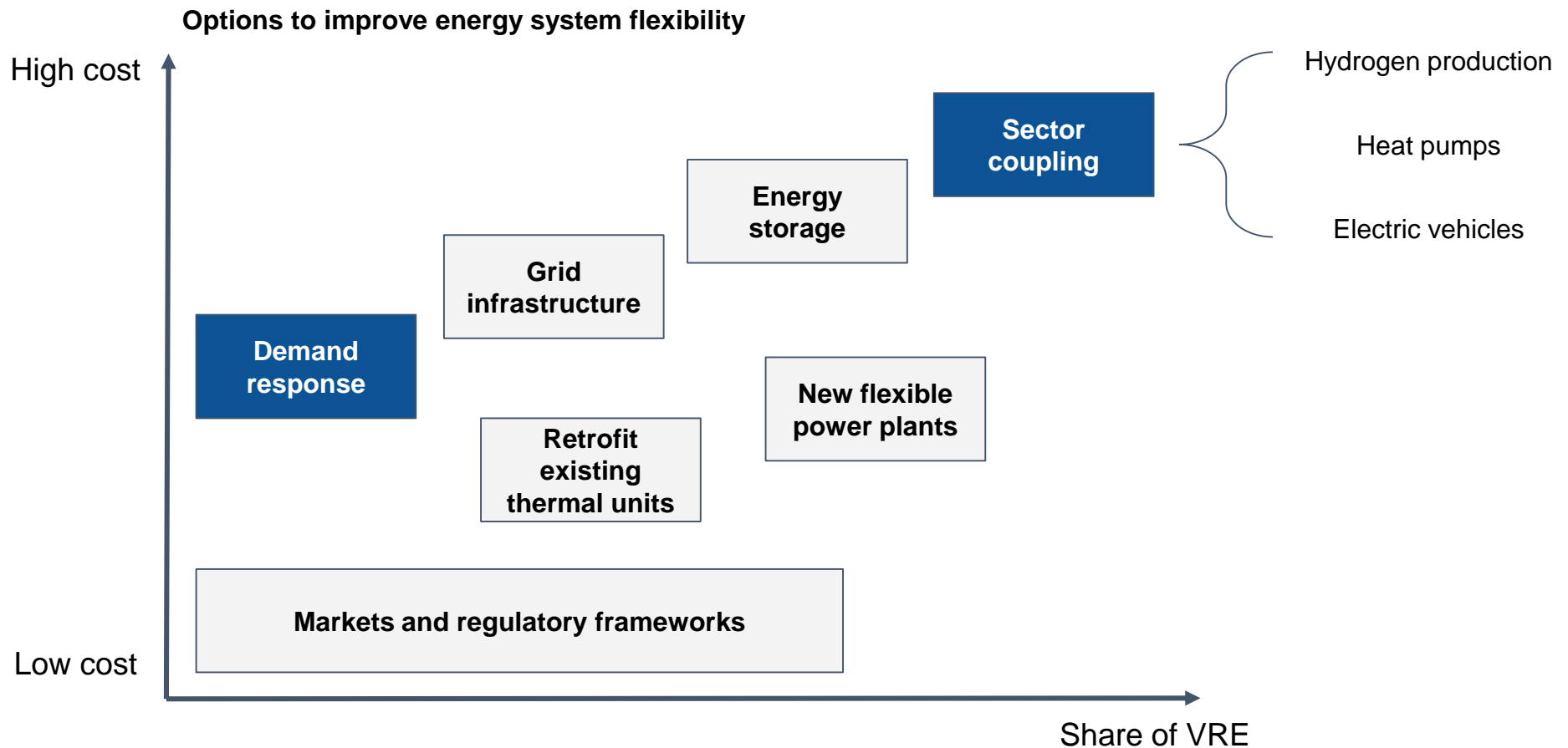
AMMONIA

IRON & STEEL

Nearly 90% of the identified abatement potential for these three industries relates to energy (either renewable electricity or hydrogen)

Scale of change required in NSW is huge, approximately 24TWh of renewable electricity would be needed. Three times NSW's current renewable generation, capital cost of approx. \$10 billion. Equivalent to renewables added to Australia over the last 10 years.

