Federal Ministry for Economic Affairs and Energy

Federal Ministry of Education and Research

Australian Government
Department of the Environment and Energy

Australian Government
Department of Foreign Affairs and Trade

Energiewende Switch to the Future

Welcome to the

Australian-German Energy Symposium

18-19 September 2019

adelphi

ENERGY TRANSITION HUB an Australian-German innovation partnership

AHK Deutsch-Australische Industrie- und Handelskammer German-Australian Chamber of Industry and Commerce

Getting there: Hydrogen roadmaps. How can policy, research and bilateral cooperation facilitate the transition?

Moderator: **Alison Reeve**
Taskforce Leader for National Hydrogen Strategy, Australian Department of Industry, Innovation and Science

Dr. Falk Bömeke *(no slides)*
Acting Head of the Division for International Cooperation on Energy, German Federal Ministry for Economic Affairs and Energy

Prof. Robert Schlögl *(no slides)*
Director, Fritz Haber Institute of the Max Planck Society and Director, Max Planck Institute for Chemical Energy Conversion

Warner Priest
Business Development Manager Emerging Technologies, Siemens Australia

Prof. Michael Brear *(no slides)*
Director, Melbourne Energy Institute, University of Melbourne

Andrew Dickson *(no slides)*
Development Manager, Asian Renewable Energy Hub

Dr. Wolf-Peter Schill
Deputy Head, Department Energy, Transportation, Environment, German Institute for Economic Research (DIW)

