



Designing Australia's Energy Future

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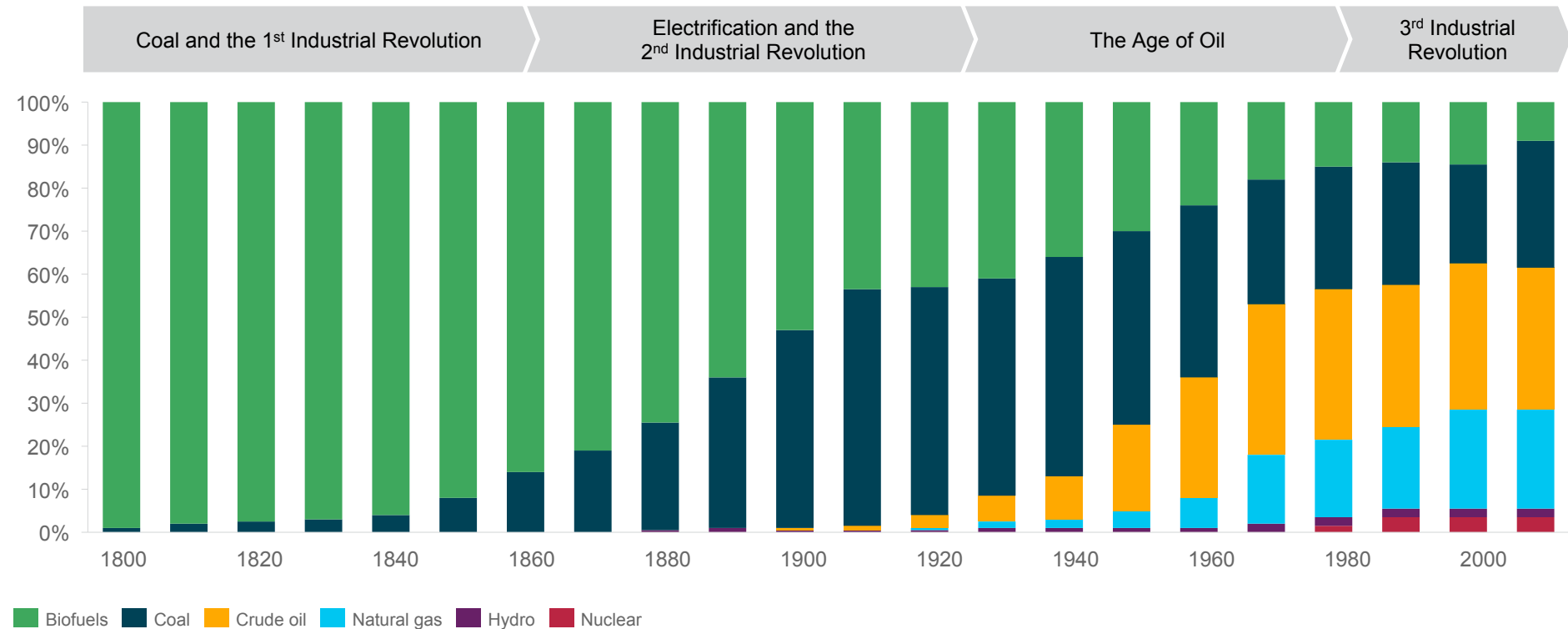
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The history of the energy industry is marked by profound energy transitions

Through the centuries industrial revolutions have been underpinned by transitions in fuel energy



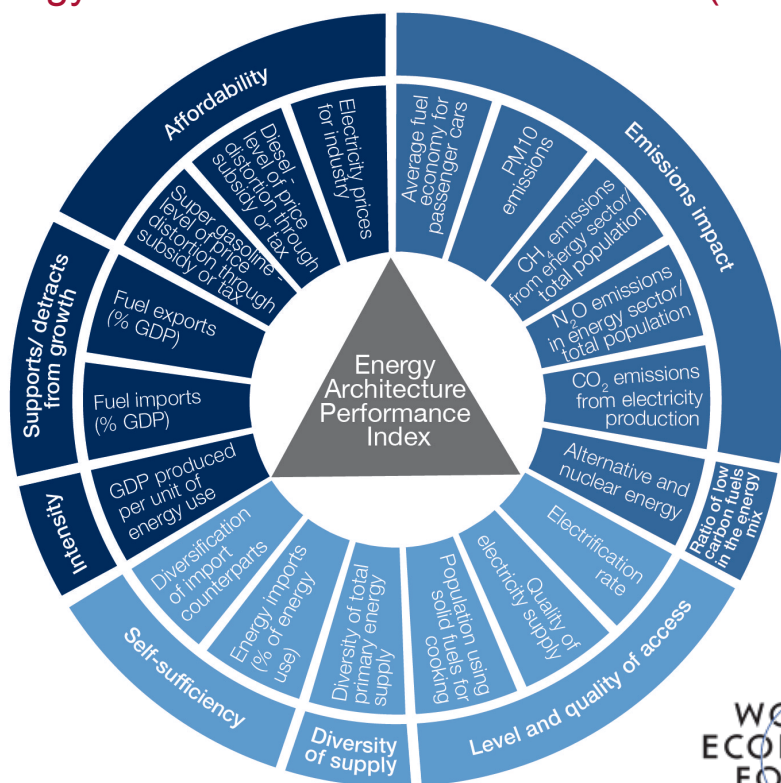
Source: Vaclav Smil, Energy Transitions: History, Requirements, Prospects, 2010

