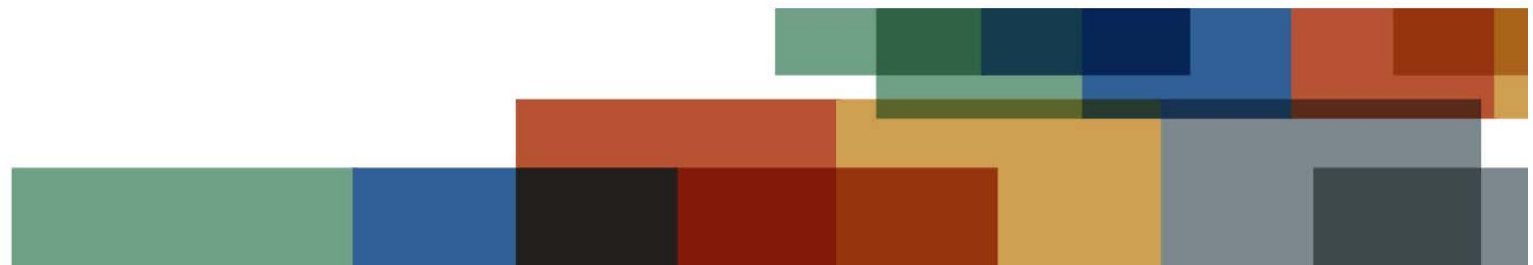


WA Domgas and LNG An Epiphytic Relationship?

**SevenWest Business Outlook Series
Domgas Discussion**

20th November 2014



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 - In preparing this presentation RISC has considered and relied solely upon information in the public domain. This information has been considered in the light of RISC’s knowledge and experience of the upstream oil and gas industry and, in some instances, our perspectives differ from many of our highly valued clients.
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Do gas companies prefer LNG because of higher margins?

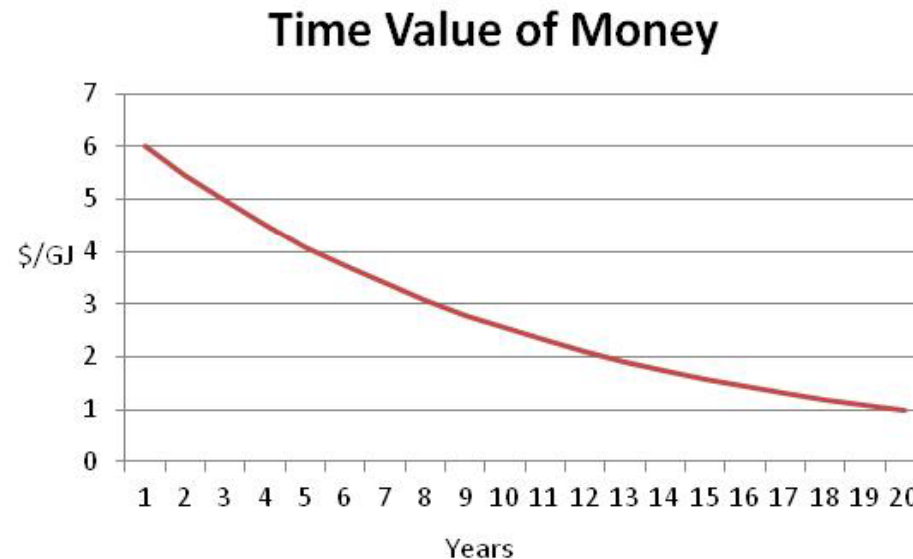


- Development plan driven by size of discovery and location
- WA domgas market ~1000TJ/d equivalent to ~385Bcf/yr; 7.7Tcf over 20 years
- Market opportunities typically, at best <100TJ/d; <1Tcf over 20 years
- 2 train LNG plant , ~9 mtpa, uses ~1200TJ/d; ~450Bcf/yr; ~9Tcf over 20 years.
- Large offshore resources, >5Tcf, need the LNG market to monetise
- Small/modest inshore or onshore resources, <1Tcf, need the domgas market to monetise – or a long wait