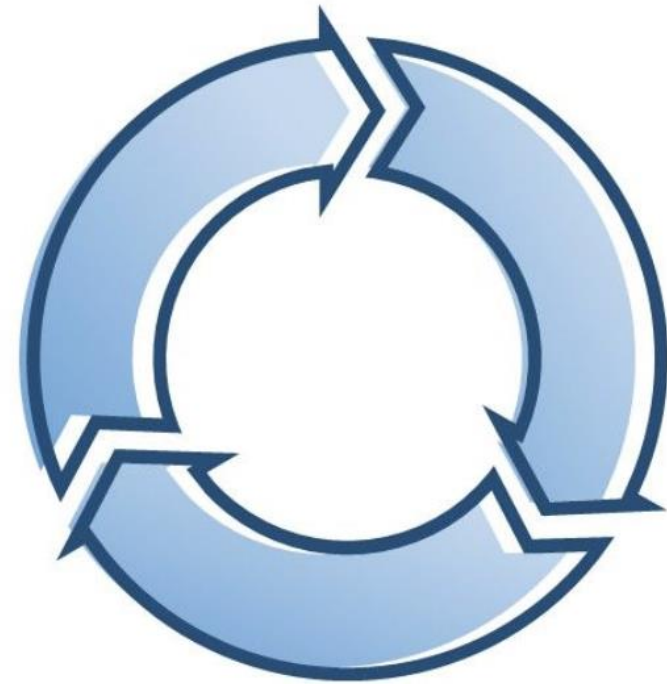
# Demand-side flexibility measures can help industry integrate higher shares of variable renewable energy while managing costs



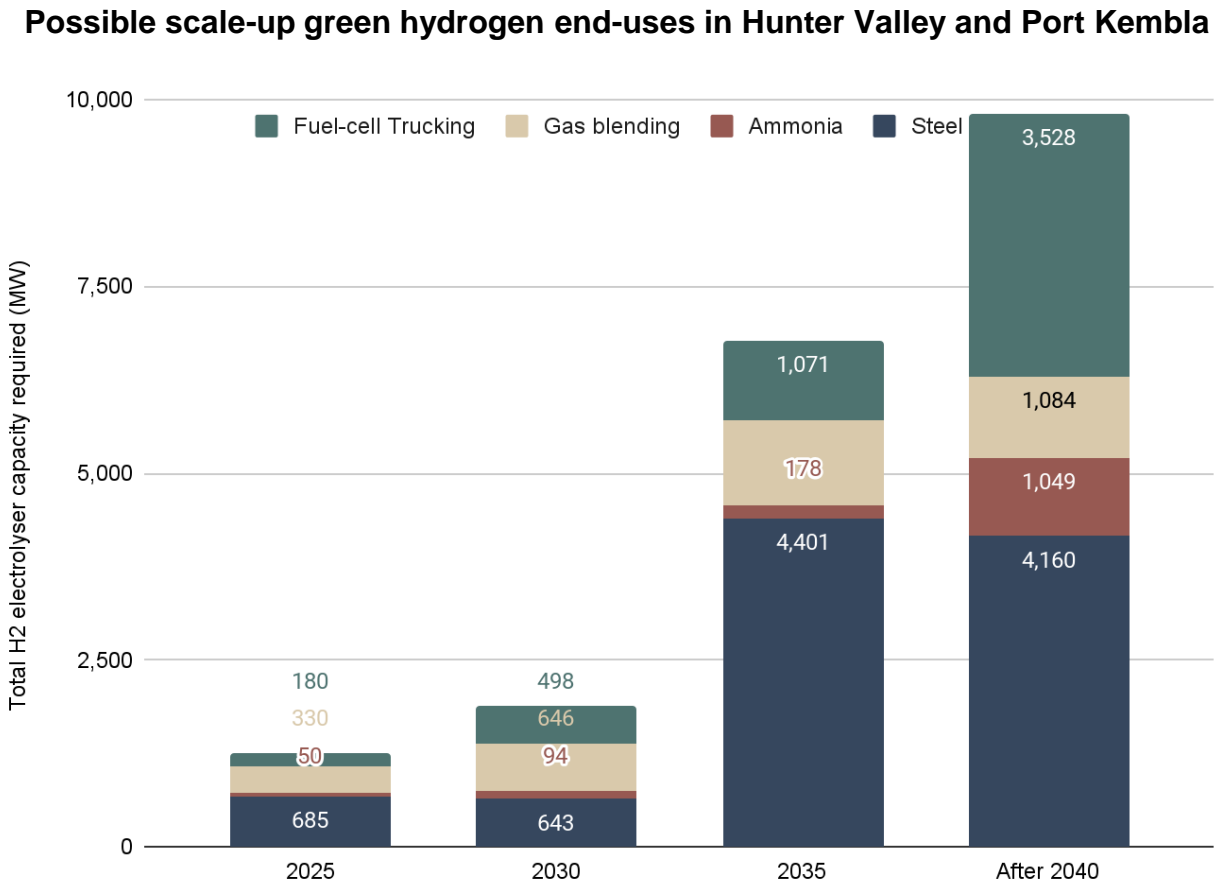
# Green hydrogen production represents a potential 'virtuous circle', supporting both industrial decarbonisation and energy system transformation

