

ENERGY SECURITY FOR AUSTRALIA – HAS IT ALREADY ESCAPED US?

The Major Risk to the Supply of Liquid Transport Fuels & Fuels for Industry, and Potential Failures in Electricity Supply, Must be Addressed

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Could Australia have a fuels emergency? Answer: Yes

- Some possibilities:
- There could be serious shortfalls of liquid fuels on the eastern seaboard and to critical areas of the economy in the event of a N. Asian, S. Asian, South China Sea and/or Middle Eastern crises,
- and,
- Being increasingly dependant on imported finished fuels and given increasingly limited refining capacity, Australia would not have the ability to meet its own needs from indigenous raw crude.

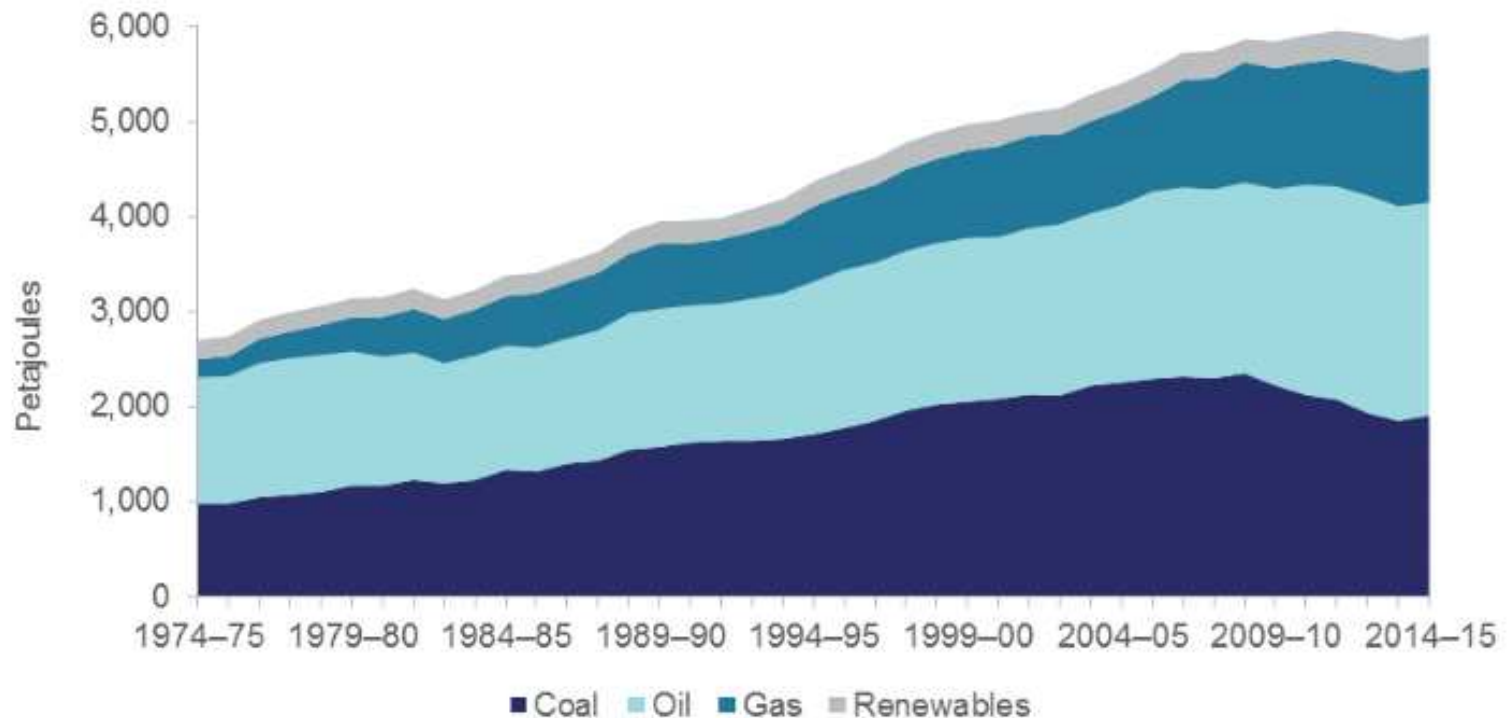
Could Australia have an electricity emergency? Answer: Yes

- Some possibilities:
- Failure of sections of the East (or West) Australian power grids through accident or misadventure have seriously interrupt electricity supply,
- and,
- The increasing use of gas fired generation coupled with an increasing proportion of solar and wind generation is decreasing system reliability, whilst increasing generation and transmission costs.