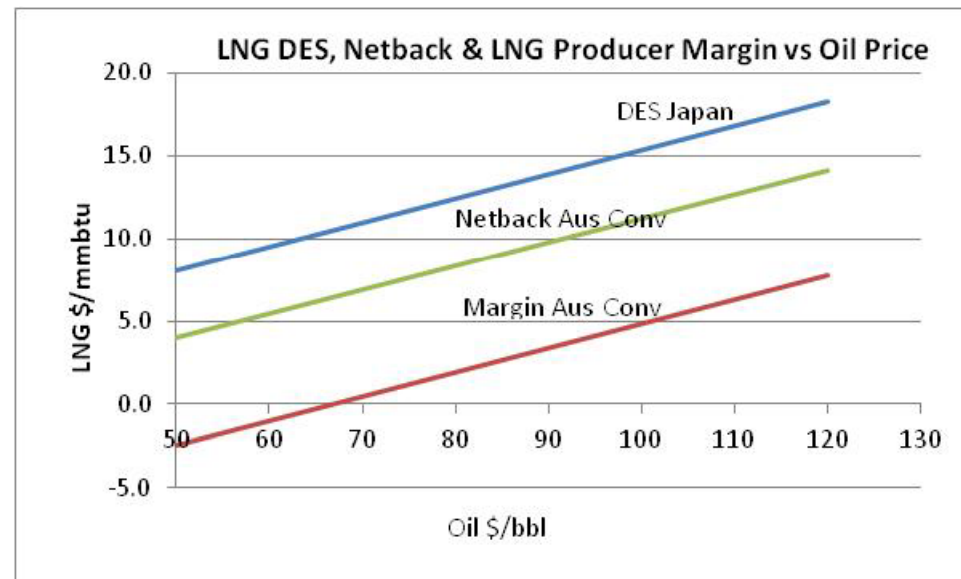
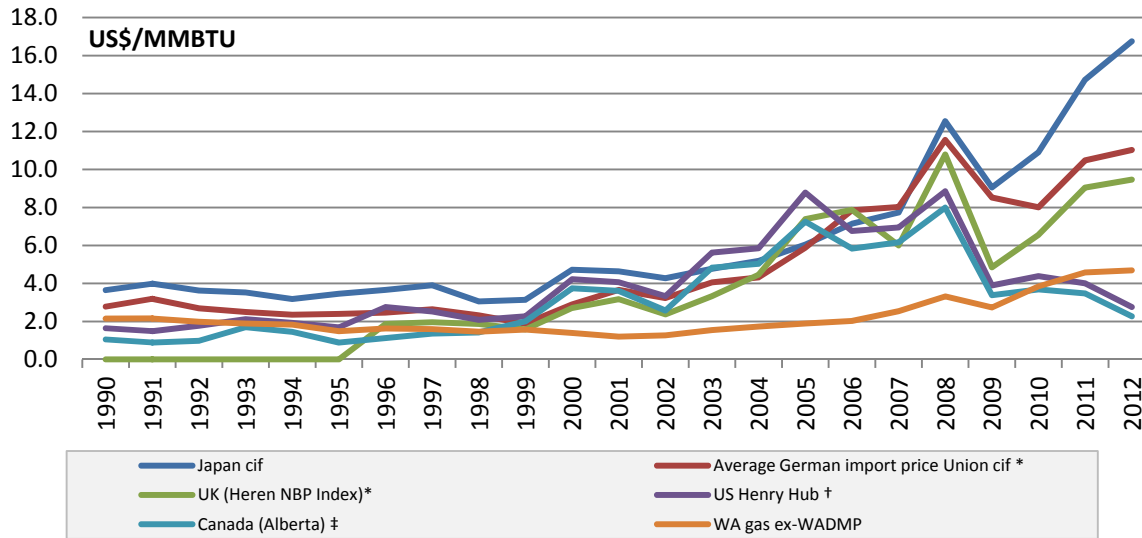
Do gas companies prefer LNG because of higher margins?



- Different story for mature facilities at end of contracts; opportunity cost is a function of:
 - $\text{LNG FOB\$} - (\text{LNG Opex\$} - \text{Domgas Opex\$})$
- Domgas “indifference” price therefore direct function of LNG price
- Time value of money also an important factor; at 10% DR economic rationalists will be indifferent to \$3 today or \$6 in 8 years time; or \$1 today and \$6 in 20 years time when the current LNG contracts expire



