H2 under 2 Working Group update

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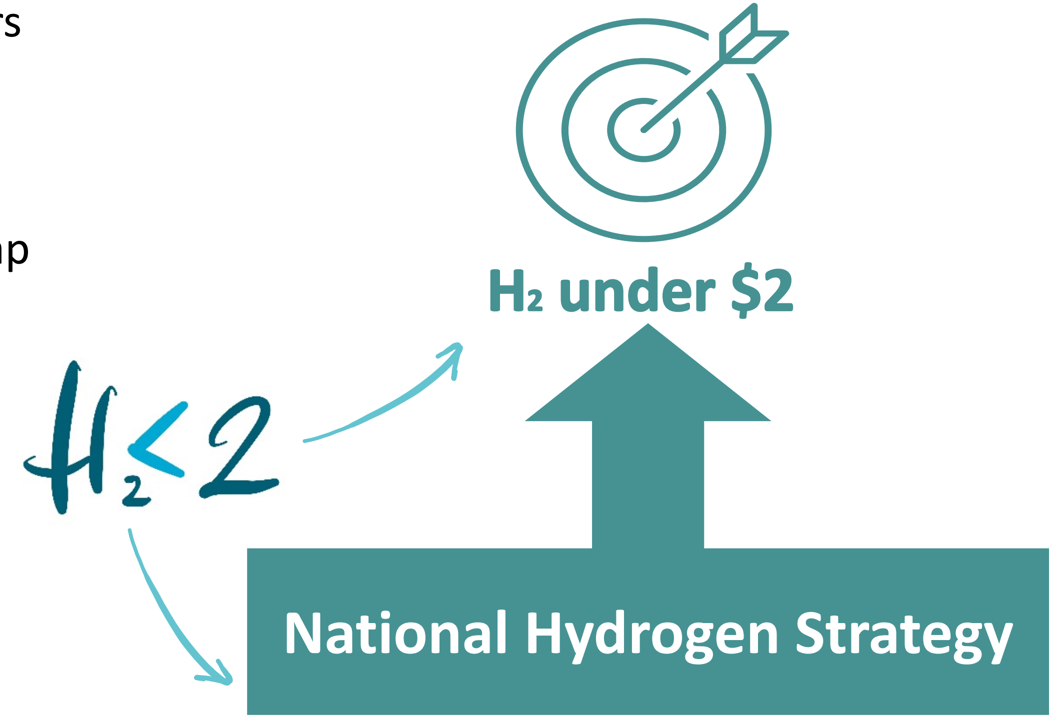
CONTEXT

What we have:

- The NHS provides the foundation
  - With roles to play across governments and agencies/others
  - Significant goodwill across all parties
- ‘H2 under $2’ statement provides a goal
  - With support through the Technology Investment Roadmap

What we need:

- Coordination and information sharing between the relevant parties
- Draft/suggested milestones to get to H2 under 2
- An explicit connection between the strategy and the goal



The H2 under 2 Working group can assist…

H2 UNDER 2 WORKING GROUP OBJECTIVE

Objective

To provide a forum for information sharing and collaboration that:

- accelerates delivery of the National Hydrogen Strategy's adaptive pathway; and
- connects it to the H2 under $2 goal.

WHERE DO WE START?

