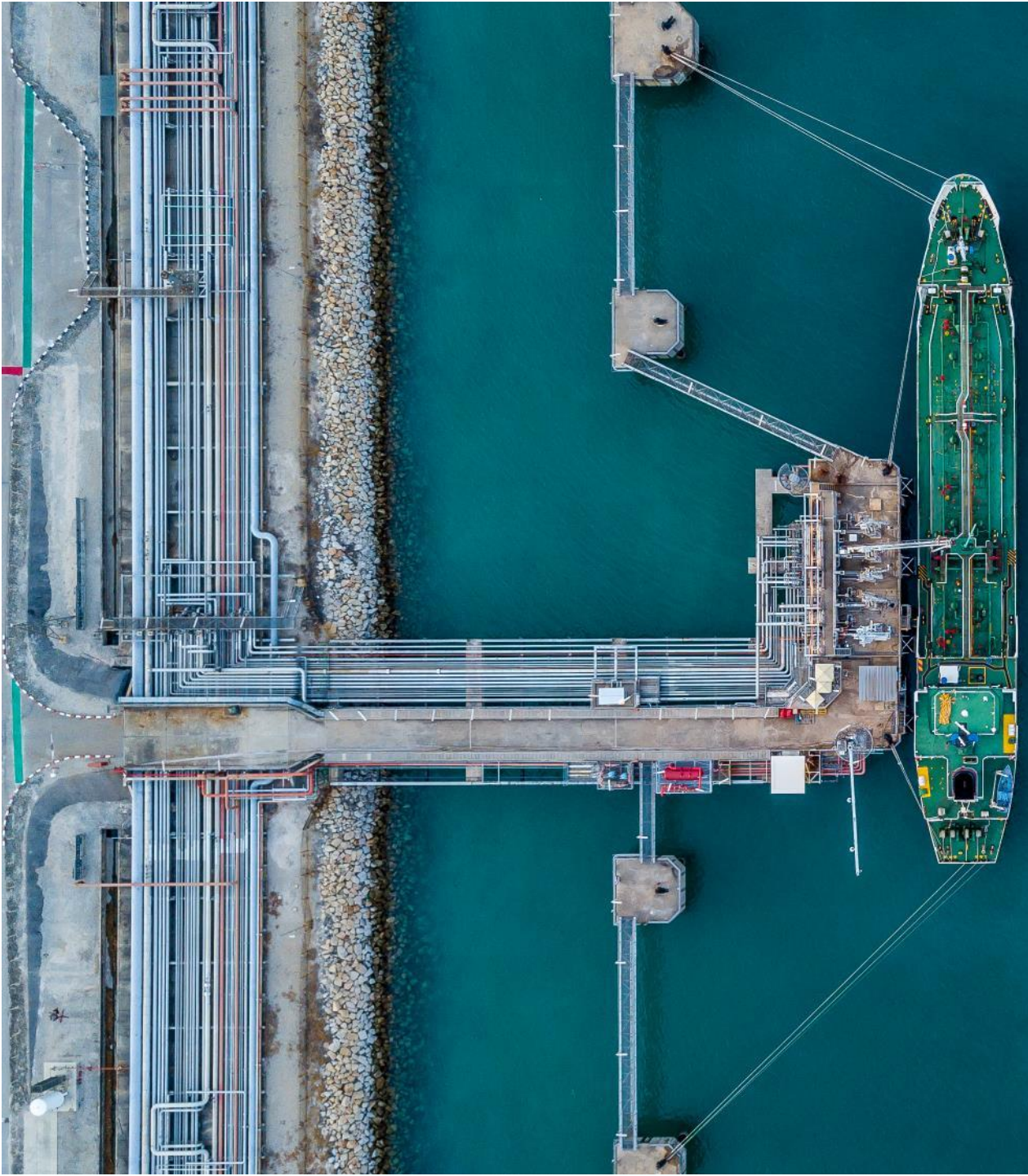
Innovation and Technology

Driving the Future of Australia's Oil and Gas Industry

Miranda Taylor,
NERA CEO

NERA NATIONAL ENERGY RESOURCES AUSTRALIA

Creating connections for growth



Australia is now the world's leading LNG exporter

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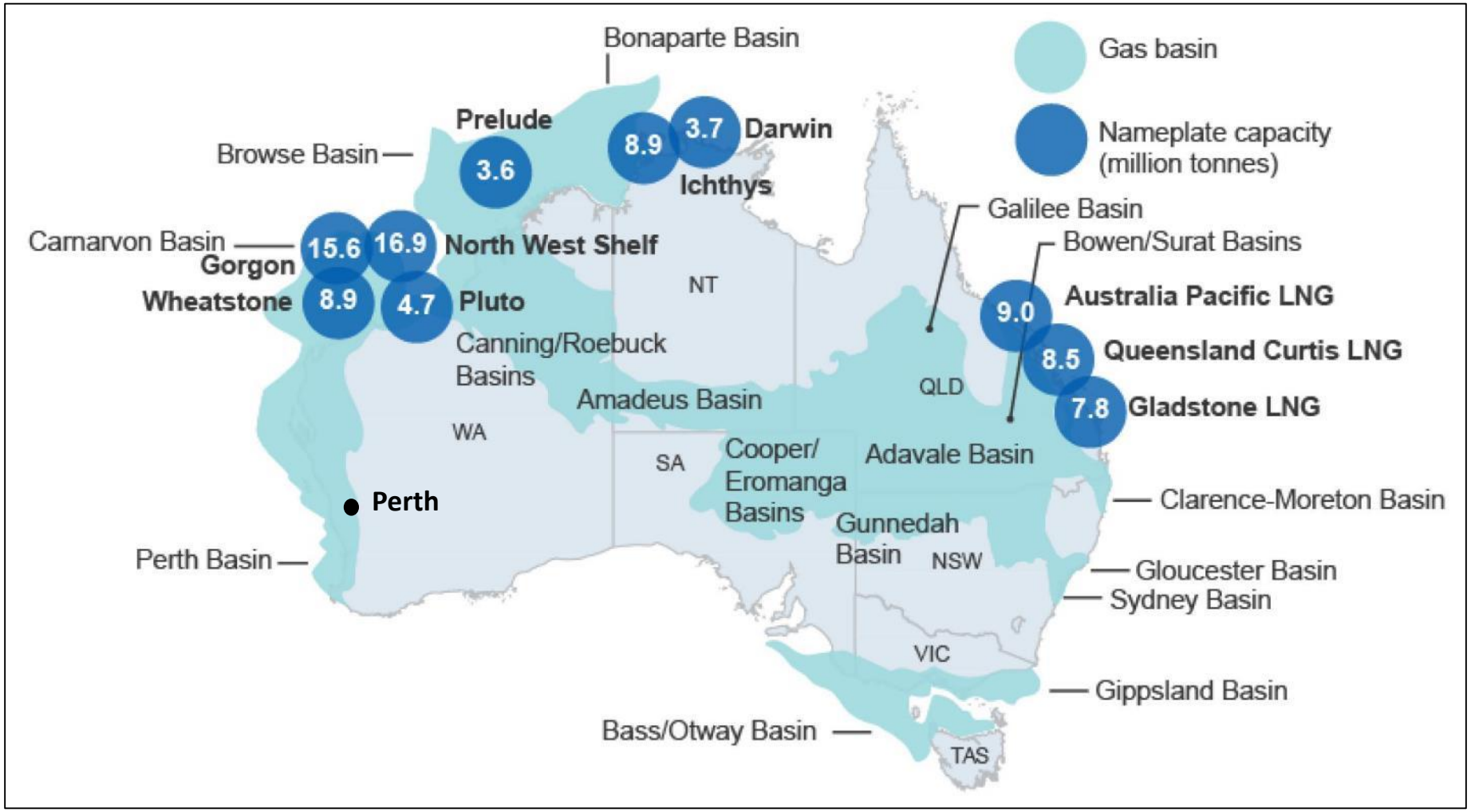
However this position will be challenged in the near future

Australia's LNG projects and gas basins



Responding to the challenges:

1. What are the key drivers for change across the Australian oil and gas industry?
2. How will industry navigate these?
3. What is NERA doing to support the industry make the change?

WHAT ARE THE KEY DRIVERS FOR CHANGE ACROSS AUSTRALIA'S OIL AND GAS INDUSTRY?