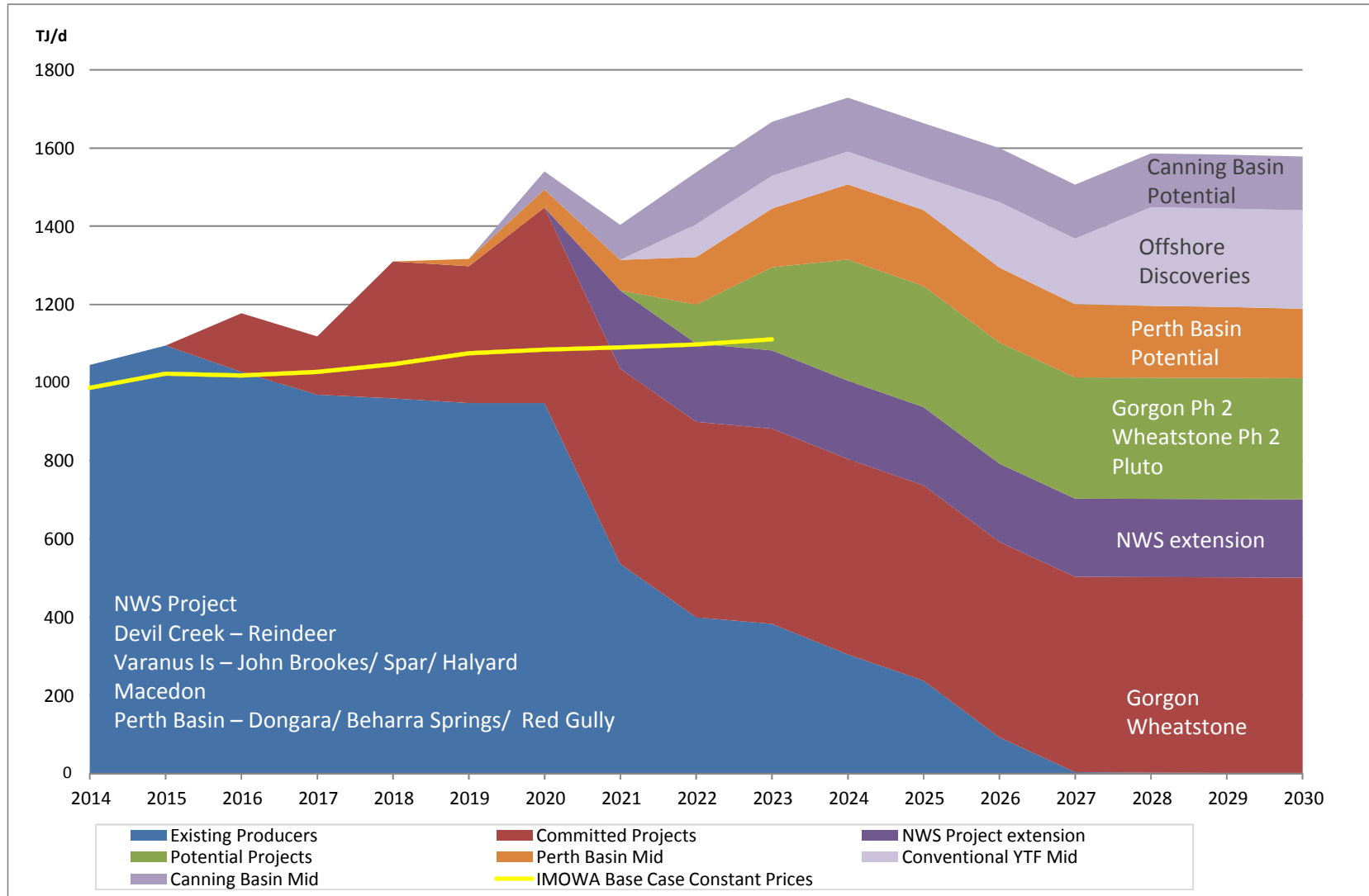
Prices and producer margins



Is the domestic gas reservation policy working?



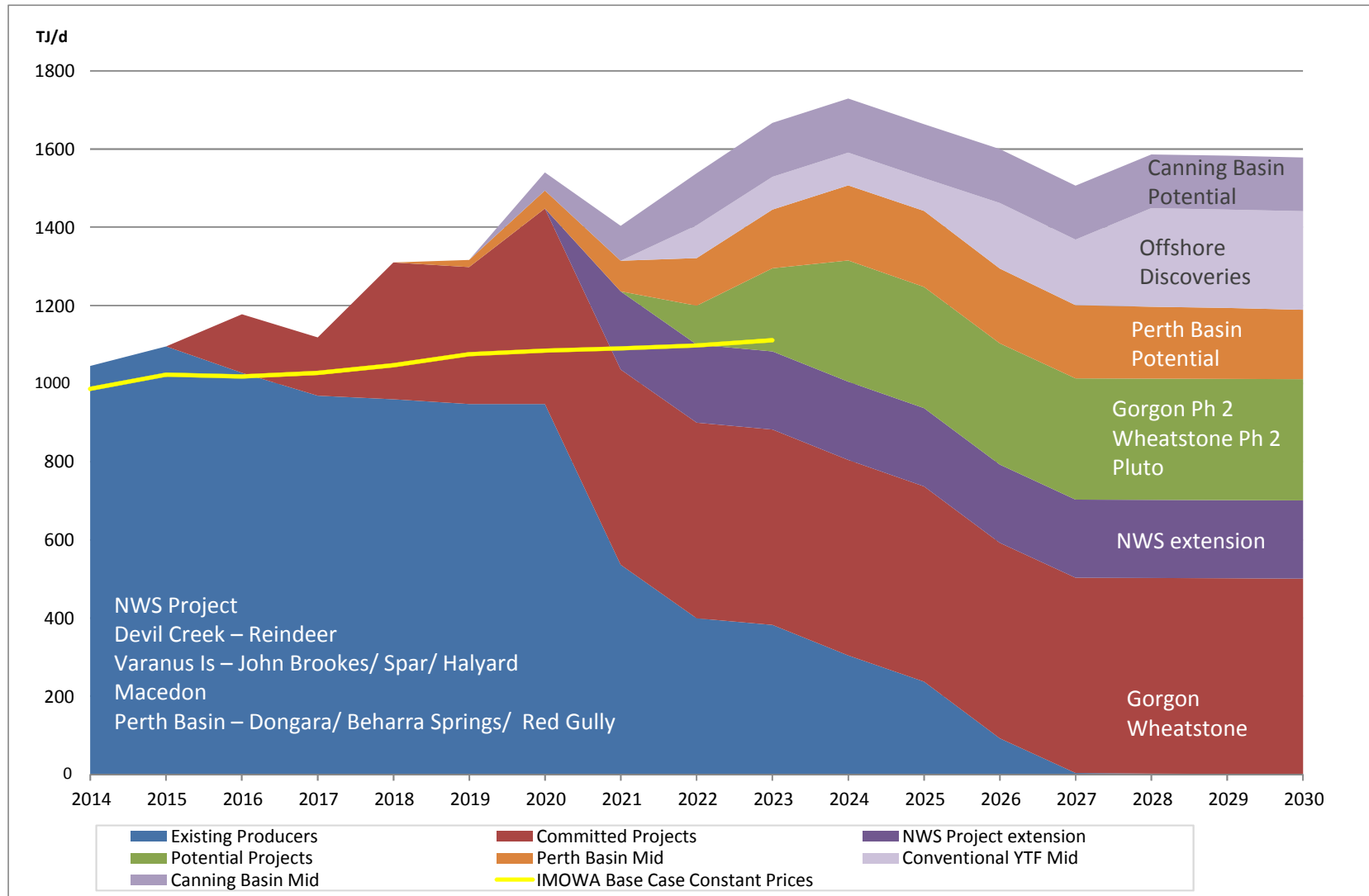
Possibly but not as it was intended!