Could Australia have an electricity /fuels emergency? Answer: Yes

- A distinct possibility:
- A crisis in gas supply could lead to serious curtailment of base and peak load electricity generation,
- and,
- National measures are still being planned but not mandated, where export gas is directed into domestic supply? Still being considered!

What Fuels are we consuming?



Source: Dept: Industry, Innovation & Science 2016

What sort of liquid fuels are we producing?

	Production Year 2000	Production Year 2009	Production Year 2013
Commodity	million barrels	million barrels	million barrels
Crude Oil	213.9	94.2	68.5
Condensate	46.9	57.6	48.2
LPG	25.7	24.9	22.4
Total Liquids	285.5	176.6	139.1

Source: APPEA 2014

Condensate?

- Condensate: Light, volatile components of petroleum,
- Condensate will continue to have steady or increased production in Australia, especially from NON-conventional oil and gas recovery,
- BUT,
- Australia has virtually NIL ability to refine condensate into transport fuels.

Some Energy Vulnerabilities

- Failures in major power and gas grids, such as occurred with the Longford Gas Explosion, the Moomba Hub fire, and South Australia summer 2016/7,
- Inability to produce required volumes and types of liquid (transport) fuels,
- The vulnerability of our offshore oil and gas production units to interruption (attack, hijacking, storm damage or plant failure), and
- Conflicts in East, North and South Asia, and the Middle East, Nationalism and Force Majeure.

An Energy Vulnerability



But this is largely a threat to export earnings, not domestic liquid fuel supply

Another Energy Vulnerability

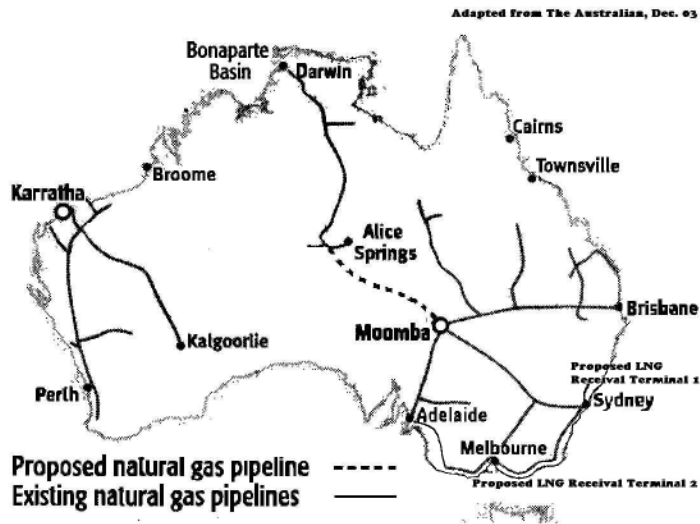
- Cyber Threats against the Energy Sector
 - Western Ukraine late 2015 was in darkness for six hours,
 - August 2012 the Saudi petroleum company Aramco was attacked using a computer virus, &
 - The South Korean Nuclear Power System was attacked in 2014, leaking the personal details of workers and technical information.

US-Israel were able to cause damage to the Iranian Nuclear Centrifuges by causing the centrifuges to over-speed in 2009 by the introduction of a Stuxnet worm.

Are there solutions to overcoming our vulnerabilities? POSSIBLY!