Variegated global markets, increasing competition, lower for longer commodity prices

Energy transition

Automation technologies

These global and local challenges require:

- ❑ New ways of thinking
- ❑ Technology innovation
- ❑ Collaboration

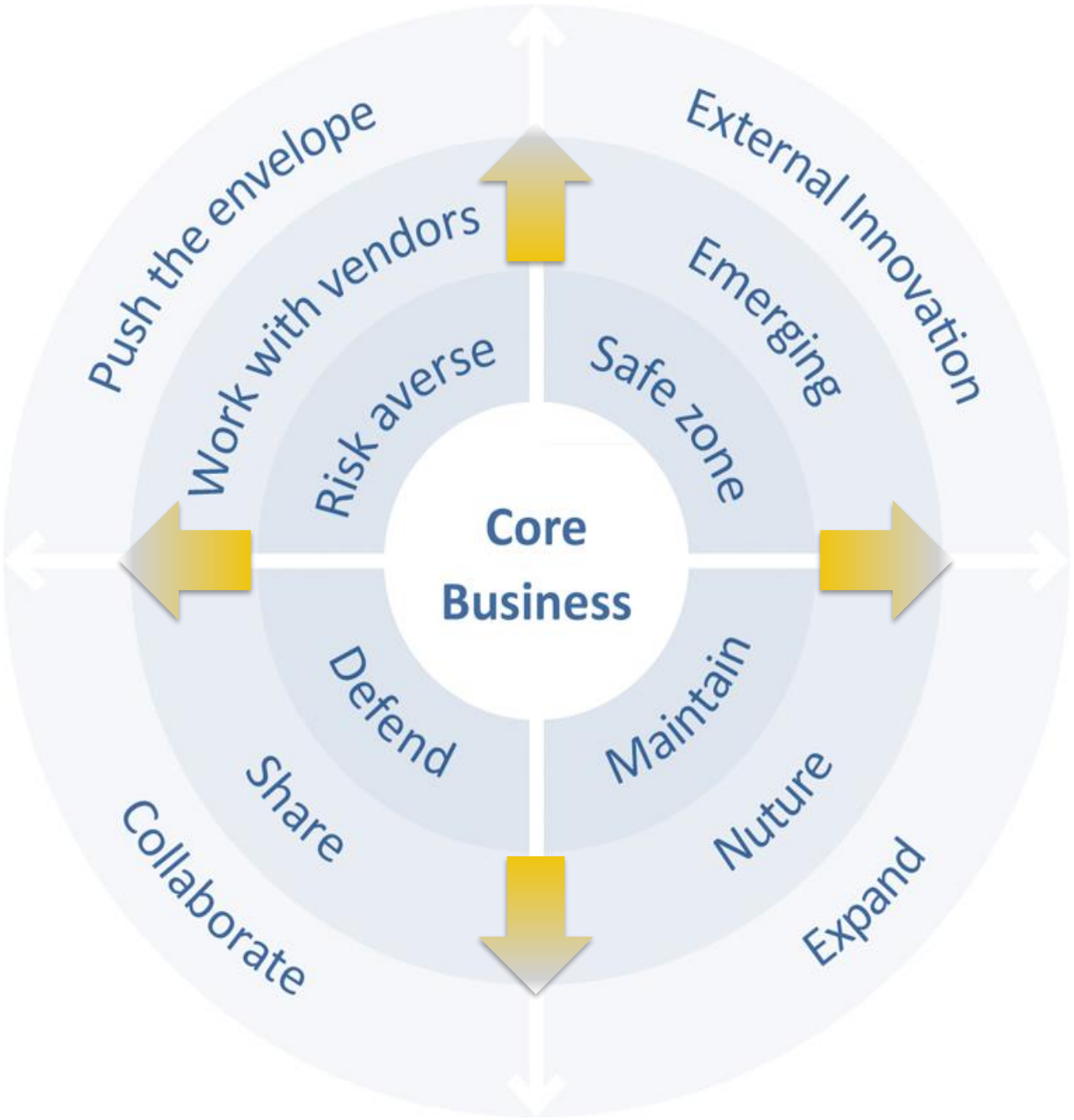
The sector can expect three stages of automation to 2030

	PRESENT	2025	2030+
	① Automated equipment	② Connected, digitised pieces of equipment	③ Integrated value chain
Example technology	Proprietary drones, autonomous underwater vehicles, semi-autonomous drills	Smart sensors that both monitor and control equipment in plant/mine	Automated machinery and equipment that is working in concert together e.g. maintenance, logistics, production
Level of interoperability	Low: technology developed by a handful of OEMs; not standardised or interoperable	Medium: equipment and data from a range of different vendors capable of operating together	High: open source platforms which allow integration and interoperability across value chain
Drivers	• Safety • Operational and capital productivity	• As with stage 1 • Reduced automation costs	• As with stages 1 and 2 • Integration benefits / access to new resources
Level of automation	Mainly semi-automated tech; but with some full automation	Most equipment now fully automated; limited self-learning	Equipment and processes capable of self-learning and making decisions without human input
Data maturity	Low: identifying value of existing data sets using machine learning	Medium: filling gaps in datasets to enhance machine learning	High: advanced data analytics across value chain

HOW WILL INDUSTRY NAVIGATE THESE?