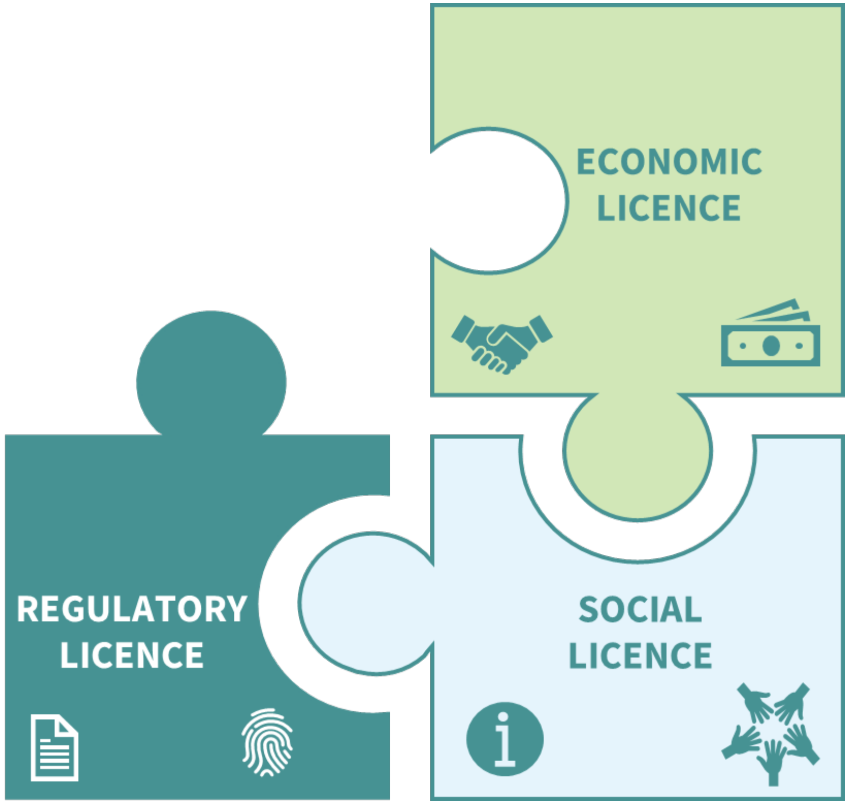
AHC framework: industry licences to operate

The emerging hydrogen industry needs:

- Economic licence, where the industry needs to get to scale
- Social licence, which allows for trusted customer and community relationships
- Regulatory licence, where the industry needs stable, meaningful and efficient regulatory settings

Given we are pre-commercial, the economic licence seems most urgent for now

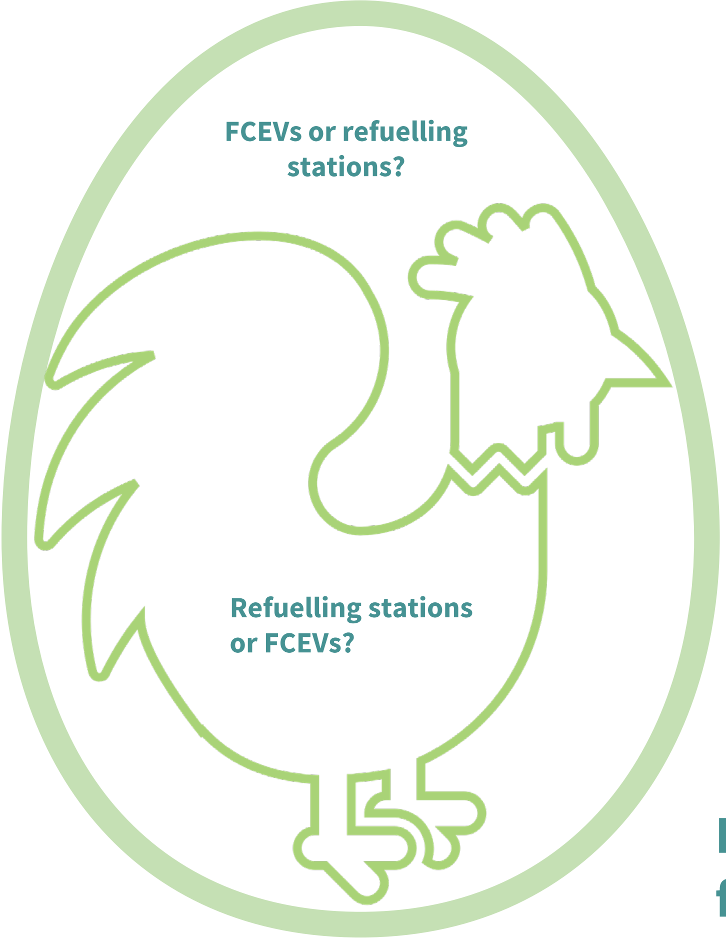
This is also the basis of 'H2 under $2' as a policy goal



PRIORITIES: WE NEED THEM

PRIORITIES: WHICH COMES FIRST?