Gas supply



- Based on planned gas projects, WA has a surplus of discovered gas to meet demand to ~2030 even without new supplies from Browse or discoveries in the Perth and Canning Basins and offshore



Uncertainty; the anathema of decision making!



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- This *potential* oversupply is leading to uncertainty for producers and consumers alike
 - Domgas supply focussed offshore suppliers are circumspect about committing to exploration & development investment because of potential for domestic reservation volumes from LNG projects
 - The LNG projects have large volumes of gas to place into the market, but must await a suitably sized-market window
 - Capital intensive projects in the Canning basin are also likely to be affected by uncertainty in the timing of available market windows
 - Only Perth Basin producers are likely to be unaffected by the market responses of other producers

Free market rules?



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- Subsidies don't work, e.g. UAE, Algeria, Indonesia
 - Mandated pricing also creates market distortions
 - Market distortions create wrong behaviours and eventually and in tears, e.g Indonesia
 - However government investment to catalyse development can work, e.g WA/DBNGP, Qatar/LNG and GTL projects
 - Effective management of retention leases will also impact the development of resources
 - “Encouragement” of industry collaboration on use of infrastructure has potential to realise substantial benefits

Will prices come down with resources downturn?



No, not unless you have a GSA with price linked to commodity price!

- WA is an illiquid project market; approximately 95% of demand is consumed almost equally between 3 market sectors: electricity generation; mining and industrial/manufacturing.
- The majority of this demand is consumed by a small group of consumers:
 - Alcoa Australia
 - Alinta Energy
 - BHP Billiton
 - Yara Pilbara Fertilisers
 - Synergy
- Development cycle for new gas supplies are also relatively lengthy. Field sizes of 1Tcf could take +/- 5 years to develop for the domgas market

Breakeven Gas Prices - Offshore Carnarvon Basin gas developments

Field Size	0.5 Tcf, Inboard	0.5 Tcf, Outboard	1 Tcf, Inboard	1 Tcf, Outboard
Estimated BEGP, \$/GJ (real 2014)	6.25	12.30	3.90	7.50

Breakeven Gas Prices - Perth Basin Shale gas developments

Field Size	100 Bcf	500 Bcf	1000 Bcf Low	1000 Bcf Base	1000 Bcf High
Estimated BEGP, AU\$/GJ (real 2014)	16.10	9.50	13.90	8.10	6.80

Breakeven Gas Prices -Canning Basin Shale gas developments

Field Size	500 Bcf	1000 Bcf	2000 Bcf Low	2000 Bcf Base	2000 Bcf High
Estimated BEGP, AU\$/GJ (real 2014)	10.9	10.3	14.6	8.8	7.1

Shale Gas viability?