Global industry drivers are influencing the local industry's business model

Industry is exploring collaboration to monetise more resources, focusing on where the value is across the entire supply chain, partnerships with renewable energy technologies and more agile and resilient business strategies



Extending the innovation boundary

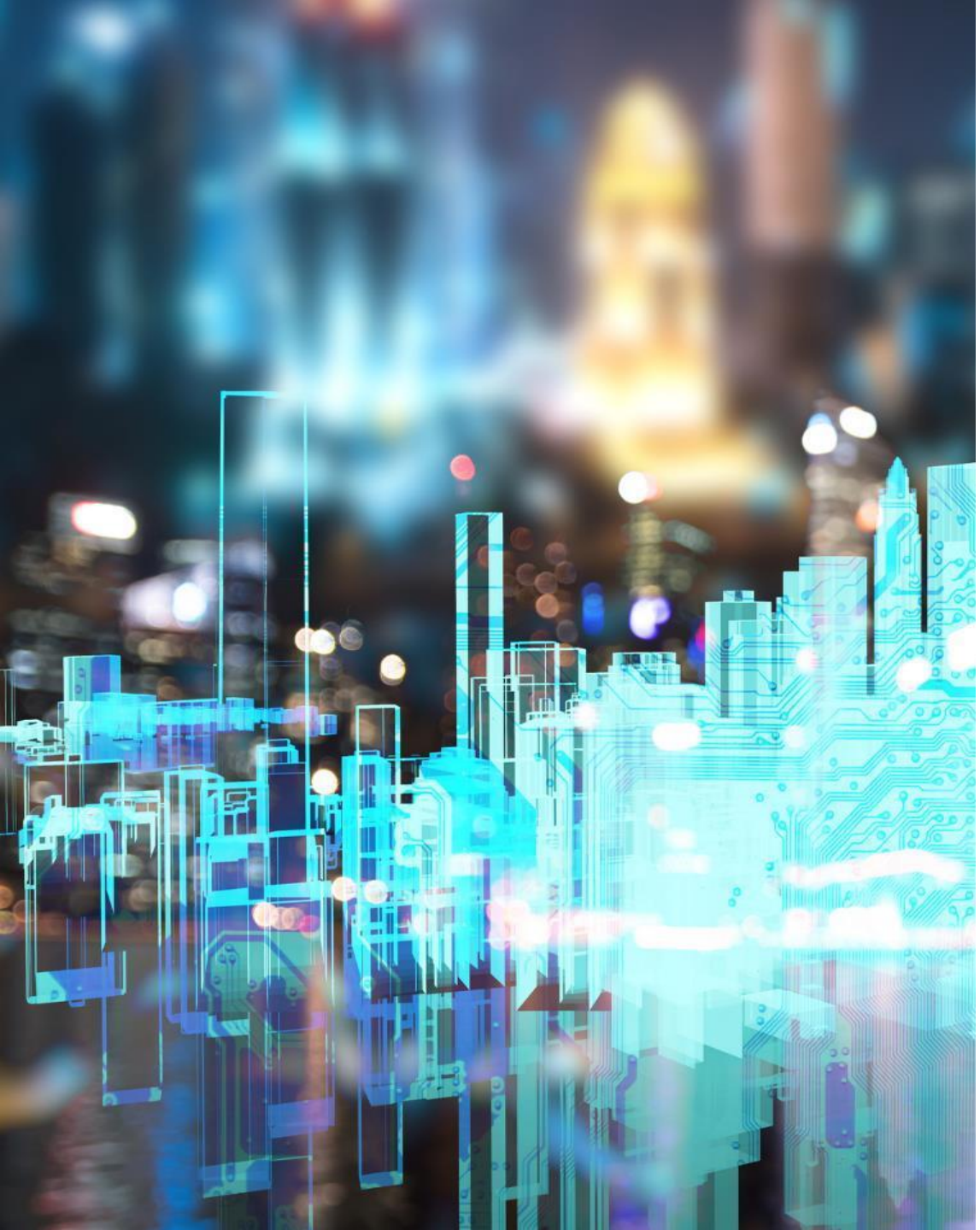
1. **The safe zone –** look internally, improve margins and keep cash coming in
2. **Emerging innovation –** work with vendors, extend collaboration externally and create new value
3. **External innovation –** engage with multiple external knowledge experts, use technology to verify and de risk adoption of innovation