The famous hydrogen vehicle chicken and egg situation…



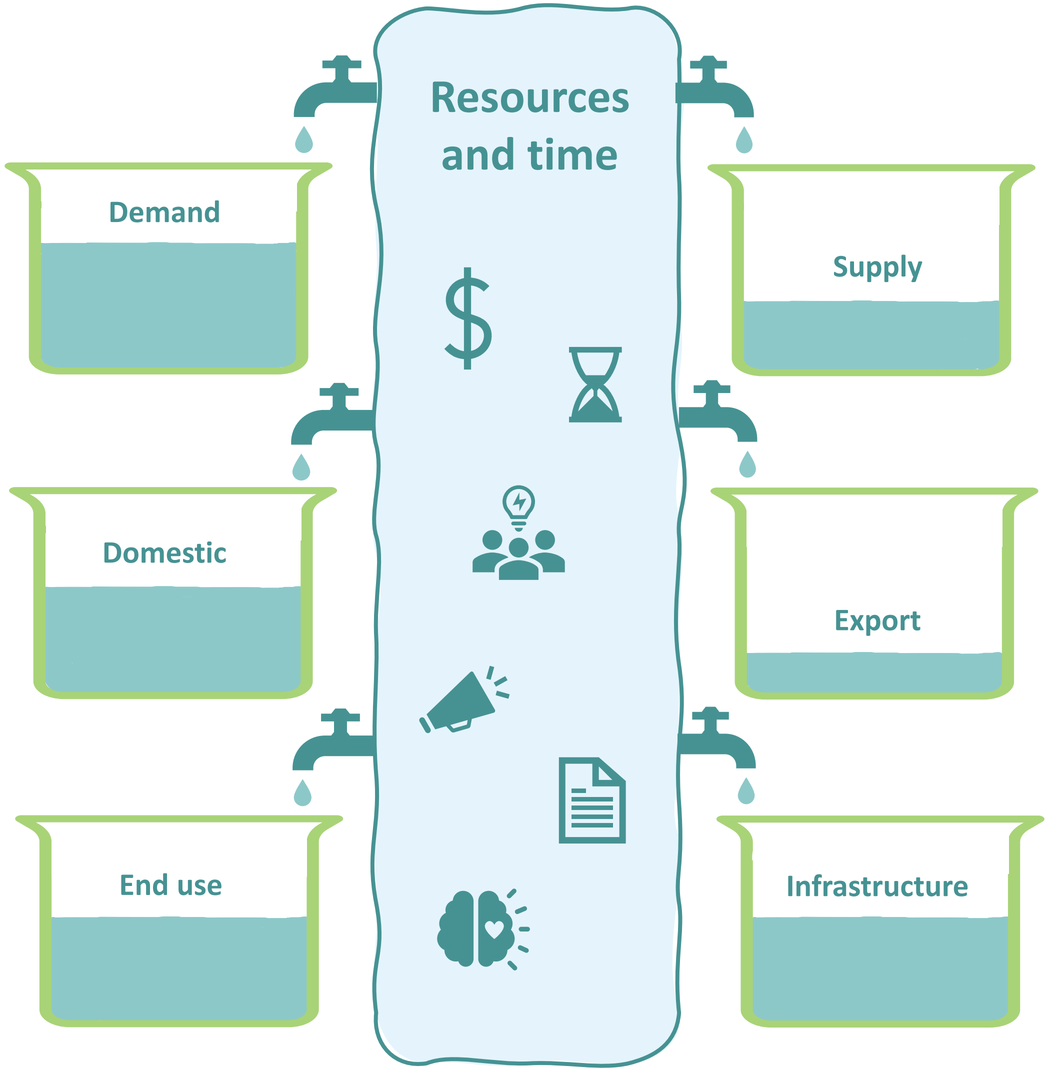
For our purposes there are a few chickens and eggs…

PRIORITIES: WHICH COMES FIRST?