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- The success of “unconventional” hydrocarbon production in the USA has been unquestionably transformational for that country:
 - Low cost gas driving manufacturing growth
 - Low cost gas supporting an embryonic LNG export industry
 - Minimal/no dependency on ME for oil imports
 - High level of energy security
 - Many other countries, including Australia, have “unconventional” potential
 - However no country , including Australia, has enabling conditions which come close to those in USA

Shale Gas challenges



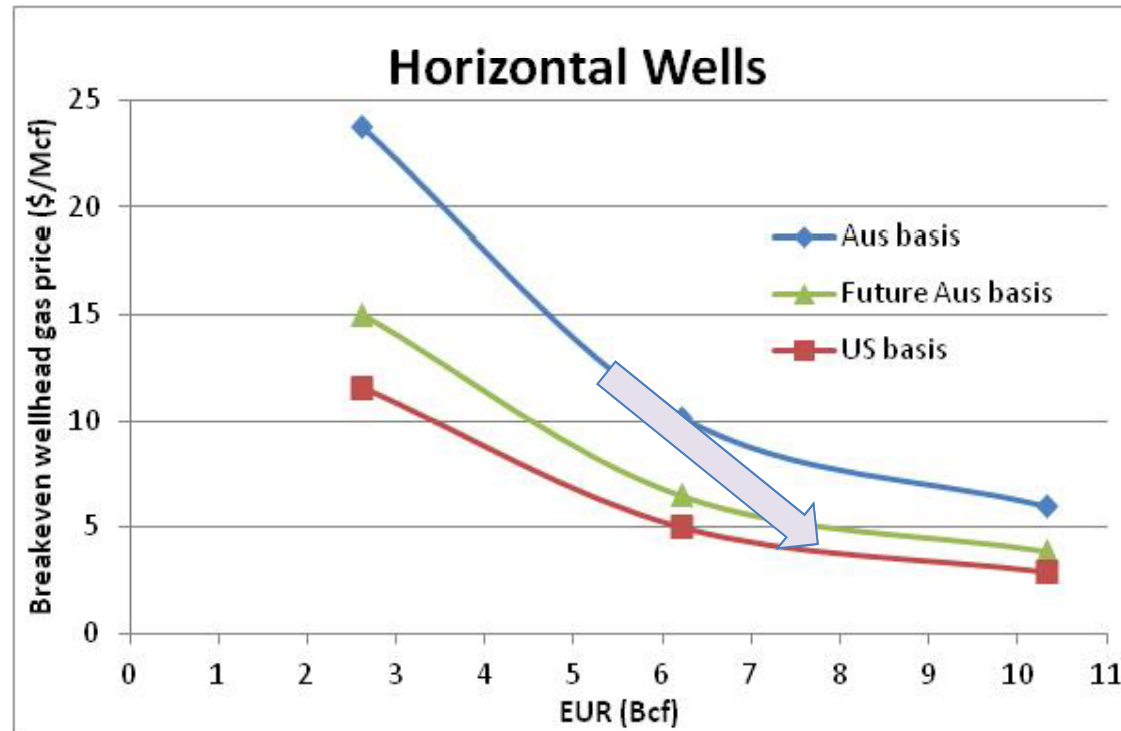
The challenges faced by W Australian shale gas developers are not to be dismissed lightly and include:

- Lack the depth and breadth of drilling and completion services required for successful unconventional campaigns
- Well costs which are up to twice those in the US
- Based on initial and sparse data, lower well productivities
- Requirement for massive drilling campaigns to find fracking “coda”
- Infrastructure is limited/inadequate
- Government capacity to facilitate development limited
- Complex and lengthy approvals processes
- Poor coordination between different government agencies and between different levels of government
- Industry lacks collaborative culture
- Access to land is difficult
- Regulations and contracts designed for the extraction of conventional hydrocarbons
- Effective engagement with society is extremely difficult, time consuming and de rigeur

WA costs have to come down and EUR/IP has to go up!



- Horizontal well costs clearly need to be closer to the US norm
- High wellhead gas prices and high EUR likely to be required commercial viability

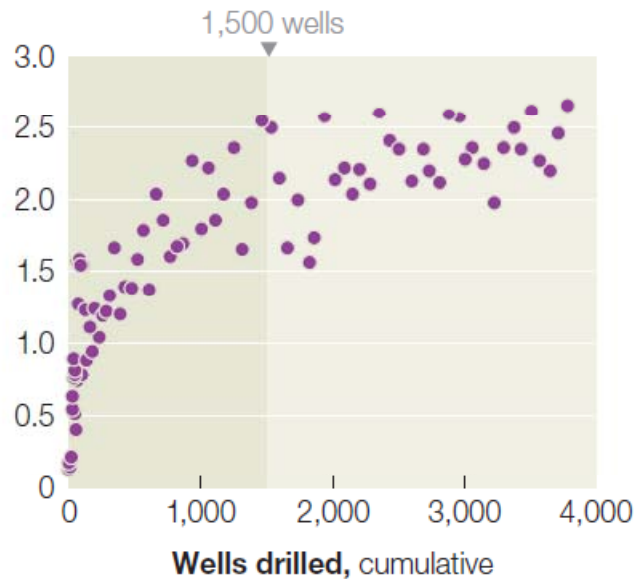


Learning curves for new shale-gas basins suggest ~1,500 wells to reach full IP potential