Making innovation part of our DNA

- Leadership, vision and strategy
- Engagement and trust
- Integrated, multidisciplinary teams not siloed jobs – interoperability
- Performance contracts based on ongoing value creation not procurement
- Giving employees the skills and incentives to find and deploy innovation and technology
- Future of education and training is lifetime learning

Technology is making innovation a ‘safer bet’

- Full automation is the next evolution – Industry 4.0
- Leverage smart connected assets
- Making failure safe
- Using data to get insights to enable People, Assets & Processes = optimisation
- Enable integrated operations across the enterprise
- Facilitates a new externally focussed business model creating user value



New business models supporting innovation

- New strategic alliances and collaborative industry approaches
- Rapid developments in automation and digital technology
- External innovation partnerships
- Move to ‘performance based’ contracts

The future of education and training

- STEAM as core skills
- Soft skills still essential
- Industry focused
- Micro credentials
- Lifetime skills passport
- Experiential and on the job learning

WHAT IS NERA DOING TO SUPPORT THE INDUSTRY MAKE THE CHANGE?

NERA NATIONAL ENERGY RESOURCES AUSTRALIA

Six Industry Growth Centres

- Industry led and independent
- Build sector productivity & competitiveness
- Through lighthouse projects - R &D and Innovation to demonstration and commercialisation
- Build SME/supply chain capabilities and capacity, supported by skills
- Connected to global export markets

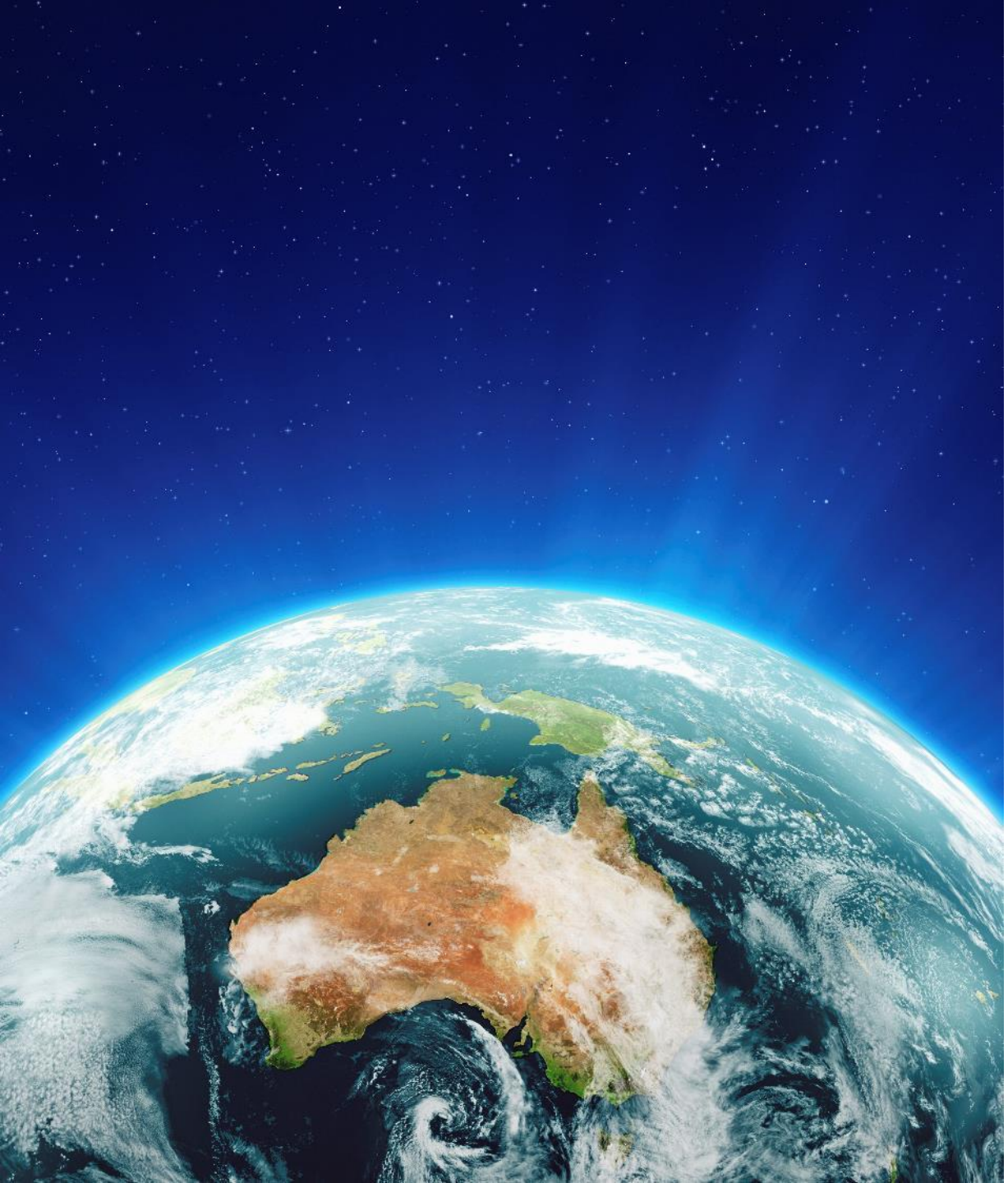
NERA works across the energy resources sector to:

Grow the sector into a global energy powerhouse

Lead the global digital and automation technology race, and support innovative SMEs go global

Transition to a low-carbon future

NERA



NERA

Sector Competitiveness Plan

Ten Year Horizon

A ROADMAP to address sector wide challenges and opportunities and drive transformation

Identifies +$5B of additional value per annum to unlock for Australia's oil and gas industry

Identifies priorities for collaborative action and innovation to unlock that value

KNOWLEDGE PRIORITIES

Enhance skills and business capabilities to support automation and digitisation

Build talent and enable effective collaboration and innovation

Pursue a sustainable and low carbonenergy future

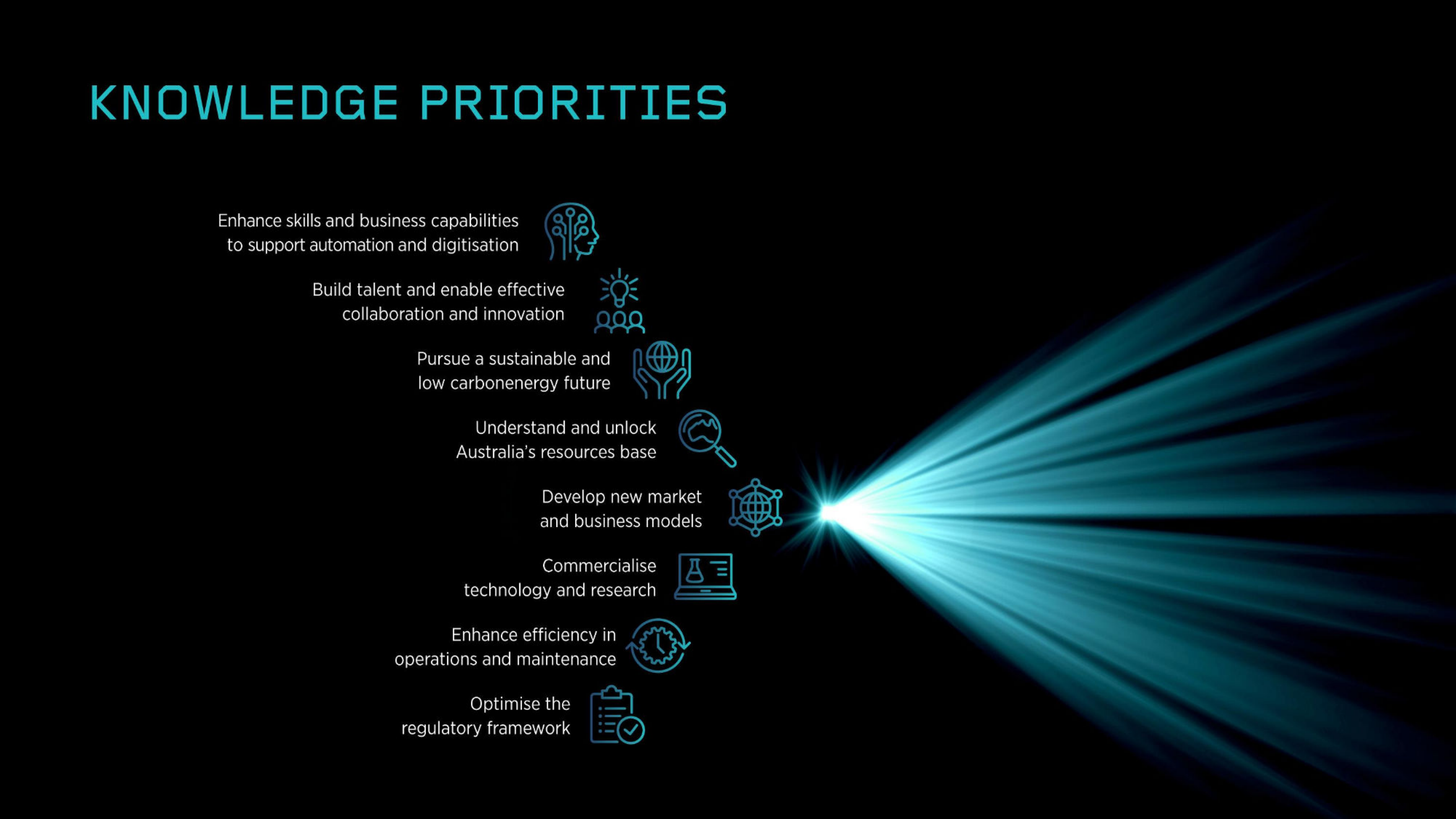
Understand and unlock Australia's resources base