Reasonable to prioritise demand – about offtake and aggregating through hubs to get supply going, links to jobs

Reasonable to prioritise domestic, connects to demand/offtake

Less for H2 under 2 work and more for investors/policy to support demand/domestic



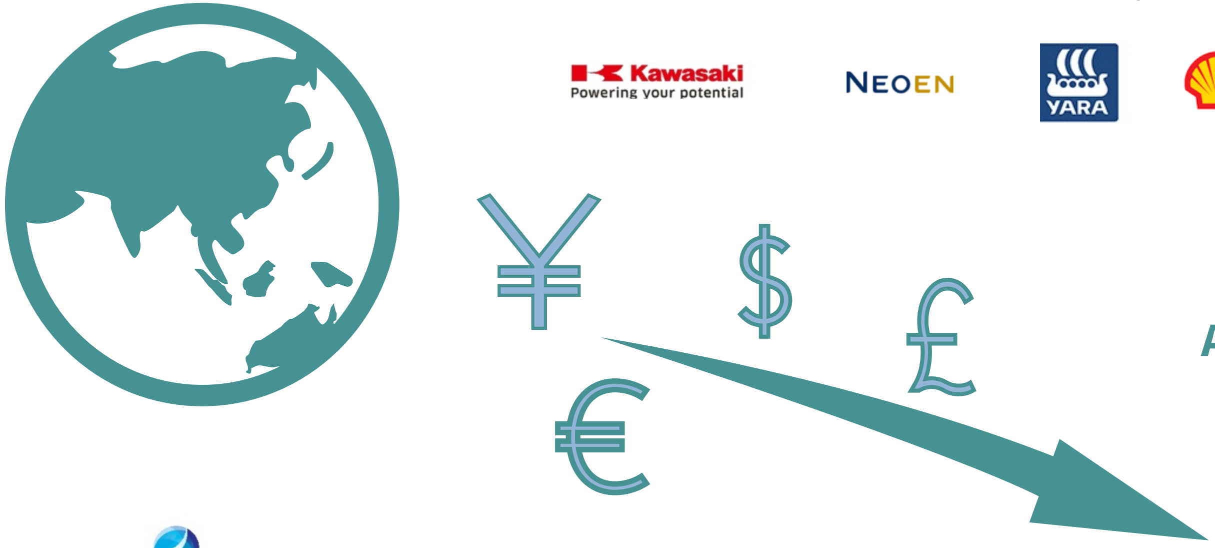
Still keep an eye on supply to address preventable barriers and align with ARENA funding round

Still keep an eye on export from perspective of international investors and their needs

PRIORITIES: MONEY FLOWS

Where does the private investment come from?

J-POWER
Iwatani
Marubeni
Sumitomo Corporation
Kawasaki Powering your potential
NEOEN
YARA
Shell



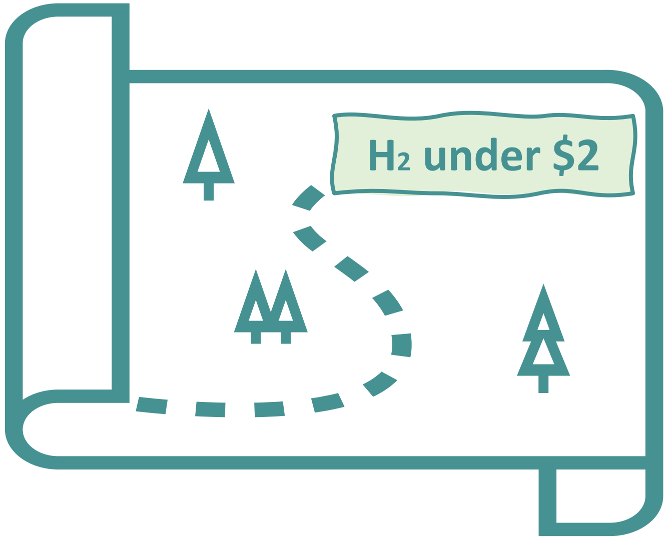
And what do our international and local investors need to see?

