



NERA

NATIONAL
ENERGY RESOURCES
AUSTRALIA

Creating connections for growth



Energy NSW Industry Forum

2017



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1

Why the energy resources sector needs to transform & What we need to focus on now to prepare for the future

2

Collaboration and NERA's role

3

**The How - NERA Sector
Competitiveness Plan
Role of Thermal Coal**



Australia has seen 25 years of sustained growth, strongly underpinned by the energy resources sector....

But economy and energy now in transition

1

**Why the energy
resources sector
needs to transform &**

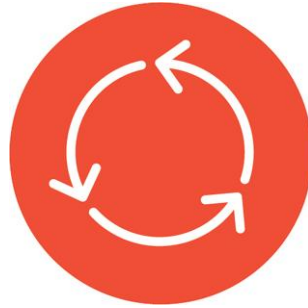
**What we need to
focus on now to
prepare for the
future**



1 Why the sector needs to transform



**Changing Energy
Demand**



**Changing Energy
Supply**



Technology

1 Finkel blueprint for the future

- 🔌 Independent Review into Future Security of National Electricity Market:
 - ... to address shortfalls in the electricity security of what is known as the ‘National Electricity Market’ - which is the interconnected electricity grid of Qld, NSW, ACT, SA and Tas**
- 🔌 Report is energy source agnostic
- 🔌 While it supports particular emissions reduction approaches, it does not proscribe one technology over another

1 Once in a generation opportunity

- 🇦🇺 Australia has an inherent advantage in all forms of energy
- 🇦🇺 But - policy uncertainty is killing investment and damaging the economy
- 🇦🇺 Finkel Blueprint offers a once in a generation opportunity to agree a pathway to lower emissions whilst enabling the economy to adapt
- 🇦🇺 But it will need all parties to be open minded and prepared to compromise
- 🇦🇺 Australia's energy resources industry must also lead and adapt

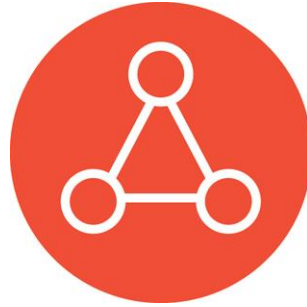
1 Some key Finkel recommendations

- 🌐 Review and update the regulatory framework to facilitate proof-of-concept testing of innovative approaches and technologies
- 🌐 Proof-of-concept testing of innovative grid-scale solutions will be required for as long as technology is continuing to rapidly evolve
- 🌐 Governments should adopt evidence based regulatory regimes to manage the risk of individual gas projects on a case-by-case basis. This should include an outline on how governments will adopt means to ensure that landholders receive fair compensation
- 🌐 Improve engagement with communities and stakeholders
- 🌐 Transparency around industry's performance data