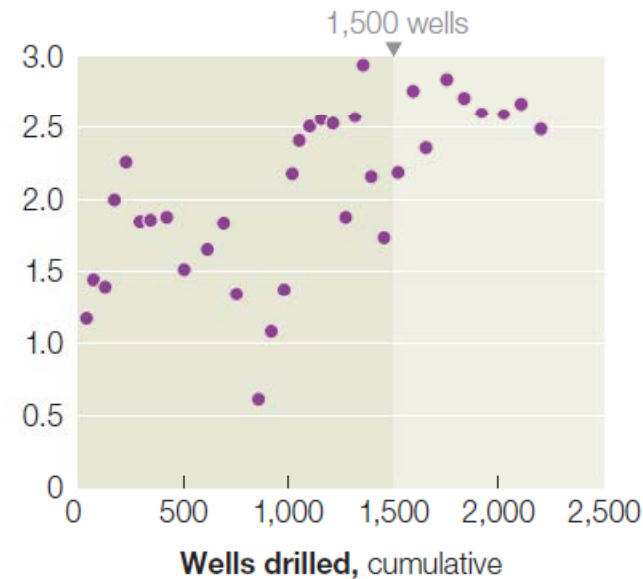


Initial production,¹ millions of cubic feet per day equivalent

Fayetteville basin²



Bakken-US basin



¹Based on reported initial production rates for first 2 calendar months of production.

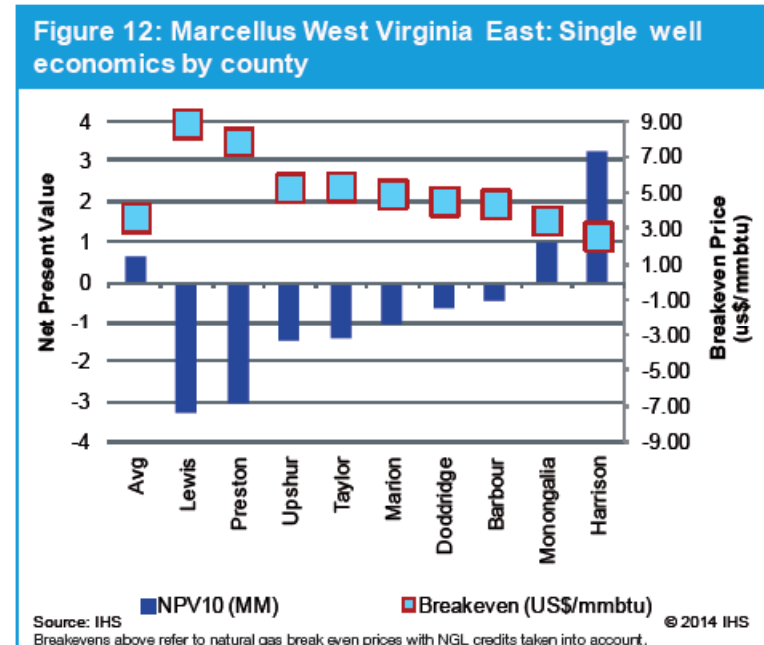
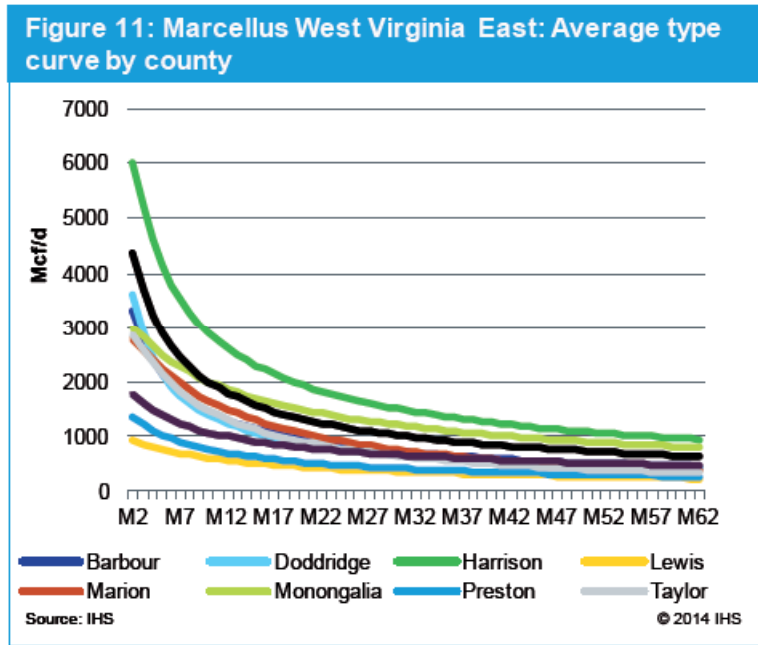
²Includes both East and West Fayetteville.