Potential uses for green hydrogen:

1. Store and generate electricity (grid firming)
2. Enhance system reliability - support higher shares of renewable energy generation through flexible production (ramp up/down with supply)
3. Enhance system stability - provide frequency control services
4. Direct decarbonisation solution, e.g. green ammonia
5. Export



# Possible early demand markets in NSW's existing industrial regions for experimenting and building scale for green hydrogen production



# Discussion

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- What ideas do you have for decarbonisation in the region?

- 5 mins alone
- 15 mins as a group
- Write down your reflections and questions



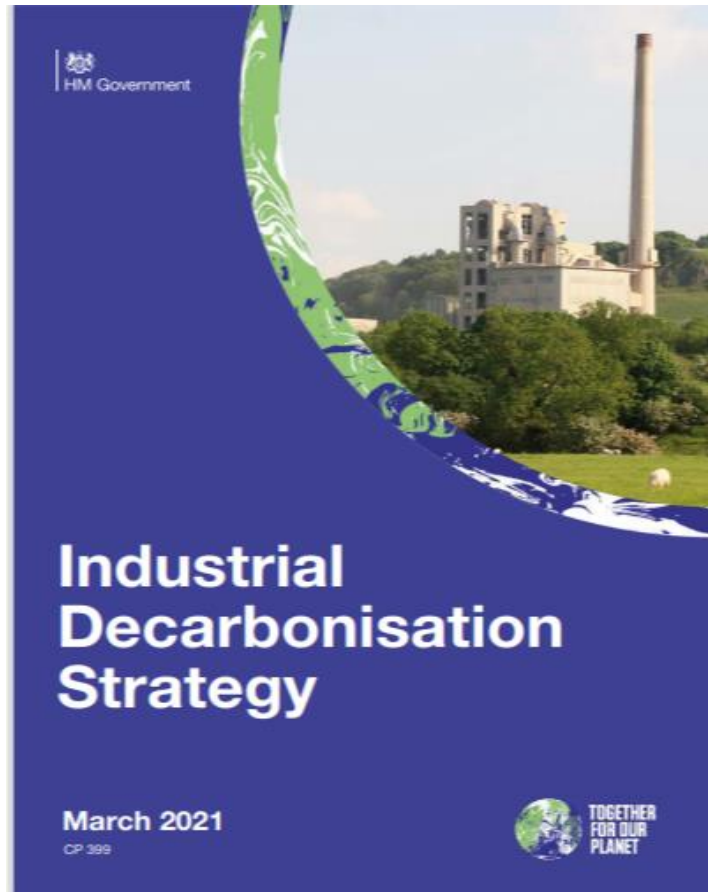
# **Coordination and collaboration in industrial region transition**