Australian Government

COAG Energy Council

Australia's National Hydrogen Strategy

Australian-German Energy Symposium 2019

Alison Reeve

19 September 2019

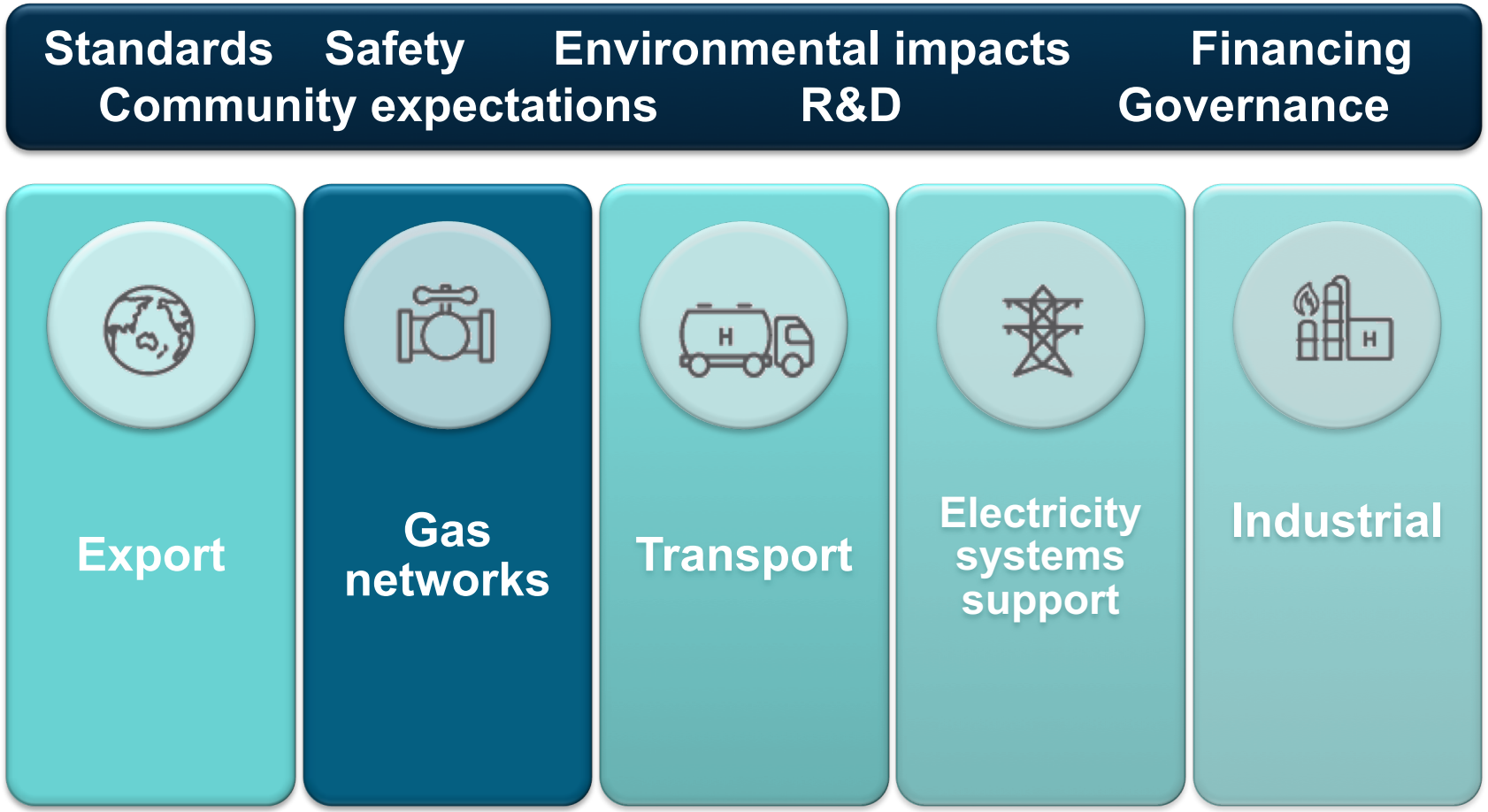
A bit of (recent) history

National strategy

"The COAG Energy Council seeks to support the development of a clean, innovative and competitive hydrogen industry that benefits all Australians and is a major global player by 2030."