1 Why is it hard to transform



**Internal pipeline
approach**



**Typically structured
with a few vendors**



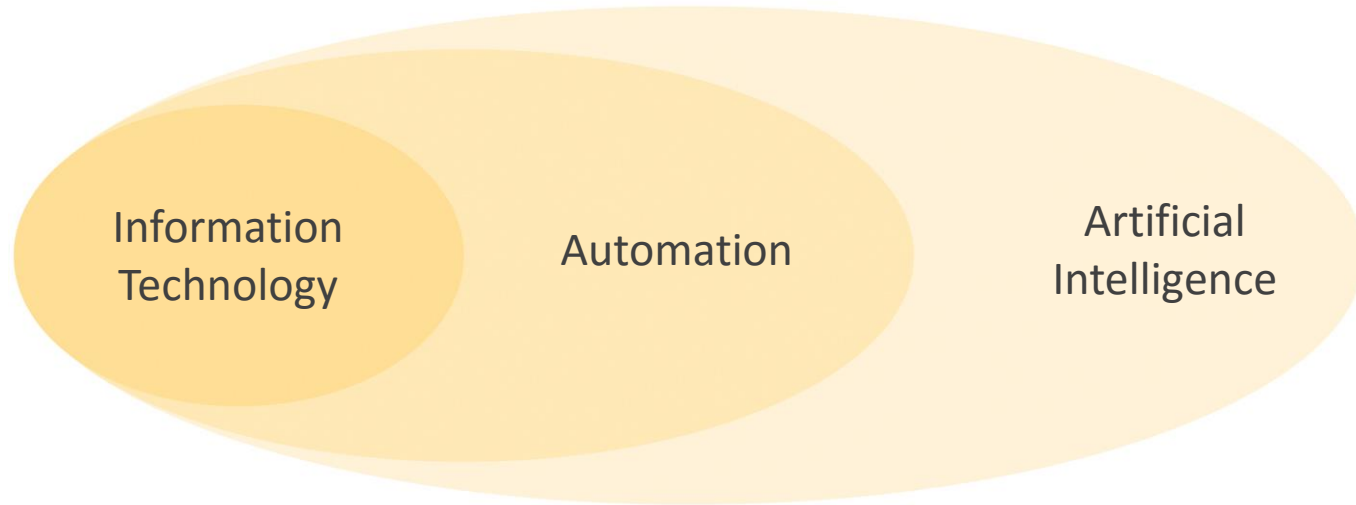
**Slow results,
highly risk averse**

1 Technology - disruptor or enabler

- ⚙️ Either way it is evolving rapidly e.g. full automation and AI
- ⚙️ Need to prepare now to leverage full benefits
- ⚙️ It can enable e.g. as horizontal drilling technology has done for us



1 Leverage multiple disciplines

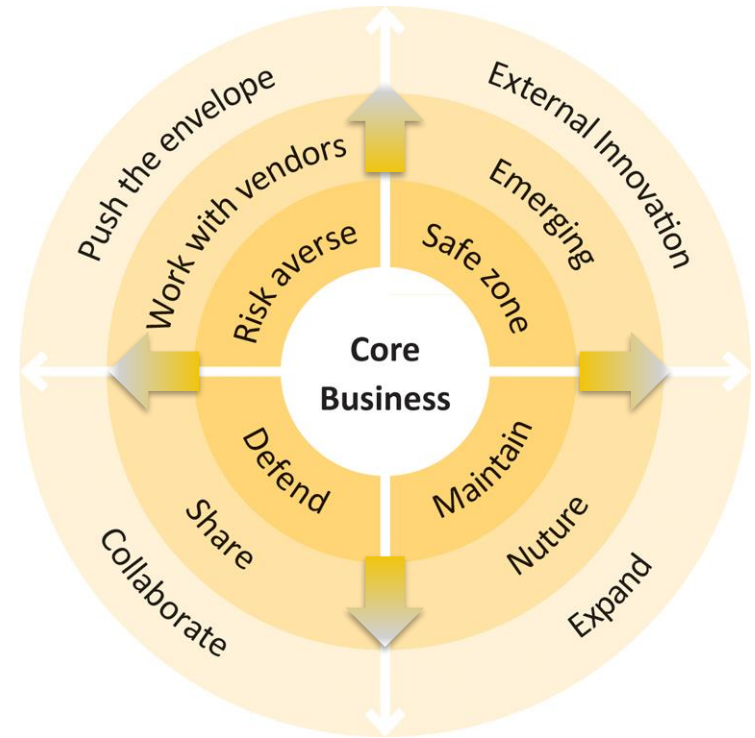


1 Automation

- Full automation is the next evolution
- Leverages smart connected assets
- Enables integrated automation across the enterprise
- Advanced analytics enabling People, Assets & Processes to perform efficiently & reliably = optimisation
- Facilitates a new externally focused business model creating user value.

1 Extending the innovation boundary

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



1 Culture change in organisations

Willingness to push innovation boundaries – with technology enabling us to test, verify and de risk adoption of more innovation

e.g. through simulation/digital twins and living labs

The screenshot shows a news article from ITnews. The header includes the ITnews logo and the tagline 'The daily newsfeed of choice for CIOs, CSOs and IT managers.' Below the header are navigation links for 'GOVERNMENT IT', 'INFOSEC', 'FINANCE IT', 'TELCO', and 'BENCHMARK AWARDS', along with social media icons for Twitter, Facebook, and LinkedIn. The main headline is 'Rio Tinto engineer turns spare time into \$44m'. A sub-headline reads 'Creates code to optimise coal flow into plant.' The article text states: 'Rio Tinto is anticipating an up to \$44 million "near term" windfall in its coal operations from a piece of code written by a control system engineer in his spare time.' It further explains: 'The code is used to analyse and automatically adjust the amount of coal fed into a mine's handling and preparation plant for processing.' A final paragraph notes: 'It's a "delicate balance" but an important one as miners look to maximise the tons of coal they can process each hour without impacting quality.' The article includes a photo of Leonard Gould, a control system engineer at Rio Tinto's Hail Creek coal mine, sitting at a computer workstation. A small inset image at the bottom right shows a glass of water and a laptop.

itnews The daily newsfeed of choice for CIOs, CSOs and IT managers.