- Developing NON-conventional (e.g. shale-gas) and conventional (lower quality coal) onshore raw energy resources,
- Put in place refinery capacity to convert those NON-conventional and conventional raw energy resources into usable and desirable fuels with co-production of electricity, and
- Maintain the diversity of electricity generation (i.e. install significant new coal generation), and limit renewables to 'system safe' levels.

Gas Security



- Build LNG RECEIVAL terminals near Sydney, Melbourne & Adelaide,
- Build additional small to medium LNG plants in regional Australia to supply LNG fuelled transport,
- Consider Synthetic Natural Gas (SNG) production from non export coal,
- Add gas storage hubs to the system, that would include gas storage in depleted reservoirs,
- Build some redundancy into the gas grid,
- Dedicate a percentage of proven gas to a national reserve, and
- Have a plan.

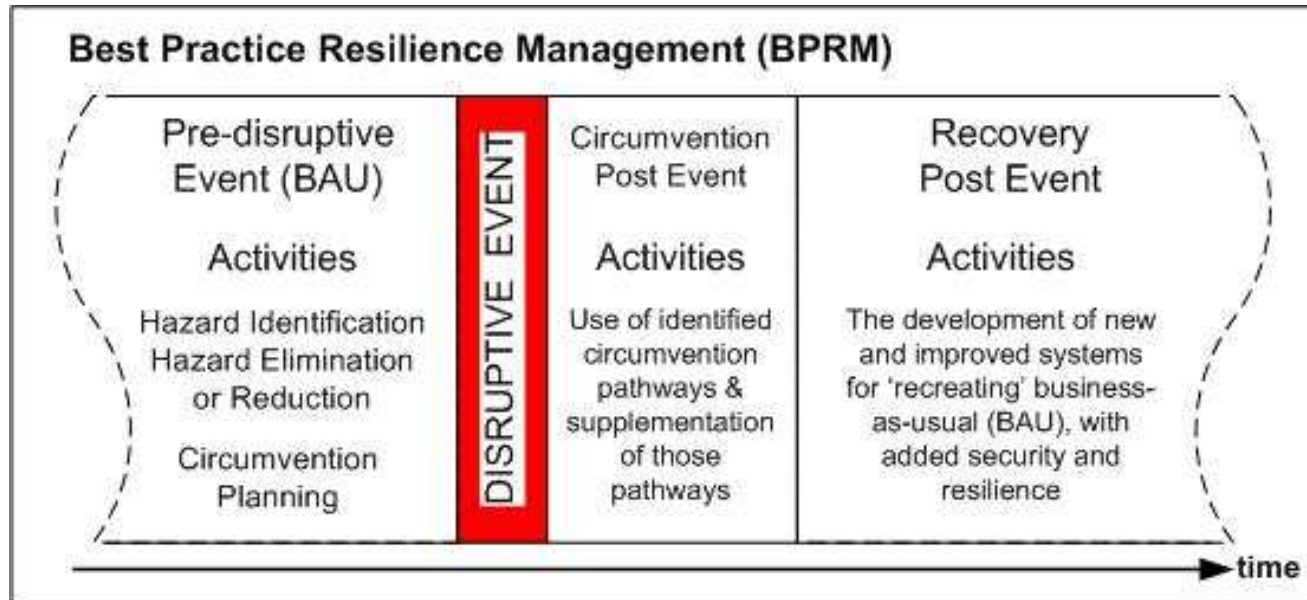
Short-term Liquid Fuels Security

- Increase the Australian liquid finished fuels storage capacity from 20 to 90 days,
- Revamp one or more of the existing oil refineries, including adding a condensate conversion facility,
- Look to alternative fuel suppliers outside the region (i.e. Singapore), that may include establishing finished fuels logistics with Californian oil refiners.

