

# **Examining the future of nature gas usage in the Australian National Electricity Market.**

by

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- A natural tension has arisen in the Australian natural gas market between electricity generators and export markets.
- With export markets being made available to natural gas producers, the price of methane will rise to meet the international market position.
- Rapid price inflation could place gas generation assets at a distinct disadvantage against coal fired electricity production.

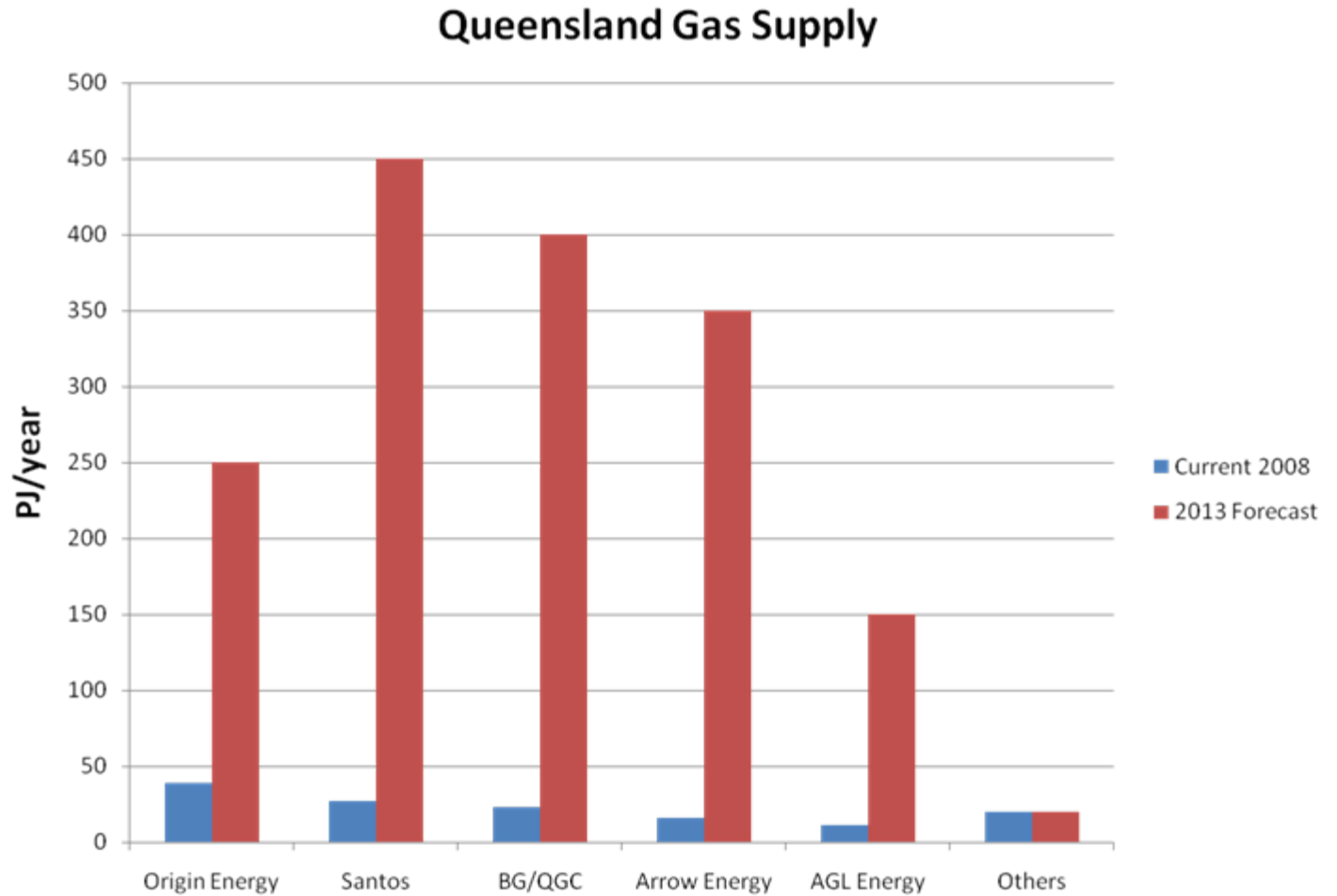
# Ramp Gas

- Before LNG export can begin, wells will have to be installed to gauge the proven reserves for each site.
- This process will provide a significant amount of excess supply of natural gas for the electricity market before exports begin.
- The expected price of Coal Seam Methane for electricity generators is expected to drop from \$3.5/GJ to \$1.8/GJ