GOVERNMENT IT INFOSEC FINANCE IT TELCO BENCHMARK AWARDS

Rio Tinto engineer turns spare time into \$44m

Creates code to optimise coal flow into plant.

Rio Tinto is anticipating an up to \$44 million "near term" windfall in its coal operations from a piece of code written by a control system engineer in his spare time.

The code is used to analyse and automatically adjust the amount of coal fed into a mine's handling and preparation plant for processing.

It's a "delicate balance" but an important one as miners look to maximise the tons of coal they can process each hour without impacting quality.

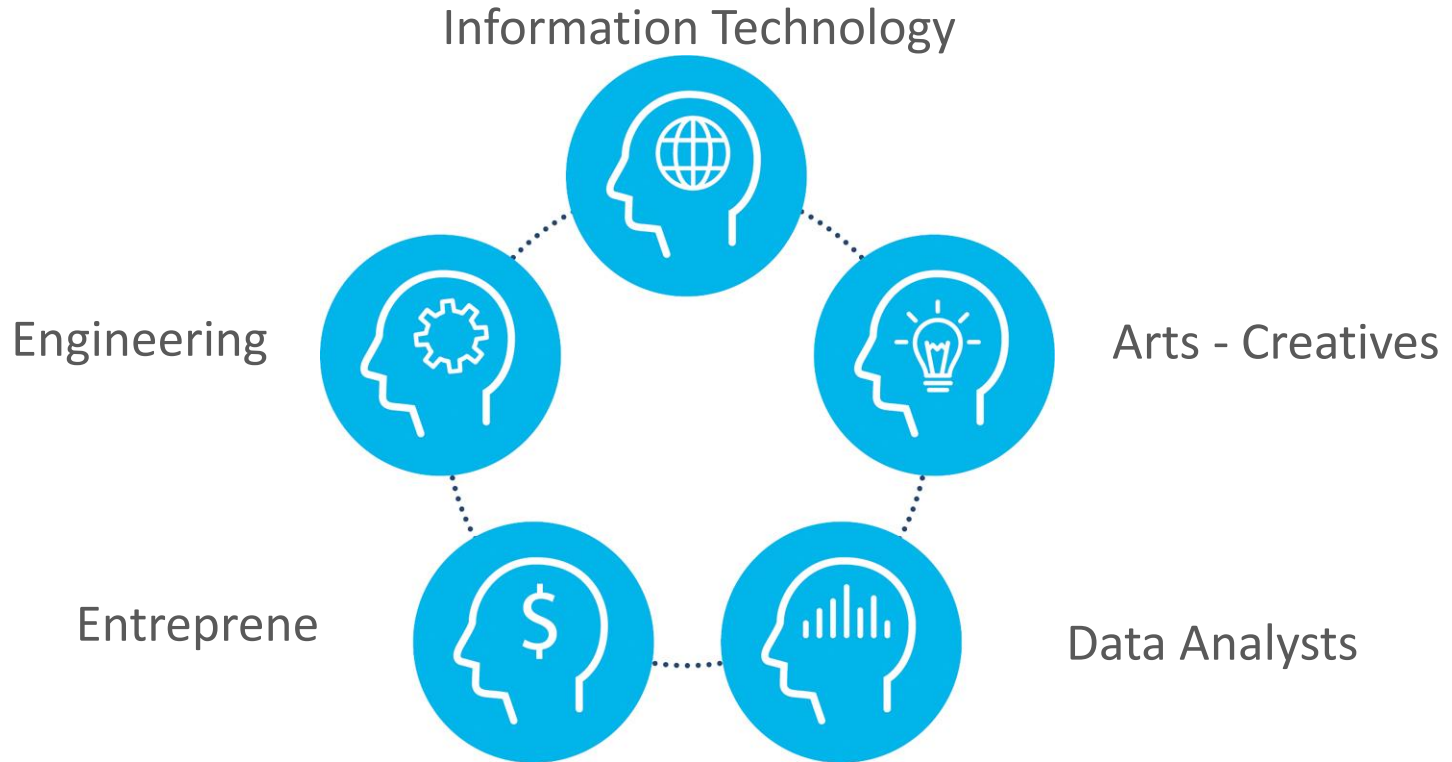
Leonard Gould, control system engineer at Rio Tinto's Hail Creek coal mine. (Credit: Rio Tinto)