COAG Energy Council

Australia's national strategy



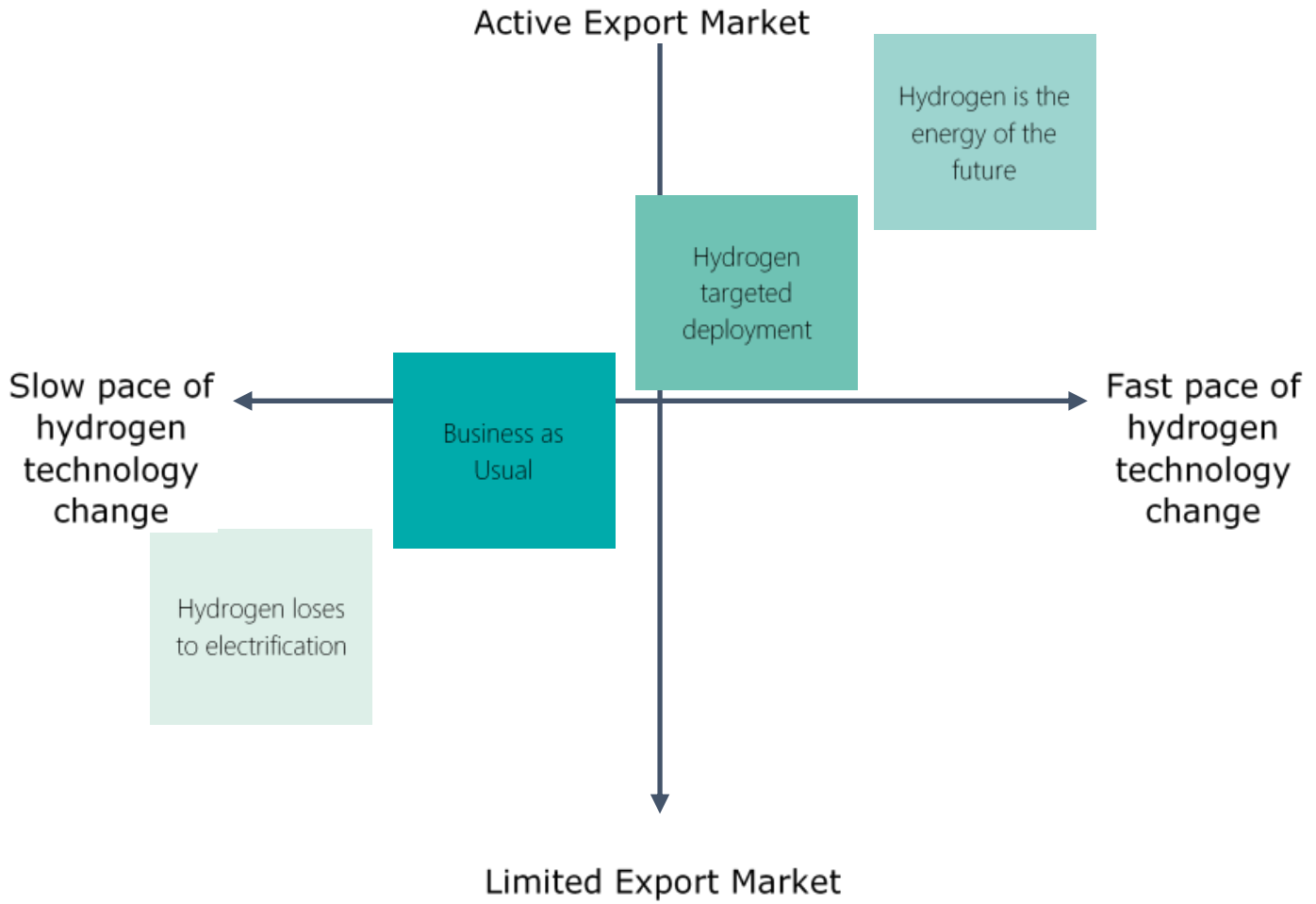
It’s a balancing act

Uncertainty	vs	urgency
High production potential	vs	no clear demand
National consistency	vs	State/Territory jurisdiction
Needs of industry	vs	Energy Council remit

Four point approach

1	• Understand the potential opportunity	Strong competitive advantage, but several possible futures that may emerge.
2	• Establish an adaptive pathway	Routes to capture these opportunities, respond to signs market is emerging or shifting
3	• Take early action in a co-ordinated way	Things to do now to keep all possible futures open
4	• Review, revise, adapt	Keep a strategic view of the market, be ready to adapt and change.

The four scenarios



Purpose: *The National Strategy will outline pragmatic, co-ordinated government and industry actions to work towards common goals.*

Six areas for action
- Local production capacity & demand
- Regulatory reform
- International engagement
- Attract investment
- Skills & training
- Innovation & R&D