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# Case study- UK NZ Industrial Clusters Mission

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*Establish the world's first net-zero carbon industrial cluster  
by 2040 and 4 low-carbon clusters by 2030*

# 1. Industrial Cluster

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## UK Industrial Clusters



- Initiative provided up to £8 million for 6 projects across the UK
- Lead agencies produced initial plans for reducing emissions across major industrial clusters
- Deliver collaborative projects to decarbonize clusters
- Identifying the optimal decarbonisation path that benefit multiple industries
- Co-investment in shared infrastructure

Source: Ferguson & Tarrant, 2021

## 2. Zero Carbon Humber cluster

### Partners



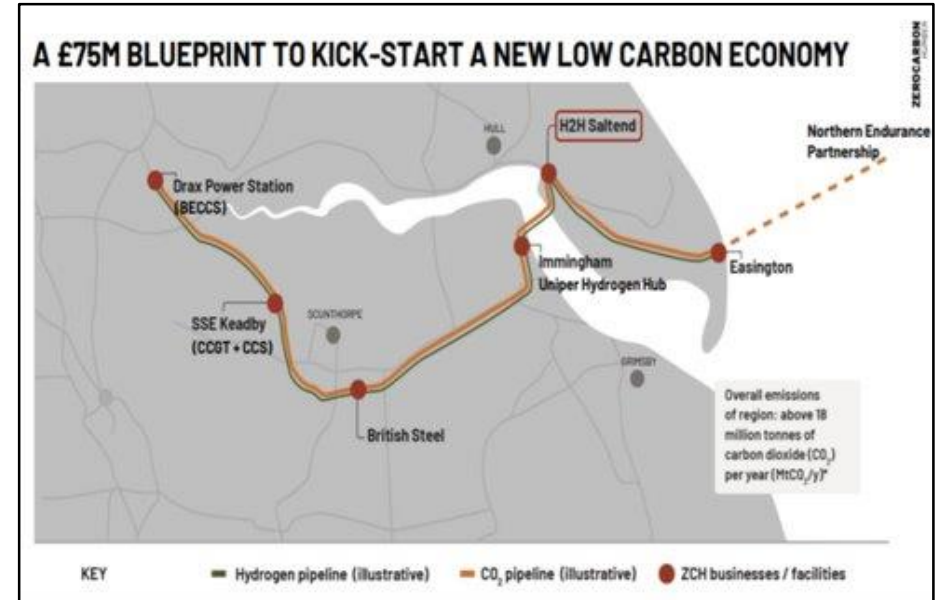
### Broader Cluster Network



- UK's largest cluster
- Emitting >18 million tonnes of CO<sub>2</sub> per year
- Industries include steel, chemicals, cement and oil refineries.
- Six companies contribute to 87% of “big emitter” emissions:

# 3. Planned Infrastructure Projects

- Hydrogen production plant
- CCS at Equinor's H2H Saltend project
- Carbon negative power station at Drax
- Decarbonised gas power station at SSE's Keadby site
- Additional hydrogen production capability at Uniper's Killingholme site
- Low carbon steel production at Scunthorpe steelworks



Source: Zero Carbon Humber

- Joint infrastructure that have multiple users
- Expands menu of abatement options for industry
- Users extend beyond cluster

# Case study- Kwinana Industries Council



- Industry leadership and advocacy;
- Promote, liaise with stakeholders, facilitate access
- Advance common interests



<https://kic.org.au>

# Not just about technology and finances

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A net zero transition demands simultaneous shifts to occur across multiple dimensions

- **Position green firming as an opportunity for industry:** incentivise action where large industrial players help drive the energy transition
- **Stimulate early demand:** prioritise key strategic markets i.e. hydrogen
- **Align regulations to net zero visions:** operationalise policies, standards, planning schemes across departments to net zero
- **Attract transformational leadership:** activate and attract the business investment mindset that will drive a transition
- **Leverage competitive advantages:** promote and enhance the distinctive strengths in the region to attract net zero investment.
- **Enable effective relationships:** value effective relationships across scale and geography.