Australian Gas Infrastructure Group
Jemena
BOC Member of The Linde Group
HYSTER
HYUNDAI
bp
ATCO
ENGIE
AusNet services
SIEMENS Ingenuity for life
nel
TOYOTA
ITM POWER Energy Storage | Clean Fuel
Haskel Hydrogen Systems
TRANSIT SYSTEMS
Air Liquide creative oxygen

H2 2

SCOPE

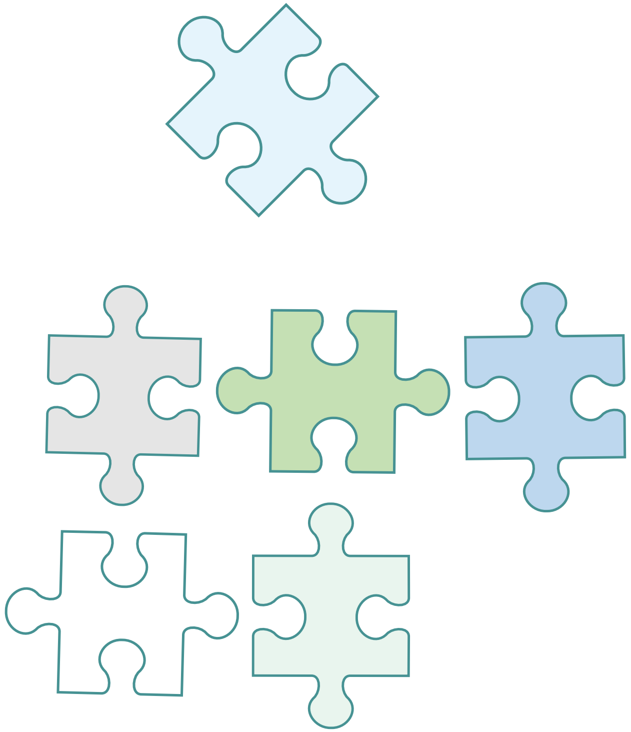
1. Sharing information
   - Mapping the boundaries of what members of the group are doing and establishing relationships
   - Developing a directory on relevant projects and organisations for use of group and states/territories
   - Developing information for international investors
2. Identifying and mapping milestones to H2 under 2
   - Potentially for release but in the first instance to collaborate, coordinate views and findings and provide a further foundation for future Team Australia messaging where appropriate
3. Identifying and seeking to resolve gaps and urgent matters



WHO WE INCLUDE AND WHEN

As a starting point…

- Need to manage numbers and aim for efficiency
- Members are conduits to others
    - Industry associations are conduits to their membership base – these cover main industry players and all fundamental issues
        - AHC is also sharing information beyond membership base
    - FFCRC is main conduit to other CRCs and research community
    - Strategy Project Team is main conduit to states and territories
- Secretariat can provide states and territories with regular updates
- Look at engaging with AEMC, AEMO and AER in time
- Quarterly updates to broader stakeholder group?
- Reassess in October 2020



HOW WE ORGANISE AND RESOURCE

As a starting point…

- Group meets every six weeks
- Secretariat convenes and prepares papers
  - AHC CEO is currently the Secretariat
  - Other parties are welcome
- Any appetite for resourcing staff/reports?