Co-ordinated actions

Commonwealth activity

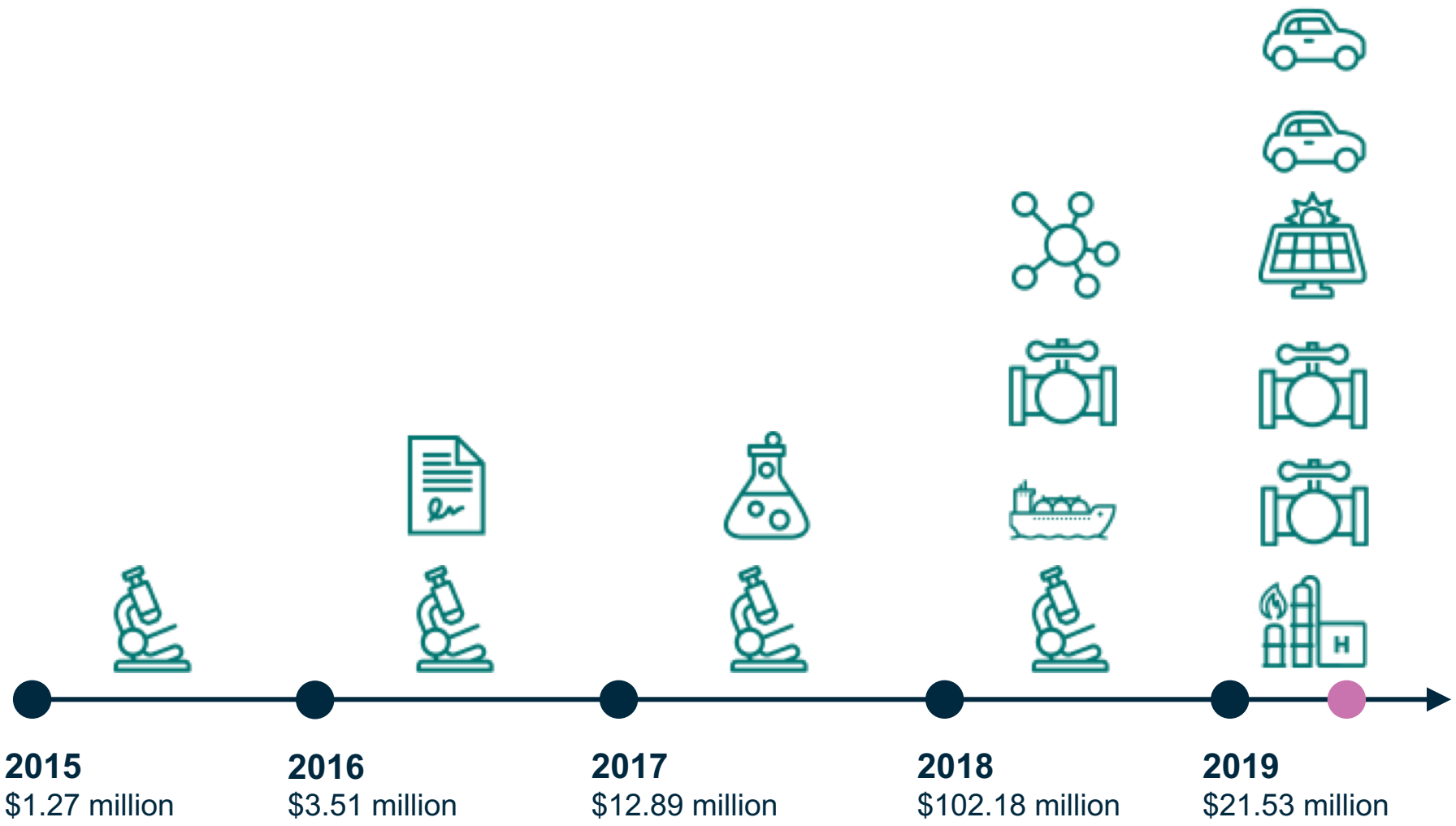
State strategies and other activities

Expectations of industry

National strategic co-ordination and market analysis

Outcome: *A clean, innovative, safe and competitive hydrogen industry that benefits all Australians and is a major global player by 2030*

Project momentum



2015
$1.27 million

2016
$3.51 million

2017
$12.89 million

2018
$102.18 million

2019
$21.53 million

Next steps

- Draft strategy considered by ministers from September onwards
- Strategy release anticipated December 2019.

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Ingenuity for life

Hydrogen Market Opportunity in the Energy Transition

Innovative Technology Solutions in Australia / NZ

Hydrogen (Power-to-X) Australia's Areas of Focus
(based on future market potential)