2

Collaboration and NERA's role



2 Investment in multidisciplinary teams



2 Engage the best talent

Future Energy Resource Technology Companies

'...no matter who you are, most of the smartest people don't work for you.' Bill Joy, founder of Sun Microsystems

- ⚙️ Critical **Inhouse** talent – strategic and systems thinking, decision making, ownership of risk, IT & engineering, commercial & business development
- ⚙️ **External** talent – non core, contingent, intermittent and access to a global network of knowledge excellence



2 Collaboration

Technology is rapidly changing Australia's energy resources sector from

- ⚙️ a pipeline business model where innovation is internally focussed and driven through a pipeline or gateway process
- ⚙️ to a knowledge harvesting model - where organisations have core internal strategic and risk knowledge, but use technology to harvest and risk manage the best talent and solutions



2 External collaboration

- ⚙️ Those companies that focus solely on internal innovation will miss out on the opportunities that technology is opening up
- ⚙️ Pace of change is too fast and too complex to do it alone
- ⚙️ Technology is enabling 'Networks' and making it easier to access the best talent and capabilities, both internal and external



Industry Growth Centres - trusted brokers for connectivity

- Industry led and independent
- Areas of competitive strength or strategic need
- Drive productivity & competitiveness as economy transitions
- Transfer more of our investment in **knowledge** into **commercial value** developed here in Australia
- But connected to global markets



Creating innovation platform for energy resources stakeholders to:

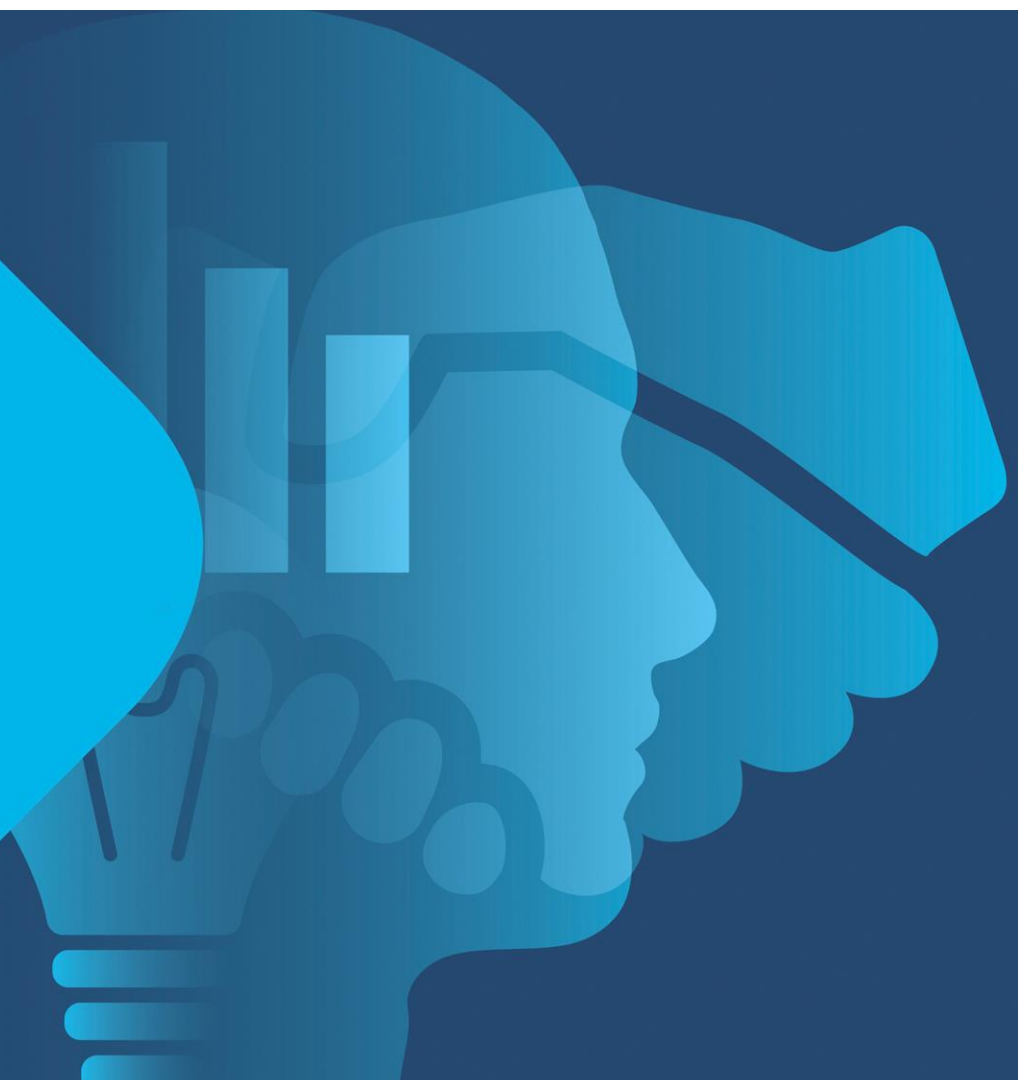
1. Manage costs and optimise productivity of current assets through ability to harvest external knowledge and rapidly adopt innovation and technology
2. Maximise efficiency and environmental performance through fast adoption of range of clean and renewable technologies, and by reducing carbon emissions
3. Build agile, resilient supply chain working across multiple industries