Source: HPDI; McKinsey analysis

- Fraccing coda takes trial and error and not transferable between basins – sometimes not between fields

Significant heterogeneity within basins

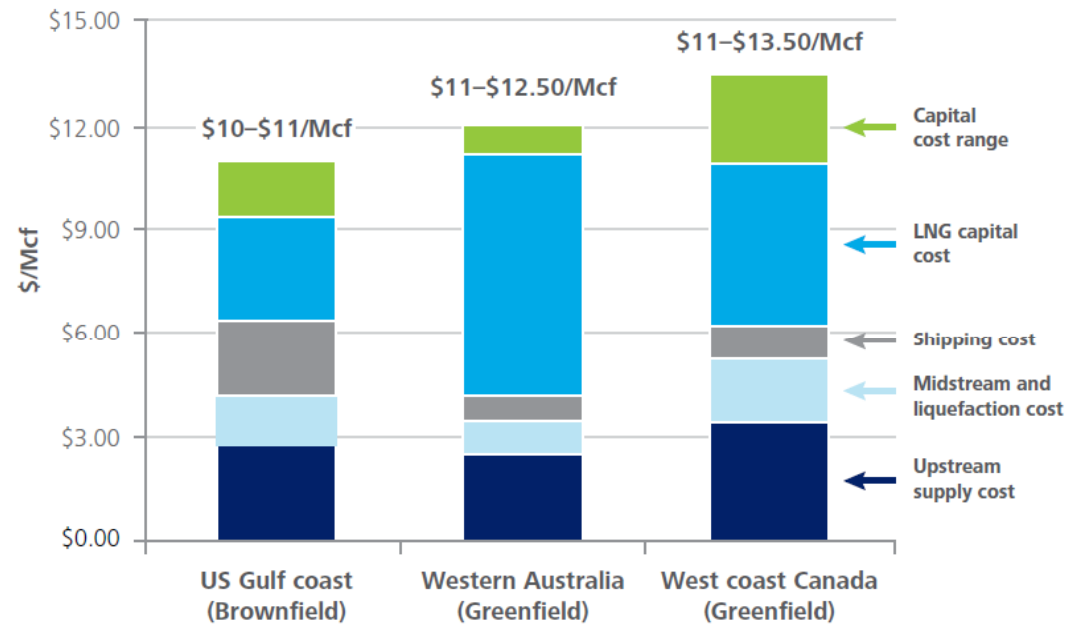
- Not all producers are making money



Impact of US Shale gas on Domgas prices?

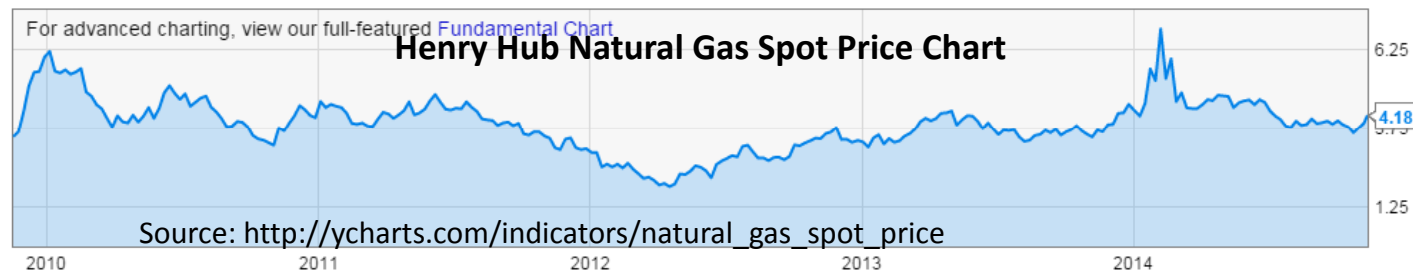


- Sabine Pass (under construction) Hackberry, Cove Pt and last week Freeport –brownfields conversions (Figure 6. Integrated LNG supply cost (landed cost in Japan)



Note: US upstream supply cost is representative of large E&P independents' activity in the Marcellus shale play.

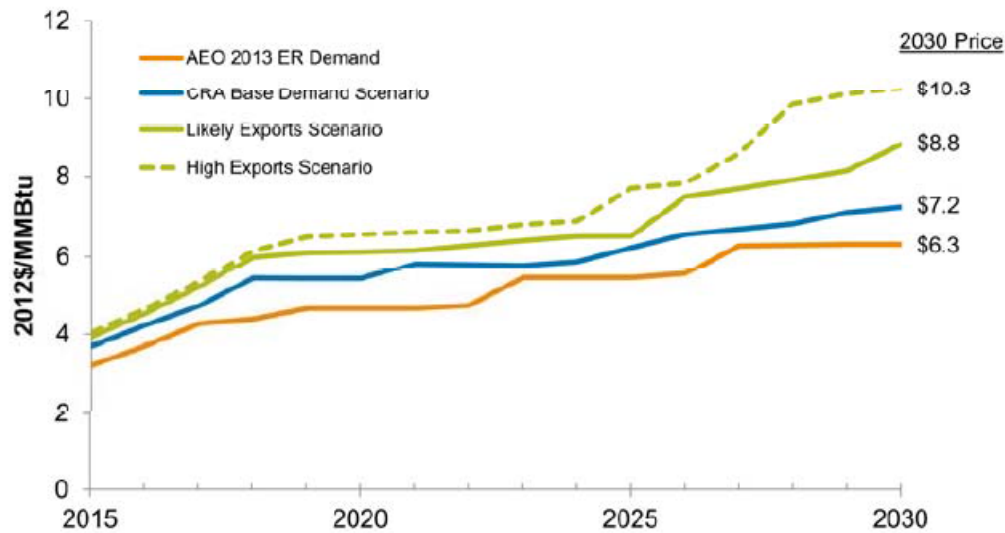
Sources: Deloitte analysis; adapted from RBC Capital, "A new dawn for North American LNG," May 2013; Chesapeake investor presentations.