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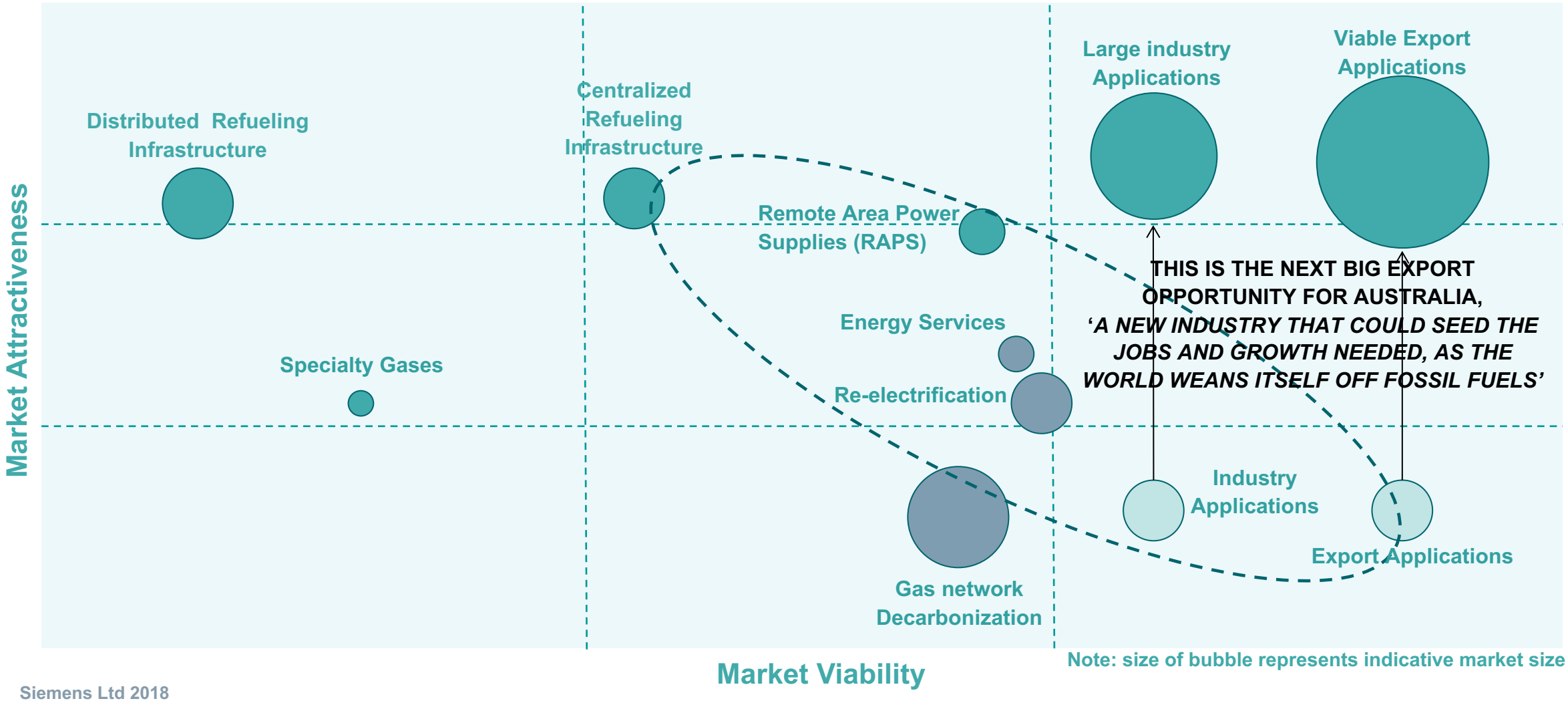
Market Segment Focus (McKinsey Matrix)



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Market Focus 2019

Sustainable pipeline of scale domestic projects will accelerate commercialization.

