

# Oil and Gas

**A Roadmap for unlocking future growth opportunities for Australia**

**SUMMARY**

**CSIRO FUTURES**

CSIRO Futures is the strategic advisory arm of Australia's national science agency.



# Megatrends: How is the sector changing?

## ENERGY HUNGRY

Global energy demand is growing but the pace of technological change and tightening climate regulations mean there is uncertainty about how much of the world's future energy mix will remain fossil-fuel based. Companies will need to diversify their offerings to meet localised demand patterns.

## CARBON CONSTRAINED

All indications are that the decarbonisation of the energy sector has begun. Governments are enacting climate change regulations. The cost of electricity generation at the grid scale from renewable sources is beginning to compete with that from fossil-fuels. The sector needs to embrace these changes or risk being left behind.

## SOCIALLY CONCERNED

Stakeholders are placing extreme pressure on companies to protect their health and the environment. Activist investors want to limit energy firms' exposure to climate change risk. Stakeholder backlash is preventing exploration for new resources. To develop oil and gas resources in the future, the sector needs work on earning and maintaining the respect and trust of stakeholders.

## DIGITALLY ENABLED

Rapid improvements in digital technologies have the potential to dramatically improve the way businesses operate across the value chain. The sector needs to accelerate the uptake of digital technologies like Artificial Intelligence (AI) to improve exploration, development, operations and maintenance.

## MORE COMPLEX AND COSTLY

Out of necessity, the sector is moving toward unconventional resources (such as ultra-deep water and shale gas) that require new technologies to produce. The added challenge is producing them economically in light of suppressed global oil and gas prices.

# What challenges do we face?

Australia's oil and gas sector faces many challenges that will test its growth potential.

- **High-cost environment** – high costs may dissuade future capital investment.
- **Regulatory uncertainty** – Exploration moratoria and unclear climate policy are creating investment uncertainty.
- **Establishing social licence to operate** – Trust needs to be built with stakeholders to unlock Australia's oil and gas resources.
- **Low oil prices, commoditisation of gas, and declining exploration** – Exploration for new resources has slowed and reserves are declining.
- **Domestic innovation and commercialisation challenges** – The sector buys its technology from abroad, despite strong domestic research capability.
- **Low levels of collaboration** – Not enough collaboration that is focused on innovation occurs in the Australia's oil and gas sector.

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**We are currently in a period of unprecedented technological disruption, and as global industries are shaped and formed through these advances, the oil and gas industry must keep pace.**

Miranda Taylor, CEO, NERA

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## How can the sector grow?

Through extensive consultation with oil and gas industry executives and experts, the Roadmap identifies a number of strategic growth opportunities.

### 1 High-value diversification

Businesses should adapt their business models and diversify into higher-value products and services to hedge against an uncertain future energy mix. Examples include integrating renewable energy, LNG for heavy transport, hydrogen, and higher-value chemical products.

### 2 Digital operations and maintenance (O&M)

Rapidly evolving digital technologies provide opportunities for safer and more efficient O&M of oil and gas assets. Examples include using robots and AI to improve the asset performance and streamline the supply chain.

### 3 Advanced environmental solutions and processes

Reducing the environmental and social impacts of projects should be a priority for the sector. Examples include storing CO<sub>2</sub> in novel geological formations, selling sequestration services to the power sector, and finding novel ways to decommission infrastructure.

### 4 Enhanced basin productivity

Technological breakthroughs will help lower the cost of locating resources and producing reserves, and may improve industry cost-competitiveness. Examples include using autonomous robots to find resources and microbes to economically recharge depleted coal seam gas reservoirs.

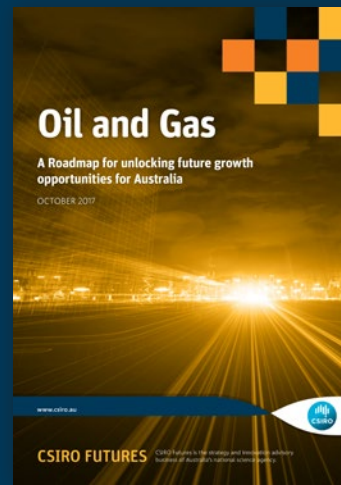
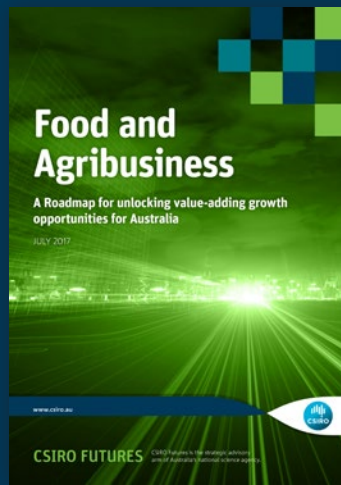
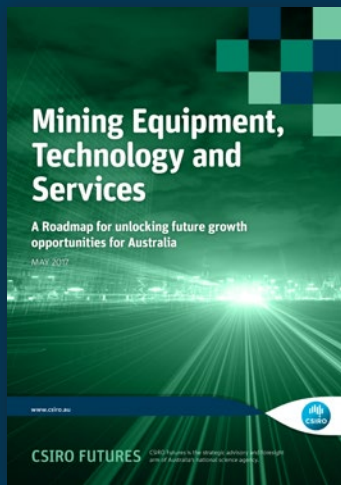
There are also a number of cross-cutting changes that will be needed to maximise the impact of these opportunities:

- To diversify, bold collaborations will be needed to build capability and enter new markets.
- To reduce costs, common digital technologies and small-scale infrastructure are needed.
- To unlock domestic resources and reduce Australia's reliance on imported fuels, an energy security perspective may be needed to shift public opinion.
- To attract future investment, common standards, streamlined approvals, and clear climate policy are needed.
- To build trust-based relationships with stakeholders, the sector should continue its social licence research, engage in integrated basin-wide planning (environmental, economic, health, etc.), and strengthen its approach to science communication.

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**Read more in the full report:**  
[www.csiro.au/Oil-and-gas](http://www.csiro.au/Oil-and-gas)

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## CSIRO FUTURES

CSIRO Futures is the strategic advisory arm of Australia's national science agency. We work with senior decision makers in Australia's largest companies – and government – to help them translate science into strategy and plan for an uncertain future. We build on CSIRO's deep research expertise to help our clients create sustainable growth and competitive advantage by harnessing science, technology and innovation.

## CSIRO ENERGY

CSIRO Energy is working to ensure economic competitiveness and energy security while enabling the transition to a lower-emissions energy future. We are pioneering energy technologies that create value for industry and households and provide the knowledge to guide us towards a smart and secure energy future. We develop pathways to achieve an enduring legacy from energy resources and the social cohesion to tackle the environmental consequences of the chosen options.

## CSIRO OCEANS AND ATMOSPHERE

CSIRO Oceans and Atmosphere delivers world-class science that enables governments, industries and communities to make informed decisions about the sustainable management of the marine and atmospheric environments. We are uniquely placed to deliver new and improved scientific knowledge, information, products and services that contribute to significant economic, social, cultural and environmental benefits for Australia and the region.

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