Develop new market and business models

Commercialise technology and research

Enhance efficiency in operations and maintenance

Optimise the regulatory framework



NERA's Projects across Australia

Western Australia

1. **Tropical Cyclone Reanalysis** - *Industry: Oil & Gas (Conventional)*
2. **Exmouth Integrated Artificial Reef** - Industry: Oil & Gas (Conventional)
3. **Living Lab Subsea Test Structure** – Industry: Oil & Gas (Conventional)
4. **LNG Futures Facility** – Industry: Oil & Gas (Conventional)
5. **Baseline Characterisation of the North Perth Basin** - Industry: Oil & Gas (Unconventional & Conventional)
6. **Blacktip Wellhead Platform** - Industry: Oil & Gas (Conventional)
7. **Beneficiation -** Industry: Uranium
8. **Optimisation of the Metallurgical Flowsheet** - Industry: Uranium
9. **Hydrate Risk in Subsea Jumpers** - Industry: Oil & Gas (Conventional)
10. **Integration of Image Recognition Technology into water hull cleaning tool** – Industry: Oil & Gas (Conventional)
11. **Subsea Innovation Cluster Australia** – Industry: Oil & Gas (Conventional)
12. **Core Innovation Hub** - Industry: Sector wide
13. **Virtual Operating Environment** - Industry: Oil & Gas (Conventional)

South Australia

14. **Automating Groundwater Compliance Monitoring** - Industry: Uranium
15. **Radiological Risk Assessment Tools** - Industry: Uranium

Northern Territory

16. **Metal 3D Printing for the Supply Chain** - Oil & Gas (Conventional)

New South Wales

17. **Machine learning-based sub-surface geological model** - Industry: (Coal)
18. **Scheduling system for coal export terminals** – Industry: (Coal)

Queensland

19. **Zero Emissions Coal Technology** - Industry: Coal
20. **Hybrid CSG Wellsite Power** - Industry: Oil & Gas (Conventional)
21. **Unlocking the Toolebuc Formation** - Industry: Oil & Gas (Unconventional)
22. **New Geostatistical Technique (Petrel plug-in)** - Industry: Oil & Gas (Unconventional)
23. **Identifying Different Sources of Methane in Groundwater -** Industry: Oil & Gas (Unconventional)
24. **Converting Tight Contingent CSG Resources - Industry:** Oil & Gas (Unconventional)
25. **Resetting our understanding of the Great Artesian Basin - Industry:** Oil & Gas (Unconventional)
26. **Diagnostic Acoustic Sensing for coal resource exploration:** Coal
27. **CSG Wellhead Compression:** Industry: Oil & Gas (Conventional)
28. **Enhancing Well Deliverabilty:** Industry: Oil & Gas (Conventional)