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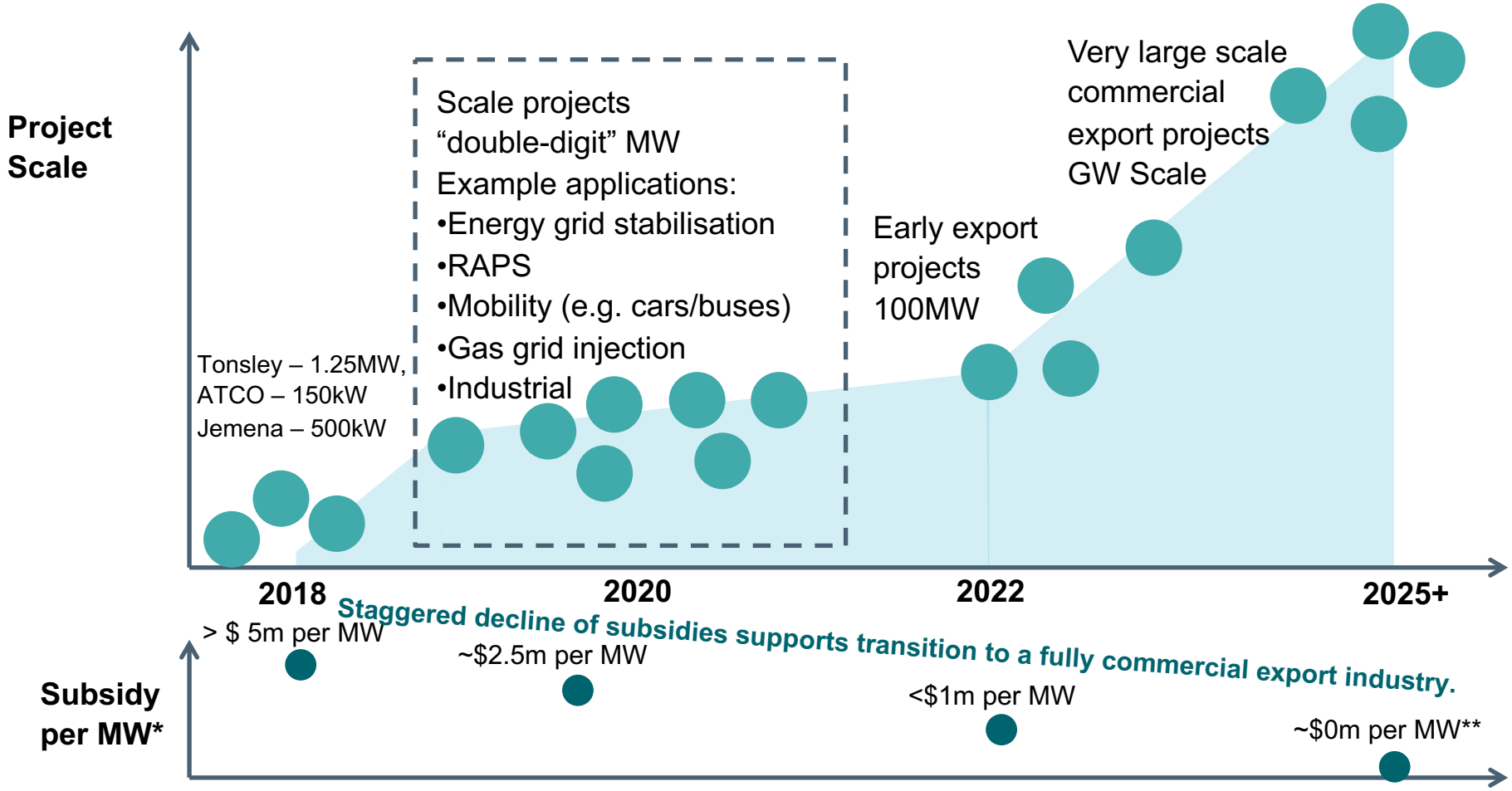
Investment in scale (multi-MW) domestic hydrogen applications which demonstrate the sector-coupling nature of hydrogen will support the development of a sustainable pipeline of projects on which to build experience and drive costs out.



