

AMMONIA PRODUCTION COSTS AND GAS PRICES

The first graph indicates the production cost for ammonia and urea from natural gas in Australia from a greenfield site (Jan 2013 construction cost). The method used reduces capital and operating costs to fixed values with only the gas feedstock as the variable. The method was developed by ICI and described in "Gas Usage and Value - The Technology and Economics of Natural Gas Use in the Process Industries", D. Seddon, PennWell, 2006. The basis for the estimate is given in the following table:

		AMMONIA	UREA
PRODUCTION	kt/a	850	1500
CAPEX	\$MM	1050.95	1182.32
CONSTRUCTION PERIOD	years	3	3
PLANT LIFE	years	15	15
RETURN ON CAPITAL (10% DCF)	%/a	16.34%	16.34%
NON GAS OPERATING COSTS	\$MM/a	252.12	284.97
GAS USAGE	PJ/a	29.62	29.62

The capital cost is assumed to be 30% higher than in the US Gulf. The plot for a US Gulf operation shown in the second graph.

For reference recent Far East ammonia prices (CFR NEA) are shown in Graph 3.

Inspection of the graphs clearly shows that at gas prices over \$8/GJ ammonia production cost in Australia would be in excess of \$600/t which compares with typically traded at prices about \$500/t. For prices below \$500/t the gas price to a new facility would have to be well below \$5.5/GJ.

Long term US gas prices are now typically in the range \$3 to \$4/GJ (~ \$/MMBTU). At this price ammonia could be produced for about \$350/t. Since typical large scale shipping of ammonia is in the region of \$50/t, ammonia delivered from a US facility would be in the region of \$400/t.

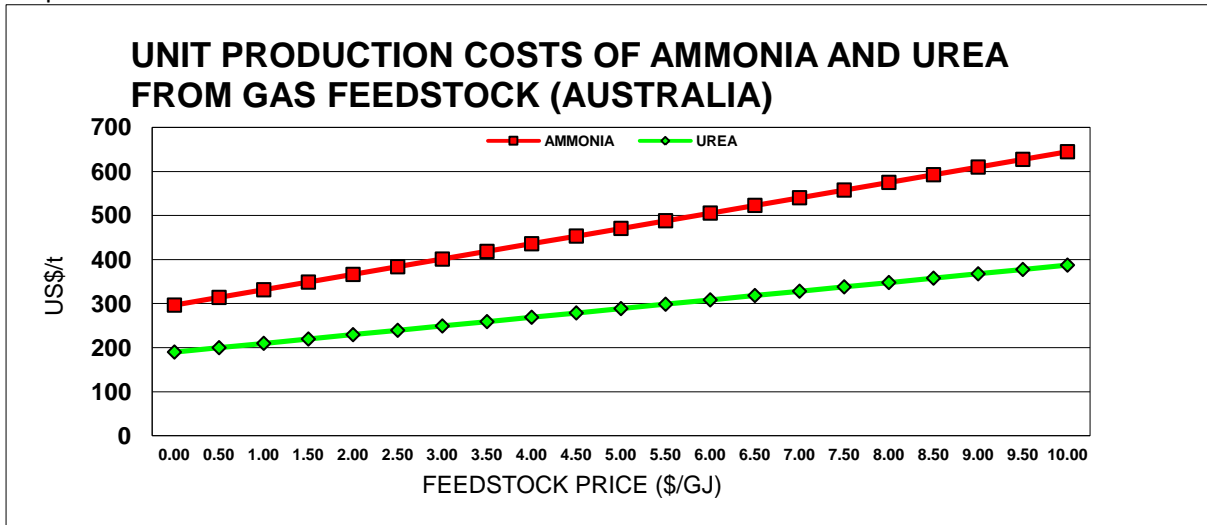
To maintain a competitive position against US imports the gas price for a new Australian facility would have to be in the region of \$3/GJ or below.

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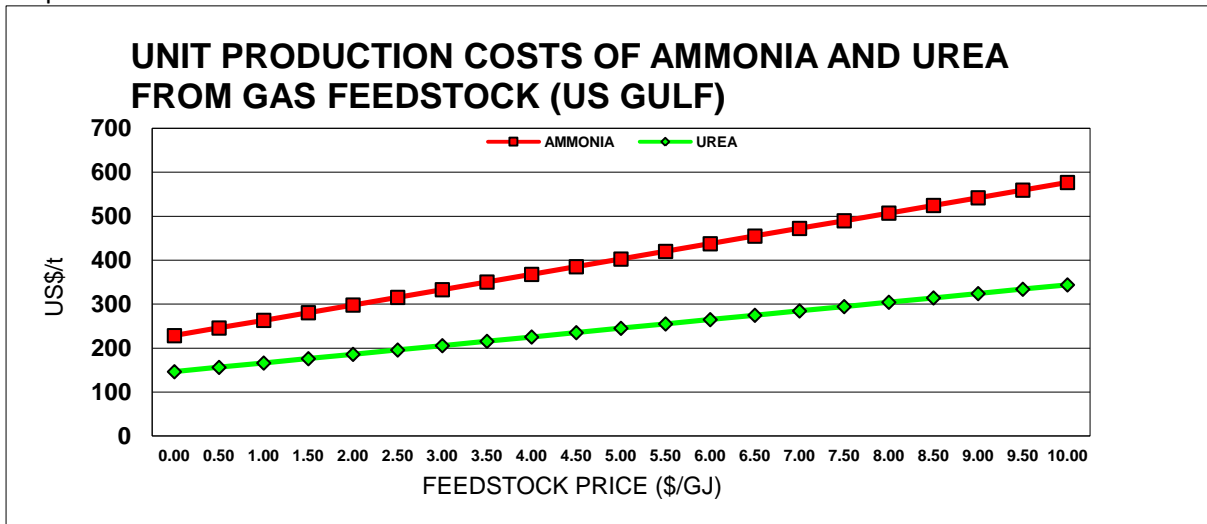
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Graph 1



Graph 2



Graph 3