### Major gas transmission pipelines and proposed pipelines in Australia

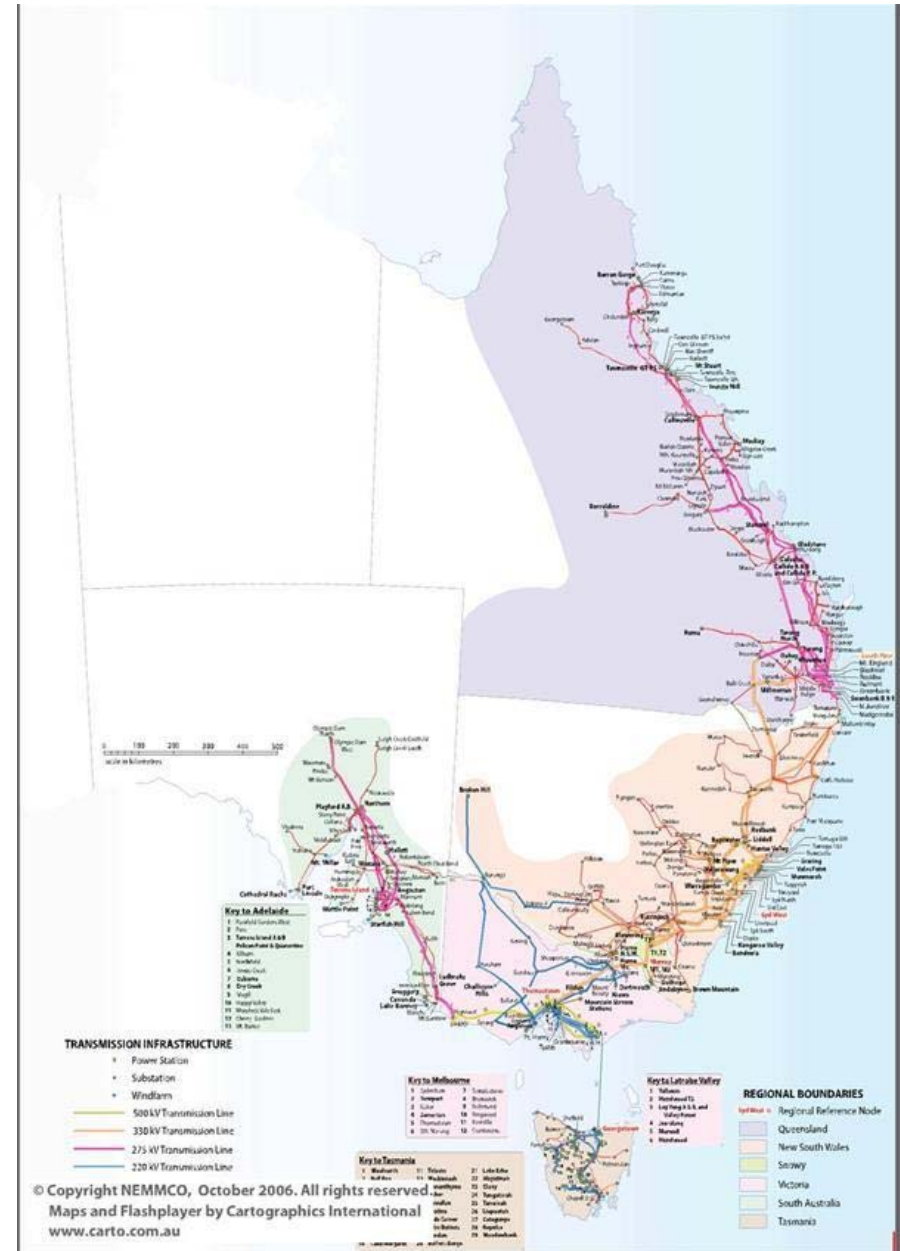


# Gas supply



# The National Electricity Market

- Black and Brown coal-fired power stations compose **85%** of generation.
- 7000MW of installed gas generation
- The average Emissions Intensity Factor (EIF) for electricity generation is 1.12.



# Emissions Trading

- A Carbon Pollution Reduction Scheme (CPRS) for Australia
- Garnaut Review
  - Broad coverage, little or no grandfathering
  - Compensation to households
- White Paper
  - Assistance to stationary energy production for 5 years
  - 130million credits (~26mill/year) will be allocated to higher emitting generators
  - Equalized emissions intensity factor
    - Brown and less efficient black EIF reduced to 0.86 t e-CO<sub>2</sub>/MWH

## **Modeling Assumptions:**

- Energy usage and new plant entry timing forecasts from NEMMCO's SOO 2008.
- National Emissions Trading Scheme to be introduced in 2011.
- Emissions abatement pathways CPRS -15% and Garnaut 450ppm.
- Firms bid SRMC for off-peak and SRMC + VO&M during peak time
- In equilibrium, capital costs are recovered during capacity constrained maximum price periods (VOLL)
- Bidding behaviour determines position in the merit order of dispatch and market prices