*Subsidy expressed as total project cost / MW electrolyser installed

** Low-cost finance and carbon pricing impact may be considered as 'subsidies'

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HyFlex
Utilizing Gas Grid for Energy Storage

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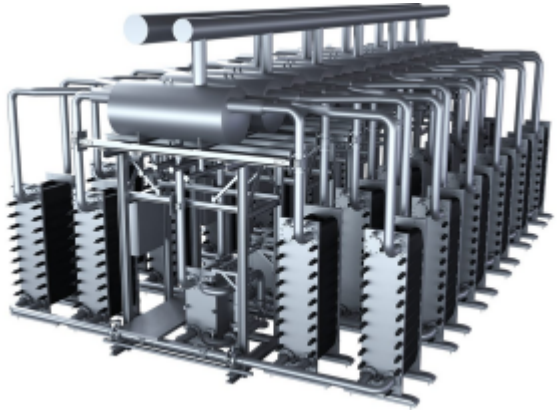
Electricity Grid

Gas Grid

Either co-located or at different locations

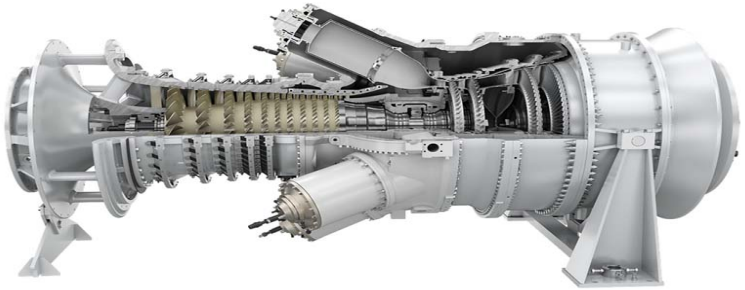
Silyzer produces hydrogen from low value renewable electricity



H_2

Gas mixing, behind the meter, to allowable limits of GT

Conventional Gas Turbine optionally clutch-coupled with synchronous condenser and/or combined with batteries



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Some notes on (green) hydrogen

Speaker

Wolf-Peter Schill

Deputy Head of Department

"Energy, Transportation, Environment"

German Institute for Economic Research (DIW Berlin)

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Potential dual benefits of (green) hydrogen in the energy transition

1. Contribution to decarbonization in sectors that are hard to electrify directly
2. (Potential) Co-benefits for integrating variable renewables in the power sector
    - Flexible hydrogen generation and storage (power-to-x)
    - Long-term electrical storage (power-to-power)