Multi-State

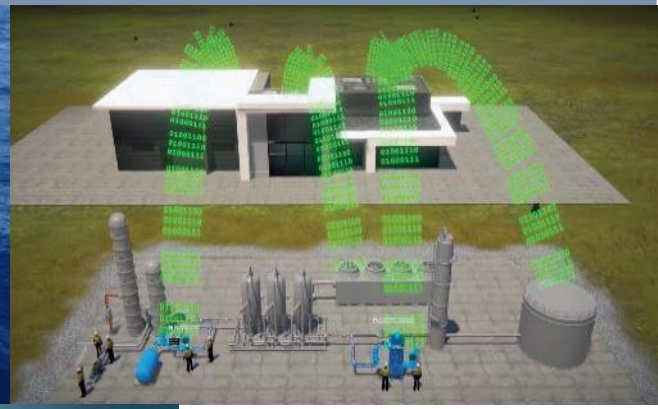
29. **Bioremediation of Contaminated Sites -** Industry: Oil & Gas (Conventional)
30. **Centralised Environmental Plans for Seismic Operations -** Industry: Oil & Gas (Conventional)
31. **SME Innovation Vouchers – Industry: Sector wide**
32. **SMART Australia – Industry: Sector wide**
33. **Decommissioning Initiative** - Industry: Oil & Gas (Conventional)
34. **Open Innovation Platform** – NUREKA - Industry: Oil & Gas
35. **Virtual marine cluster –** Industry: Oil & Gas

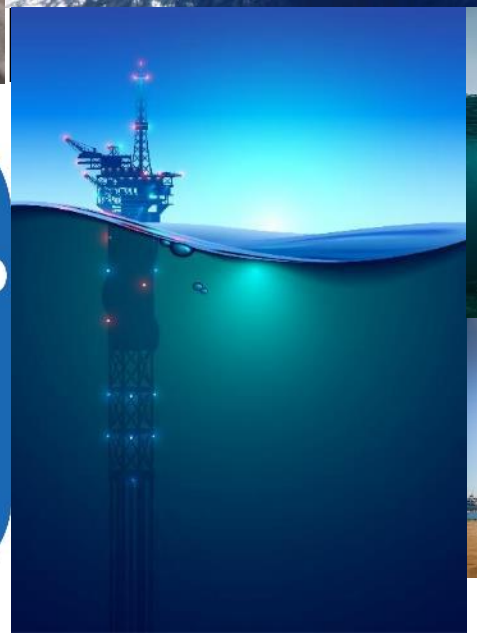
NERA's lighthouse projects

Export markets

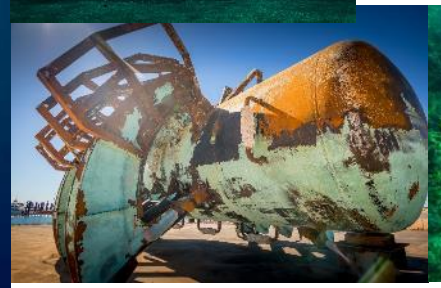
Gastech
EXHIBITION & CONFERENCE
30TH EDITION
17 - 20 SEPTEMBER 2018
FIRA GRAN VIA, BARCELONA, SPAIN

Research + collaboration





IMNIS
INDUSTRY MENTORING
NETWORK IN STEM



Exmouth Integrated Artificial Reef

CONNECTING 3 GLOBAL ENERGY HUBS ‘NEW TECH EXCHANGE PROGRAM’

Connecting leading energy technologies, companies and solutions to the world

Energy Technology Tour
May 6-9, 2019
Houston, Texas

NERA is pleased to announce the launch of a new a global program to support, promote and connect Australia’s leading technology companies with major energy resource ecosystems around the world, providing global solutions to the world.

The gateway program connects energy resource capitals Perth (Australia), Aberdeen (Scotland) and Houston (USA) providing a pathway for energy technology companies to collaborate and access new markets.

NERA
NATIONAL ENERGY RESOURCES AUSTRALIA
Creating connections for growth

The Oil & Gas Technology Centre
Your Innovation Partner

Unearthed

STATION HOUSTON

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ENERGY RESOURCES
AUSTRALIA

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Registered office:
Australian Resources Research Centre
Level 3, 26 Dick Perry Avenue
Kensington WA 6151

ABN 24 609 540 285

T: 1300 589 310
E: contact@nera.org.au
W: www.nera.org.au
@NERAnetwork
NERA – National Energy Resources Australia

www.nera.org.au