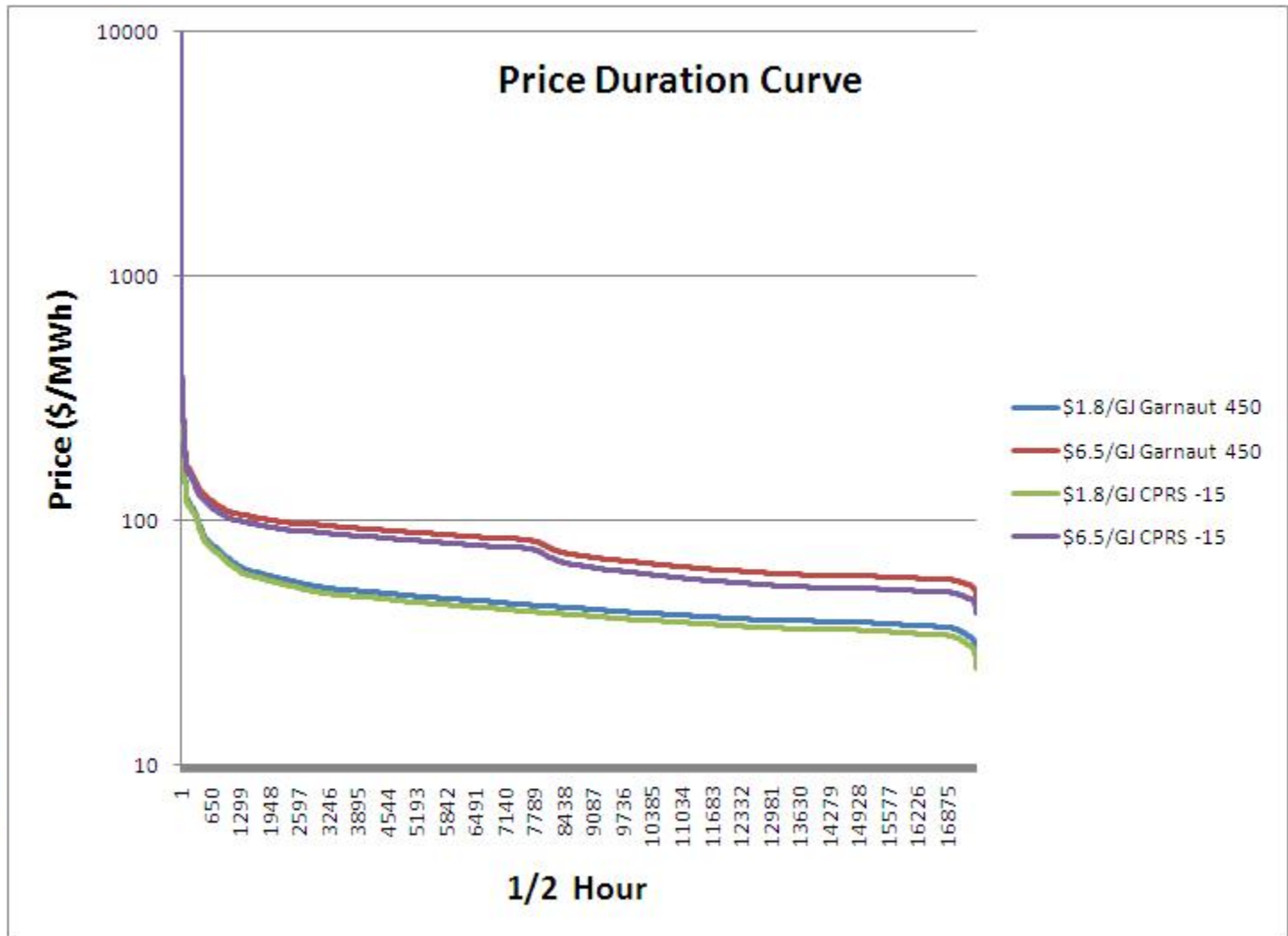
## Plexos Simulates

- Optimal dispatch of generators across the NEM.
- Optimal bid stack formulation for each station for Short Run and Long Run Marginal Cost (SRMC and LRMC) recovery.
- Merit order of dispatch formulated based on bid stack.
- Physical operating characteristics of each generating unit
  - Portfolio optimisation and emissions profiles
  - Transmission and Interconnector flows.