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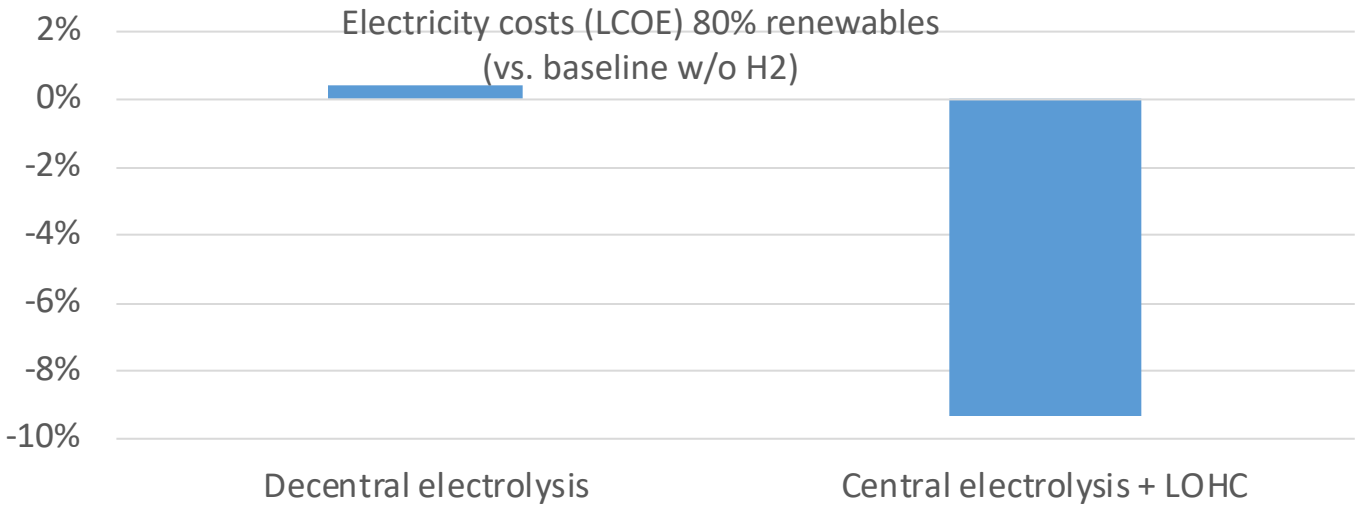
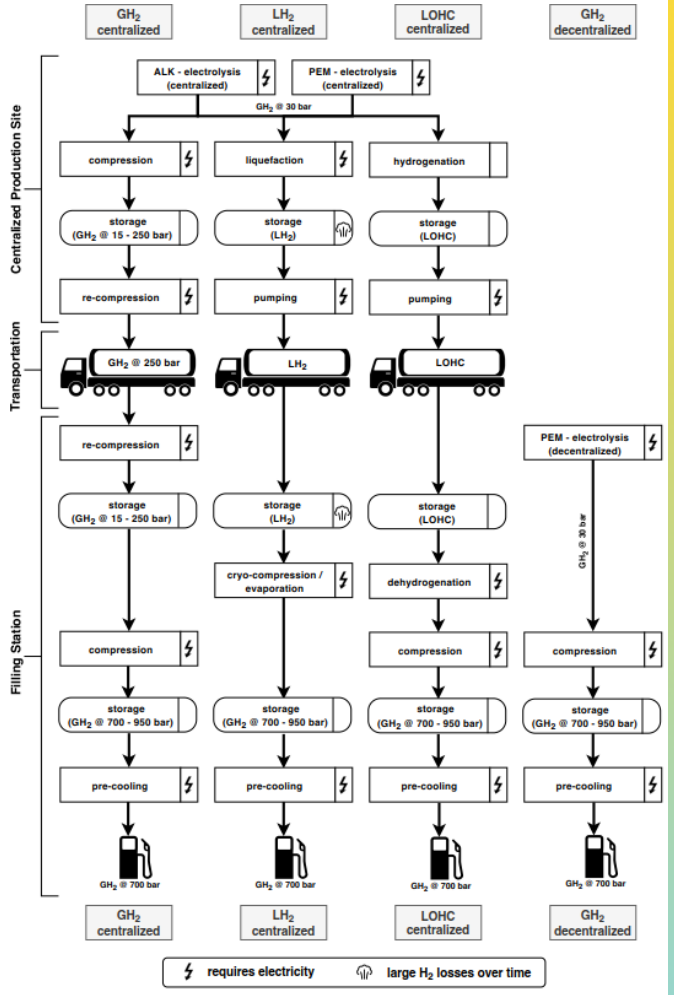
Example for power system benefits

Spotlight from DIW Berlin research in BMBF Kopernikus project:

- H_2 generation and distribution to fuel stations
- This can lower electricity costs because of cheap storage
- But: only for LH_2 or LOHC, not for on-site electrolysis without storage





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GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

But let's put hydrogen into context

Hydrogen has to be green, i.e. based on renewable electricity

Energy efficiency advantage of direct electrification

→ Lower costs

→ Lower renewable deployment needs

Rough example: electricity needed to power 1 mio passenger vehicles

- BEV: 2.6 TWh → ~1.0 GW wind power
- FCEV: 5.5 TWh → ~2.2 GW wind power (w/o losses for H_2 storage & distribution)

→ Do not maximise H_2 use, but focus on applications without direct electrification

→ Even more true for H_2-based power-to-liquid products (e-fuels)

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Hydrogen is not a silver bullet – but it can play a positive role in the energy transition.