Note

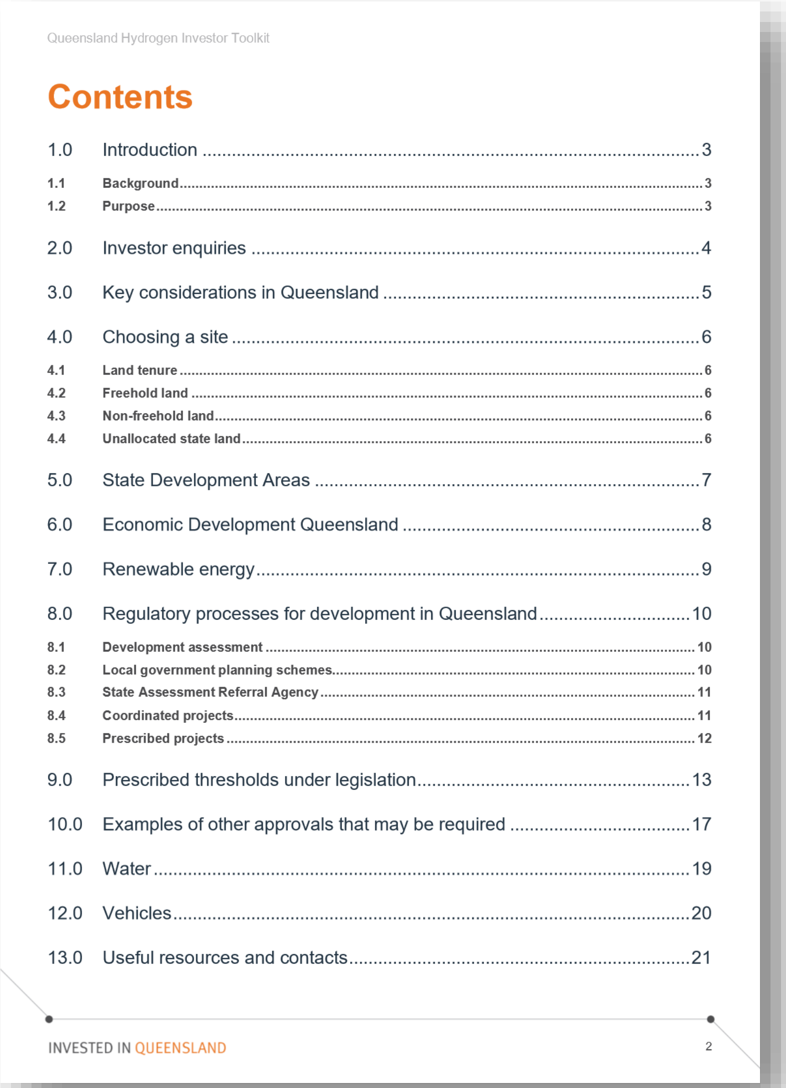
- Group aligns with NHS and COAG/Project Team implementation
- Group provide a collaborative forum; is not a decision-making body
- Group currently has no formal connection with the Technology Roadmap work

TOOLKIT: TO BE DEVELOPED

- Objective
- Audience
  - Policy people?
  - Project proponents?
  - Councils?
  - Overseas policy people?
  - Investors?
- Scope
  - NHS responsibilities and states/territories?
  - Basic stats?
  - Project considerations?
  - Regulatory considerations?
- Detail
  - Organisation level - Contact details?
  - National vs state/territory vs councils
  - Regulations?
- Ownership – location, updates


Queensland Hydrogen Investor Toolkit
May 2020

Find out how we're invested in growing Queensland at qld.gov.au/investedinqld
Connect with us @GrowingQld