No one expects HH prices to stay at current levels



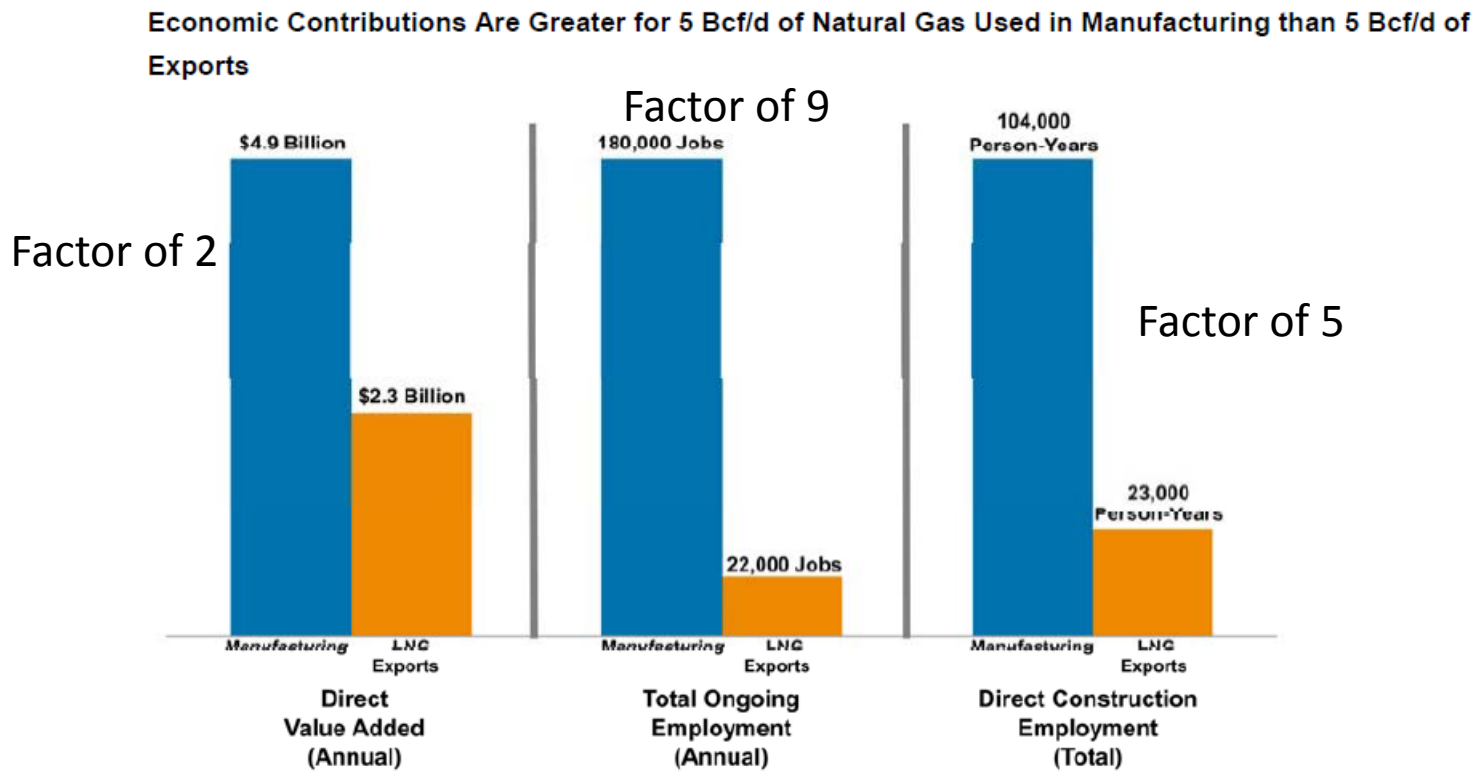
Without Trade-offs, Natural Gas Prices Will Almost Triple by 2030 with Higher Demand and LNG Exports



Source: CRA US Gas Model

In 2013 US producers flared 256Bcf of gas!

Don't underestimate the US manufacturing lobby



Source: IMPLAN, CRA analysis of public announcements in the gas-intensive portion of the manufacturing sector



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