The Price of Oil: Why it Rose, Why it Fell, and What it Will Mean for Australian LNG

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Background

- **Shale oil industry** <10 years old, still in its infancy

- **Boom has potential to spread globally**
  - Several countries well-positioned (e.g. Australia, Argentina, Canada, China, Mexico, Russia)

  → **Increased production and downward pressure on oil prices over the long term**

- **Implications for Australian LNG?**
What explains oil’s extraordinary price history?

Problems with state ownership and ‘resource curse’
What explains the price fall?

The astonishing rise of shale oil (and disappointing economic growth)

Source: EIA (annual)
Have we only seen the beginning?

- Generally, shale has been seen as medium-term phenomenon
- US oil production forecasts repeatedly revised upwards by EIA

Source: EIA Annual Energy Outlook (annual).
Technological progress: Bakken oil production & rig count

Source: EIA (2016)
Has technology played out?

- **Drilling**
  - Operational efficiencies (e.g. # days to drill)
  - Increased pad drilling, multi-lateral drilling
  - Reduced well spacing
  - Longer horizontal laterals

- **Fracking**
  - Increased # of stages
  - Optimal spacing of stages
  - “Zipper” fracking
  - Waterless fracking
  - Re-fracking
Global shale oil resources widely distributed

- Assessment by EIA (2013): global shale oil resource of \(~345\) billion barrels

- Of the total:
  - Russia 22%
  - US 17%
  - China 9%
  - Argentina 8%
  - Libya 8%
  - Australia 6%

- Our estimate, calculated with a Variable Shape Distribution Model (VSD), is \(~650\) billion barrels
Speculative rest of world **shale oil** impact 2035, mbd

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<tbody>
<tr>
<td>88.7</td>
<td>21.6</td>
<td>17%</td>
<td>3.9</td>
<td>19.5</td>
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Key considerations for global shale development

1. Developed infrastructure
2. Ownership
3. Drillers
4. Risk capital
5. Supply chains
6. Regulation
7. Environmental impact
8. Public acceptance
Environmental constraints

- There are indeed environmental problems, though often exaggerated by media

- Most concerns relate to:
  - Intensive water use
  - Contamination drinking water
  - Methane leakage
  - Induced earthquakes

- Damage caused by “wild west” industry, but hazards will be overcome as industry matures and becomes more tightly regulated
Recommendations for unconventional gas/oil development

- Organizations identified measures to reduce environmental impacts
- Some regulation in place (including in WA)
### Non-US shale oil production costs, 2014 and 2035, $/bl

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>2014</th>
<th>2035</th>
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<tbody>
<tr>
<td>Russia</td>
<td>65</td>
<td>47</td>
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<tr>
<td>Argentina</td>
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<td>36</td>
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<tr>
<td>Brazil</td>
<td>90</td>
<td>66</td>
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Cost estimates for 2014 based on IHS (2014), they comprise a 10% rate of return on invested capital; Costs in 2035, estimated in The Price of Oil (2015), assume technological progress (i.e. cost reductions) of 1.5% per annum.

- Total costs around $60/bl in 2035, so price cannot fall below that level for global revolutions to succeed
Price implications:
Successful global revolution will put significant downward pressure on global oil price

- Sufficient amounts of oil available in 2035 at total costs not exceeding $40-60/bl
  - Thus, $40-60 price adequate to support almost any conceivable level of demand

- Ample supply additions at this level assure that price settles at $40-60 in the long term

  Winners and losers, but on balance, a great advantage
Natural gas prices: divergence significantly narrowed

Source: IMF, Platts (2016)
Spot and short-term trade vs. total LNG trade

- Low oil prices will keep oil-indexed LNG prices low
- Gas-on-gas pricing will rise with growing global LNG trade

Source: GIIGNL(2016)
LNG Exports in 2015, mtpa

Source: International Gas Union (2016)
Australia: $200 billion investment in LNG projects

- By end of decade, Australia will export 85 mtpa of LNG, making it world’s largest exporter

- Contribute to already existing supply glut

- Proximity to Asia, resulting in lower shipping costs, makes region ideal destination for exports

Source: APPEA (2016)
In low price environment, LNG sellers striving to bring project costs down

- Improved productivity and operational efficiencies are seen as vital
- Better early-stage planning, standardisation of equipment, simplifying construction, and flexible technologies like FLNG
- On the consumption side, floating import infrastructure enables poorer countries to increase their natural gas consumption

Source: Shell
Concluding thoughts

- Despite low prices and current oversupply, gas/LNG long-term fundamentals remain attractive, especially in Asia
World primary energy mix (1850-2035)
Concluding thoughts

- Despite low prices and current oversupply, gas/LNG long-term fundamentals remain attractive, especially in Asia

- Australia to remain competitive, but cost reduction important

- Low oil and gas prices ahead
The Price of Oil

- Why it rose stupendously over the past 40 years
- Why it is likely to fall substantially in the coming decades
- What it will mean for the world economy, politics and the environment

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THANK YOU

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