Long-term Liquid Fuels Security

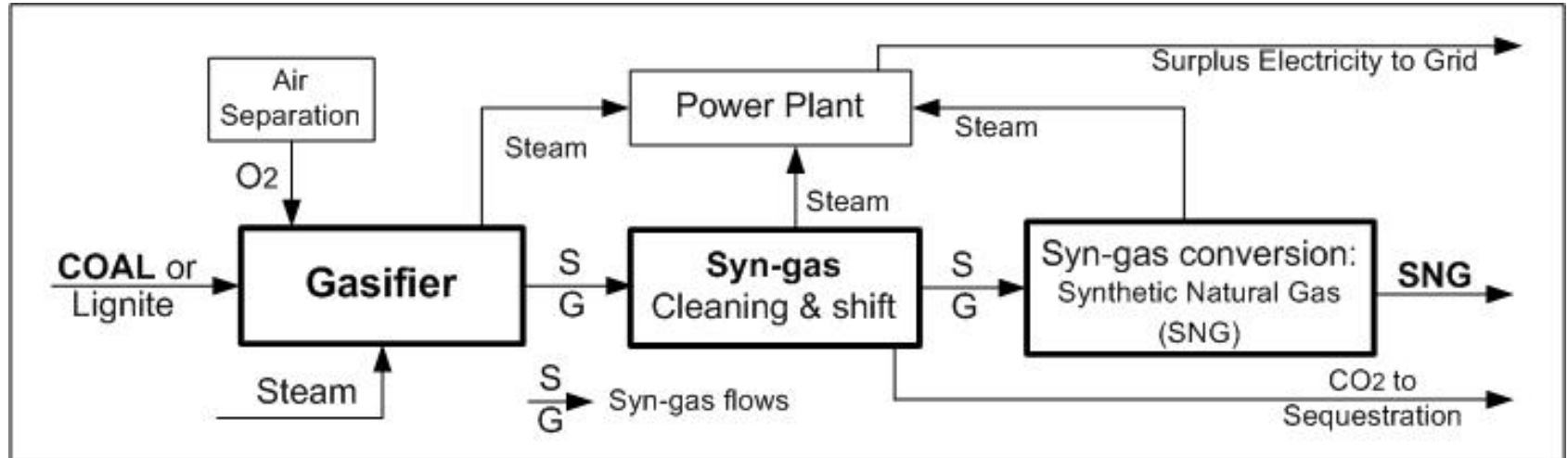
- Finally build Gas-to-Liquids (and/or Coal-to-Liquids) production facilities,
- Build at least one new versatile oil refinery,
- Expedite Unconventional oil (and gas) resources development, including:
 - NEW Shale Oil and Oil Shale discoveries, and
 - Reworking old and depleted oil (and gas) fields with unconventional recovery technology, such as horizontal drilling with **fracking**.

Plan for Energy Disruption Scenarios with Resilience and with Circumvention Strategies