We are in the midst of the next transition with multiple disruptive forces at play

Changing energy map	US LNG export	Decentralised energy systems	New demand centres	China/Indian demand uncertainty
	Unconventionals	Energy efficiency	Drop in solar costs	Russian Trade Flows
Policy implications	Climate change	Carbon market	Local content	Stranded assets
Industry reconfiguration	Market consolidation	Cost focus	Market entrants	Energy investment cycle
Industrial change	Floating LNG economic	Hydrogen economy	Energy storage	Industrial Internet of Things
	Carbon sequestration	Digital transformation		

Countries around the world are grappling with the energy trilemma

Energy Architecture Performance Index (EAPI)



Economic Growth & Development

Extent to which a country's energy architecture adds or detracts from the economy:

- Energy efficiency
- Gasoline prices
- Diesel prices
- Electricity prices
- Cost of energy imports
- Value of energy exports



Energy Security

Extent to which a energy supply is secure, accessible and diversified:

- TPES diversity
- Import counterparts
- Import dependence
- Electrification
- Solid fuel use (cooking)
- Electricity supply quality



Environmental Sustainability


Environmental impact of energy supply and consumption:

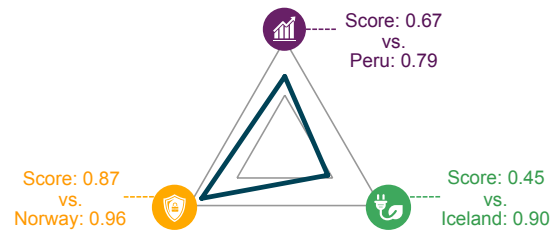
- CO2 emissions
- NO2 emissions
- CH4 emissions
- Air pollution
- Fuel economy
- Alt. and nuclear energy

Source: The Global Energy Architecture Performance Index Report 2015; World Economic Forum - Accenture

Australia ranks high on Economic Growth & Development and Energy Security but low on environmental sustainability

2015 EAPI – Australia’s performance

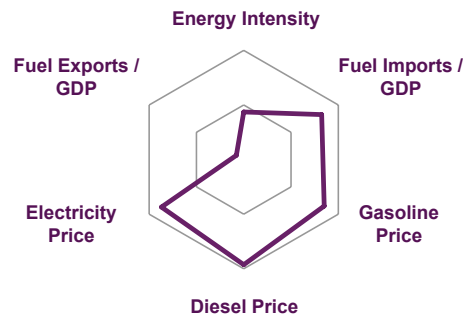
 **Energy trilemma – 38th Rank**
Score, 0-1; Comparison vs. leader provided



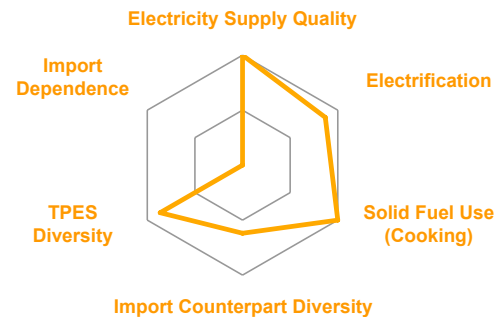
Global top 10 – Rank

	1. Switzerland		6. Sweden
	2. Norway		7. Denmark
	3. France		8. Austria
	4. New Zealand		9. Colombia
	5. Spain		10. Portugal

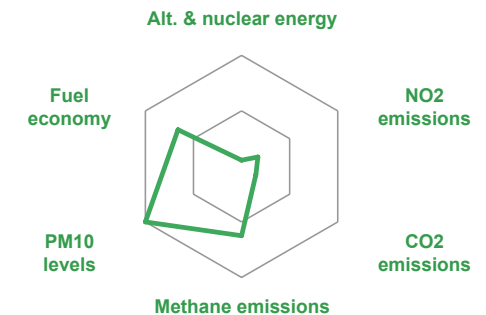
 **Ec. growth & dev. – 13th Rank**
Score, 0-1



 **Energy security – 16th Rank**
Score, 0-1



 **Env. sustainability – 103rd Rank**
Score, 0-1



Australia scores low in using renewable energy sources and higher emissions compared to other countries