2 NERA supporting SMEs and innovation

1. Are you Research Ready? Program
2. Innovation Vouchers
3. Initiate multiple CRC-Ps in key areas & build centres of excellence
4. Co-Fund Projects
5. Strategic connections with other bodies & programs e.g. CSIRO Roadmaps, Industry bodies, Entrepreneurs Program, AusIndustry Business Advisors, ATSE, Engineers Australia
6. Join NERA as a NERA Network Associate at:
https://www.nera.org.au/Category?Action=View&Category_id=95

3

The how



- Launched in March 2017
- 10 year Horizon
- Incremental and transformational actions
- Identifies priorities for collaborative action by stakeholders across the value chain to:
 - **address productivity and competitive issues thereby increasing investment and further exploration**
 - **enable the technology supply chain to innovate and compete locally and globally**
 - **secure a sustainable role in Australia's low emissions energy future**

3 Nine sector knowledge priorities



Work skills of the future



Enabling effective collaboration



Understanding Australia's resource base



Social licence to operate



Unlock future resources



New markets,
New technologies,
New business models



Commercialisation of research and development



Efficient operations and maintenance



Regulatory framework optimisation

3 Knowledge clusters

Cluster Participants

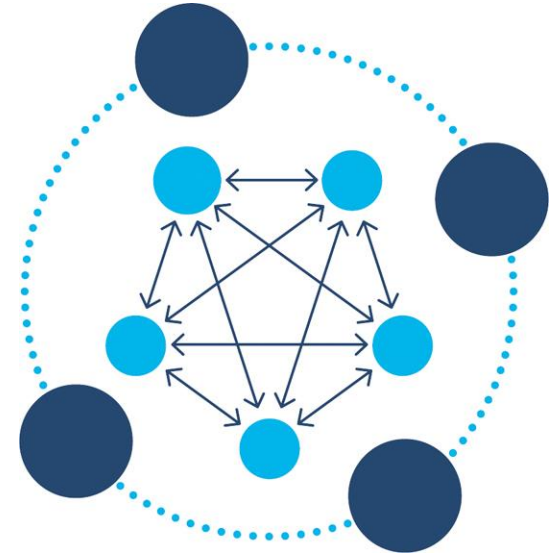
Innovators, entrepreneurs and SME's

Infrastructure