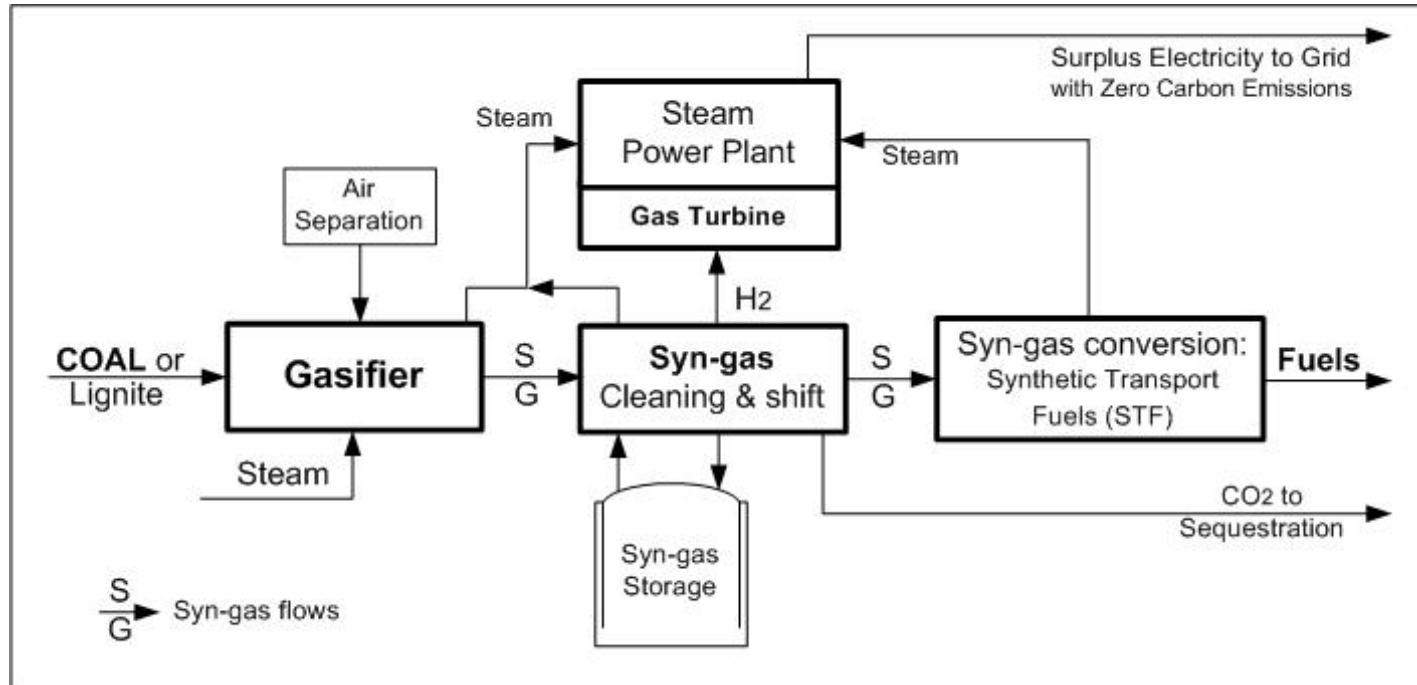
Australia is a lucky fuels rich continent but has limited ability to meet required fuel and energy supply needs in a number of disaster scenarios.

Coal to Synthetic Natural Gas – SNG



- There was a major plant built in Beulah, North Dakota during ‘the gas shortage’ period,
- The plant was a very large (15kt of low rank coal daily) demonstration of SNG technology,
- That plant has provided a pathway for new SNG production, and
- Australian non-export thermal coal would be a good feed for SNG.

Coal to Liquid (CTL) Transport Fuels



- A similar process to the SNG synthesis, but with a higher share of production for electricity,
- CTL technology is used in S. Africa by the SASOL group and provides a very large portion of S. Africa's petroleum,
- Variants of the technology can produce chemicals (e.g. NH_3), and
- Australian non-export thermal coal would be a good feed for CTL.

What is to be done: Liquid Fuels

- The adequacy of present storage capacity for refined fuels must be addressed; what is the optimum and what is the affordable? Can we meet OECD minimal volumes?
- The logistics for sourcing additional supplies from outside the region must be determined,
- Coal-to-Liquids (CTL) technologies for their abilities to remove both the liquid fuels and electricity supply threats; with the new plants being 'Carbon Capture and Sequestration (CCS) Ready' must be determined, and
- Increasing the utilisation of LNG in heavy transport must be on the transport fuels agenda.

What is to be done: Gaseous Fuels

- For natural gas supply issues it is necessary to have a formal response mechanism rather than a “leaving it to the market” approach to ensure supply as needed and on time,
- This may be extended to provision (by government investment) in strategic gas storage at appropriate points in the gas pipeline network, and
- The utilisation of onshore natural gas as LNG in fuelled long distance road and rail transport should be developed.

What is to be done: Electricity

- Follow PM's advice to install new coal-fired, high efficiency, low emission (HELE) generation technology, to stabilise the power supply and meet at least base-load,
- Match renewables with gas/coal generation to stabilise electricity delivery,
- Reconsider the nuclear options for base-load supply, and
- Develop new pumped-storage capacity to maximise diurnal and other intermittent generation capacity to provide intermediate and peak supply, as demanded.

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Final Note:

May Australia have a secure energy future.

Thank You