2015 EAPI – Key country rankings

	BRAZIL 	USA 	NORWAY 	NEW ZEALAND 	AUSTRALIA 
Energy efficiency GDP/unit energy use <i>Higher efficiency = Higher score</i>	 8.48	 7.62	 11.05	 7.69	 7.28
TPES diversity Herfindahl index <i>Greater diversity = Higher score</i>	 0.18	 0.16	 0.23	 0.10	 0.21
Alt. and nuclear energy % total <i>Higher percentage = Higher score</i>	 43%	 16%	 48%	 33%	 6%
CO2 emissions Tonnes/capita <i>Higher emissions = Lower score</i>	 63	 603	 13	 141	 823
Import dependence Imports net % use <i>Higher imports = Lower score</i>	 8%	 16%	 -677%	 14%	 -136%
EAPI RANKING	23 rd	37 th	2 nd	4 th	38 th

Source: The Global Energy Architecture Performance Index Report 2015; World Economic Forum- Accenture

How does this impact Australia's future energy system?

Three critical areas of opportunity . . .





Driving Better Industry Collaboration

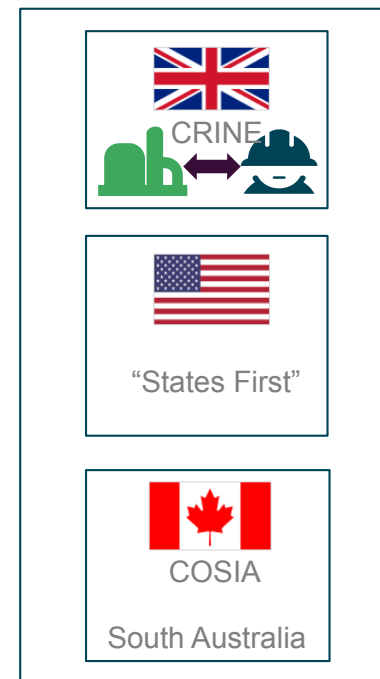
Achieving further industry collaboration and infrastructure sharing is key to improving productivity and managing costs in the oil and gas industry...

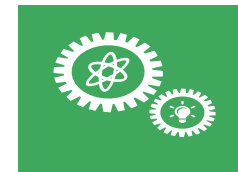
Industry Group – create a CRINE equivalent for Australia, align existing initiatives around a shared agenda and agree transparent targets

Infrastructure Sharing – Optimisation of development and use of infrastructure

Innovation and Knowledge Sharing – a more proactive and progressive sharing mindset to overcome collective cost challenges

Third Parties – can be a driver and have a role in creating and managing shared capability and infrastructure





Accelerate the pace of Innovation to drive Productivity

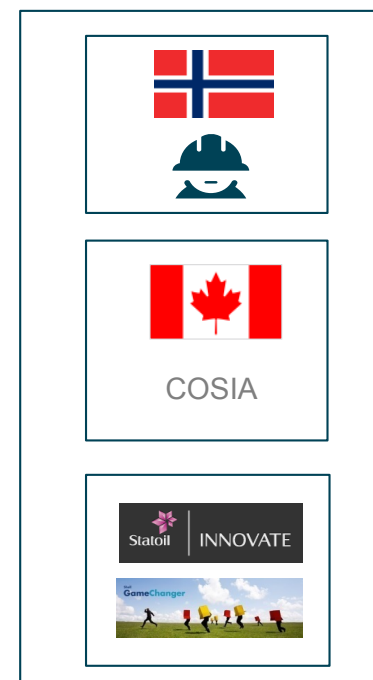
Australia needs to improve its productivity and global competitiveness to attract capital and be able to develop resources profitably

Service Provider Partnerships – 80% of oil and gas technology patents and over 63% of deployed innovations originated with services companies

Research and Development – further incentives and credit for developing and applying R&D in the industry and particularly in new basins

Digital – Embrace the Internet of Things, Predictive Analytics and Mobility to transform how business is conducted

The process of Innovation – embrace Open Innovation and develop ‘incubator’ type capabilities to be able to commercialise ideas





Government – policy, reform and support

With emergence of alternative global supplies the government needs to step up in a couple of areas

Environmental Sustainability – what is the right balance for Environmental Sustainability vs Econ. Growth and Energy Security?

Labour reform – improve labour market efficiency

Tax and Royalty Regime – maximise the incentive for operators to keep developing, especially in undeveloped areas

Regulatory Regime – simplify and align across Federal, State and Local



Southern
Australia's
Roadmap for
Unconventional
Gas Projects

The opportunity is significant – let's make it work.... TOGETHER

All the players involved will need to work together to architect the future of the industry



INDUSTRY COLLABORATION

- Create a CRINE equivalent for Australia, align existing initiatives around a shared agenda and agree transparent targets



INNOVATION & PRODUCTIVITY

- Embrace open innovation and work with partners who can help to accelerate productivity improvement
- Leverage the 'ecosystem of partners' to drive innovation



GOVERNMENT SUPPORT

- Balancing 'Environmental Sustainability' as part of the Energy system
- Maximise incentives for doing business and make it easy to do business in Australia (remove red tape)