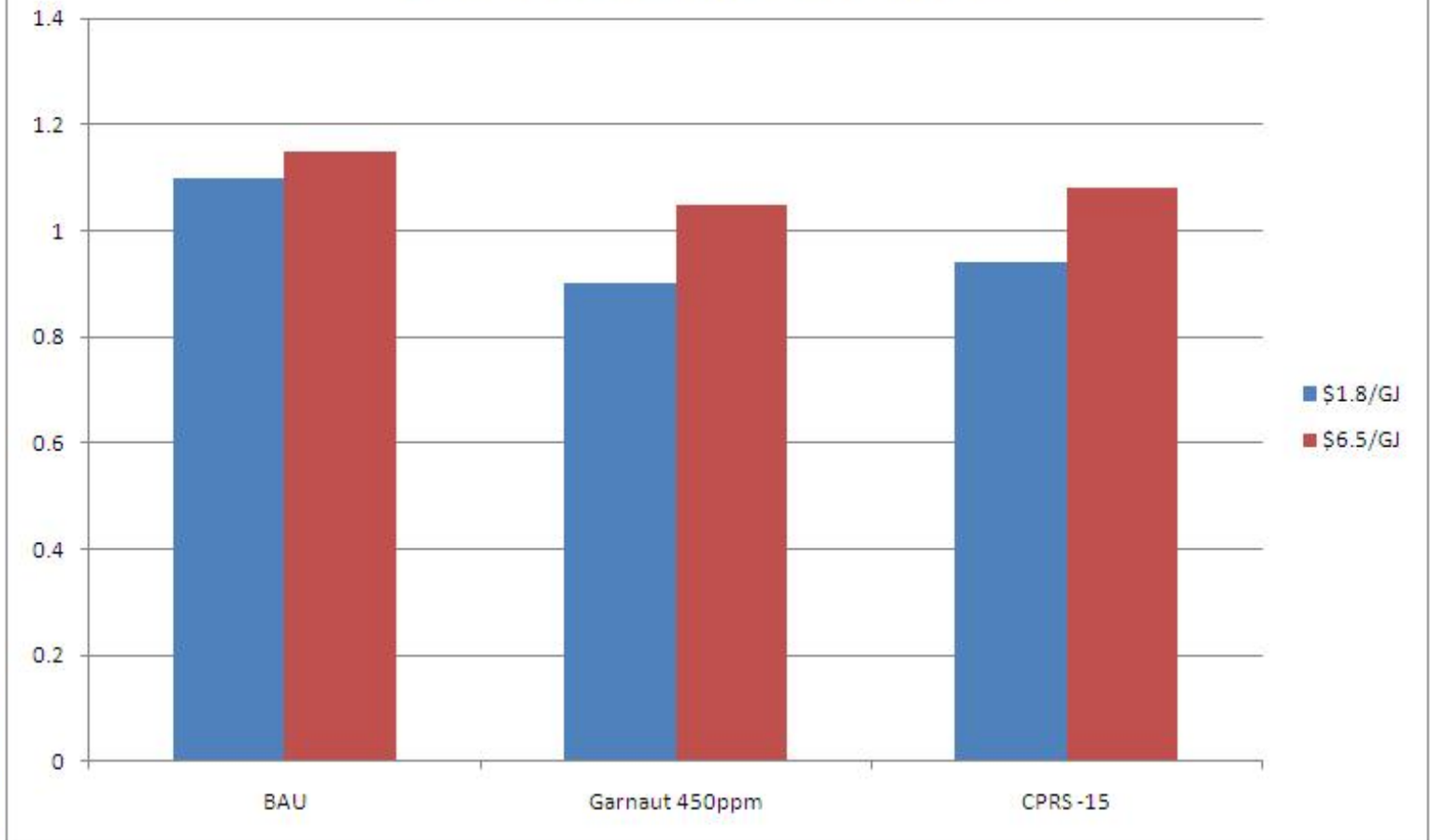
## **Time frame for analysis**

- 2013-2018
- First wells in QLD to be in place ready for LNG exports
- Growth of supply of NG in QLD and the other mainland states of the NEM
- Pipelines joining all NEM states to create a gas grid
- First LNG plant to come online
- Installed capacity of GT plant across the NEM to grow a further 9GW of installed capacity (16GW)

- Gas generation will increase from a Capacity Factor of approx 35% to 85%
- Brown coal marginalized particularly Hazelwood in Victoria with an EIF of 1.35t/MWh
  - At \$40/t e-CO<sub>2</sub> and ramp gas available this station should back off.
- Average spot prices: (Demand Weighted Average for all states to form a national price)
  - \$52/MWh with ramp gas
  - \$84/MWh following the commencement of export



## Emissions Intensity Factor (t/MWh)



# Conclusions

- Modelling suggests that a significant increase in gas prices will weaken the prospect of gas fired generation as a intermediate solution to reduce emissions.
- Ramp Gas availability will for at least 3 years place significant pressure on Brown Coal generation assets in the merit order of dispatch.

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