# Discussion

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- What do we have in the region? What can we leverage?
- What's emerging?
- What are the gaps and barriers?

- 5 mins alone
- 10 mins as a group
- Write down your reflections and questions

# Discussion

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- What collaborations, co-investments, coordinated action and clusters could kick start the transition to the low carbon economy in the region?

- 5 mins alone
- 15 mins as a group
- Write down your ideas to share

# Roadmap development

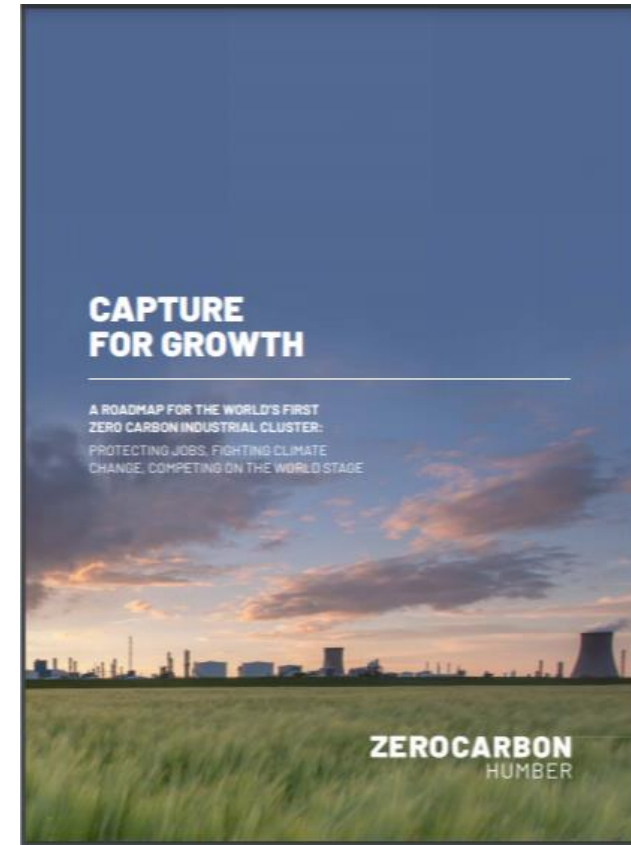
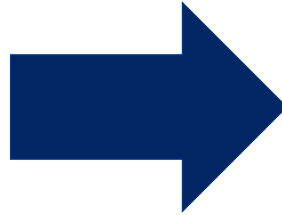
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# What is a decarbonisation roadmap?

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Roadmaps outline decarbonisation plans that benefit multiple industries and the region:

1. What's the end game?
2. What needs to get done?
3. What can we get done?
4. Who needs to be involved?



# Discussion

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- What type of roadmaps do you think are needed in the region?

- 20 mins as a group
- Write down your ideas to share

## **Next steps**

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# Initial thinking

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1

DPIE releases program guidelines and EOI

2a

Successful proponents invited to submit a formal application through a RFQ

2b

DPIE grant funding to successful applicants to develop CMP roadmap

3

Proponents apply for funding to support deployment of planned infrastructure projects

# Indicative eligibility

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- Funding may be issued to 'precinct/cluster' coordinating bodies.
- Coordinating bodies must demonstrate support from parties involved in a regional decarbonisation roadmap.
- This may represent regional partnerships that are made up of:
  - Organisations that are part of an industrial supply chain, and/or
  - Organisations from separate sector
  - Project proponents with support from a number of industrial off-takers
- Proposed road maps must show the potential to decarbonise multiple facilities in the region (and beyond).

# Discussion

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- Reflecting on the conversations today, share:
  - **What?** What did you hear or experience?
  - **So What?** What matters about that? Why is that interesting?
  - **Now What?** What do I want to see or do next?

Be brief, 30 secs.

 **Thank you**

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