Business and finance

Industry and regulations

Research organisations



Problems and concepts

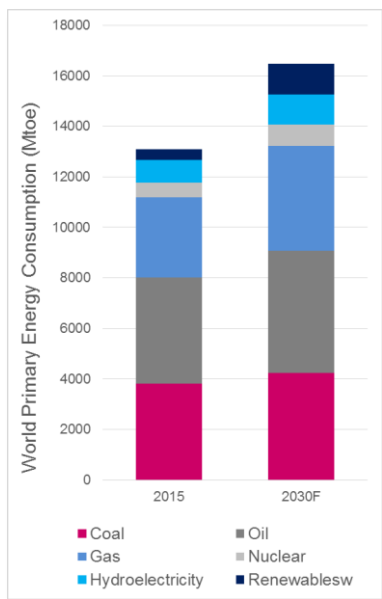
Prototyping

Testing and deploying

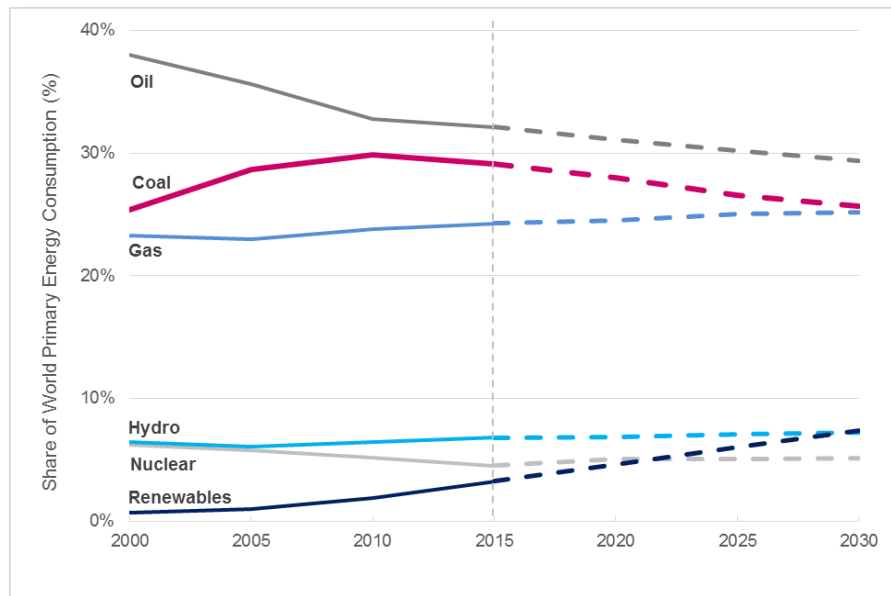
Marketing

3 Projected global energy consumption to 2030

- The world is undergoing an energy generation transition, gradually moving new energy sources but will still require gas and coal as significant players to provide affordable, reliable and secure energy for decades to come



World Primary Energy Consumption 2015 & 2030
Source: BP Statistical Review of World Energy 2016



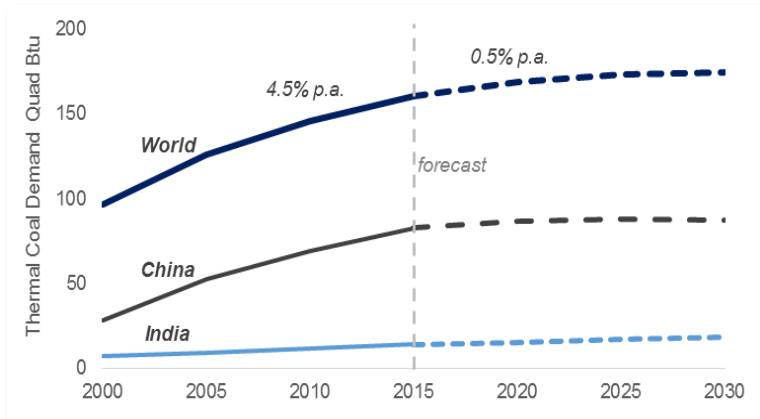
Share of World Primary Energy Consumption 2000-2030
Source: BP Statistical Review of World Energy 2016

3 Projected Global Demand for coal to 2030

Demand for metallurgical and thermal coal will continue to grow and remain an integral part of the global energy transition.

Thermal Coal

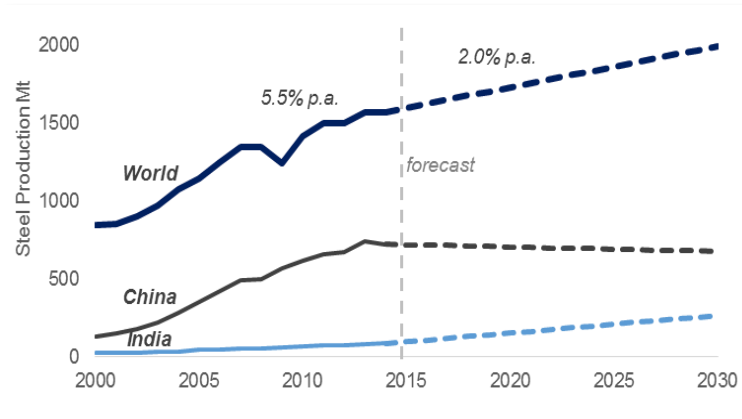
The demand for Thermal Coal is still expected to grow 8.5% by 2030 due to Asian growth, significantly slower than the last 15 years.



Global Thermal Coal Demand 2000-2030
Source: EIA International Energy Outlook 2016

Metallurgical Coal

Steel demand is expected to grow steadily as India grows, while demand in China will plateau.



Global Steel Production 2000-2030
Source: IEA 2015, World Steel Association



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