Queensland Hydrogen Investor Toolkit

Contents

INVESTED IN QUEENSLAND 2

AHC EXPORT MILESTONES: IN DEVELOPMENT

	2020	2021	2022	2023-2024	2025	2030	2035	2040	2050
	Immediate next steps →			**Early scale-up →**		**Diversification →**		**Maturing →**	**Industry mature**
Key outcomes	Accelerated deployment of strategic funding for commercial scale blue and green H_2 export projects (~10ktpa+ scale of H_2 production per project, ~100MW electrolyser scale for green H_2 projects). Commercial scale H_2 projects incorporated into broader infrastructure programs intended to stimulate economic recovery. Strategic priorities developed for the next 3-5 years based on where the demand is now i.e. export markets in Japan and Korea (see LNG industry experience). Australian H_2 technology and knowledge monetised and built into relationship with offtakers.			Commercial scale projects (10ktpa+) reach FID in 2023/2024 and construction commences. 1-10ktpa+ scale projects (10-100MW scale green H_2 projects) ready to export to Asia in 2025. Cost to produce H_2 reducing as a result of learnings from feasibility studies and commercial scale projects.		Increasing efficiency gained from commercial scale export experience. Growing volumes of H_2 exported to Japan and Korea. New export markets emerge. H_2 from export used for diversifying domestic market end-use applications.		Export industry in Australia growing and approaching maturity. 100ktpa+ scale projects increase in number.	Export industry mature and at scale, like the LNG industry today. Australia a global leader in H_2 production.
Export volume targets *	N/A	0.08 MT	0.10 MT	0.12-0.14 MT	0.2 MT	0.5 MT	2 MT	4 MT	17 MT
Export $ value milestones **	N/A	N/A	N/A	N/A	A$1.4bn p.a.	A$2bn p.a.	A$4bn p.a.	A$8bn p.a.	A$35bn p.a.
Hydrogen production scale-up milestones	**Late-2020**: feasibility studies completed for first 1-10ktpa+ scale green H_2 electrolyser projects. Feasibility studies for first small to mid-scale blue H_2 projects.◊	**Mid-2021**: FID taken on first 10ktpa+ scale electrolyser projects. FID taken on first small to mid-scale blue H2 projects.◊	**2022:** Feasibility studies begin for first 100ktpa+ scale projects. This includes the first large-scale blue H_2 projects◊ as well as ~1GW scale electrolyser projects.	**2023/2024:** FID on first 100ktpa+ projects. FID on first large-scale blue H_2 projects◊ and 1GW scale electrolyser projects.	**2025**: First small to mid-scale 10ktpa+ projects online and exporting to Asia.	**2030:** First large-scale 100ktpa+ projects online and exporting to Asia.	**2035:** Expansion of smaller-scale and large-scale facilities to meet increasing demand in Asia. Australia is established as trusted H_2 export partner.	**2040:** H_2 export industry in Australia growing and approaching maturity. 100ktpa+ projects the norm.	**2050:** Export industry mature and at scale, similar to the maturity of the LNG industry.
Funding milestones	**Mid-2020**: ARENA H_2 funding allocated to kick-start feasibility studies and pre-FEED studies.	**Early 2021**: ARENA 2.0 (or alternative) legislation passed to fund renewable investment, with **A$>2bn in H_2 investment allocation**.	**Mid-2022**: ARENA 2.0 (or alternative) funds available.						

* NHS Deloitte *Targeted deployment* scenario

** Based on A$2/kg H_2 production price in 2040 and NHS *Targeted deployment* scenario export volumes

◊ Using SMR + CCS/offsets

Appendix

CURRENT H2 UNDER 2 WG MEMBERSHIP

Organisation	Contact person	Title	Phone	Email
ARENA	Darren Miller Matt Walden	CEO Director Business Development & Transactions	T 02 6159 7800 M 0403 155 689	darren.miller@arena.gov.au matt.walden@arena.gov.au
Austrade	Leigh Kennedy	Manager - Energy	T 03 9648 3251 M 0400 178 451	leigh.kennedy@austrade.gov.au
Australian Hydrogen Council	Fiona Simon	CEO	M 0474 028 740	fsimon@h2council.com.au
Clean Energy Council	Anna Freeman	Director Energy Generation	M 0417 033 752	afreeman@cleanenergycouncil.org.au
Clean Energy Finance Corporation	Rupert Maloney	Head of Hydrogen	T 07 3188 1646 M 0438 111 176	rupert.maloney@cefc.com.au
CSIRO	Patrick Hartley	Hydrogen Industry Mission Leader	T 03 9545 2595 M 0400 101 154	patrick.hartley@csiro.au
Energy Division, Department of Industry, Science, Energy and Resources	Lesley Dowling	Assistant Secretary, Energy	M 0434568724	lesley.dowling@industry.gov.au
Energy Networks Australia	Dennis Van Puyvelde	Head of Gas	T 02 6272 1548 M 0423 024 550	dvanpuyvelde@energynetworks.com.au
Future Fuels CRC	David Norman	CEO	M 0438 043 918	david.norman@futurefuelscrc.com
Hydrogen Strategy Team, Department of Industry, Science, Energy and Resources	James Hetherington	Manager, Hydrogen Strategy	T 02 6213 6989 M 0419 780 374	james.hetherington@industry.gov.au
NERA	Miranda Taylor	CEO	M 0411 887 966	miranda.taylor@nera.org.au
Standards Australia	Emelia Addo-Appiah	Stakeholder Engagement Manager	T 02 9237 6060	emelia.addo-appiah@standards.org.au