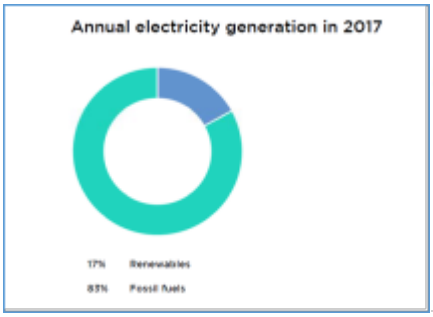
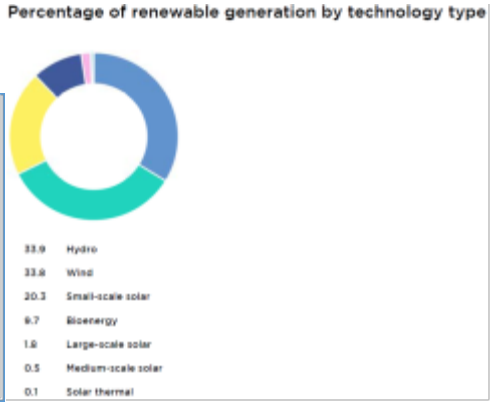
Hi Wayne

I regret to say I will not be attending the AAPG 2019 event. I have made a small effort to contribute with the following Oz-centric update. Happy to offer wider/more in depth information (as able) on request:

- Renewables (hydro, wind and solar in particular) are now of growing importance to Australia's energy mix, and in particular for generating electricity. The stability of grids has become a key issue – with some new requirements for 'new build' large scale wind and solar to manage rapid intermittency. Going forward, the addition of fast-start gas turbines, large scale batteries, pumped hydro, regional power transmission interconnectors and synchronous condensers are amongst the solutions to manage intermittent renewables in a grid. The following pie charts of percentages of electricity generation from coal/gas vs renewables in Australia help paint the picture in 2017.





- LNG exports from Australia's Northwest Shelf are produced from conventional, offshore reservoirs. Australia's first floating LNG plant at Prelude exported its first condensate shipment in March 2019. The timing of the first LNG shipment has not been announced.

- LNG exports from Australia's east coast (from Gladstone) are largely produced from coal seam gas from 400 to 1,000m depths

- There are no regional pipelines connecting gas produced in the west of Australia to population centres in the east of Australia. Economics tend to suggest intercontinental (west flowing east) pipelines need larger than foreseeable gas markets to compete with LNG import and regas options.

- LNG exports ex-Australia to Japan, China, Korea and other countries in the region are growing. This is driving the price of natural gas for domestic use in Australia to parity for the netbacks from LNG exports (roughly equal to 15% of Brent less US$1/gj to US$2/gj for processing natural gas into LNG and shipping to destinations). This is disconcerting for manufacturers (in particular) who some years ago could contract gas for roughly A$4/gj. An overall modest (by

international standards) in size Australian domestic gas market, price parity between domestic gas (in Australia) with net-backs from feedstock for LNG exports (from Australia), and relatively high costs of developing Australia's remaining reserves is tending to drive supply: demand to near balance. The results include severe natural gas price-spikes on high demand-days in spot markets. Though yet to reach FID and commence construction – there are at least 4 proposals by private enterprise to build and operate LNG import and regas facilities in southeast Australia. This could see Australia being the largest LNG exporter in the world, and an LNG importer.

- In order of export $s, from 1 July 2017 to 30 June 2018 – the biggest contributors to Australia's trade balance are: iron, coal, LNG, gold and aluminium. See https://dfat.gov.au/trade/resources/Documents/aust.pdf.

- Shale gas is yet to be commercially developed in Australia. The current best hopes for the development of shale is in the Beetaloo Basin in the Northern Territories of Australia.

- Australia has one 'pilot' underground coal gasification project in an abandoned coal mine in an area with no aquifers to impact (at Leigh Creek)

- Engagement with local constituents, ag-businesses who fear contamination, and e-lobbies generally opposed to exploration/development/production of all fossil fuels and minerals is a considerable challenge for policy makers and regulators of energy and mineral resources. One state in Australia has banned all fracture stimulation. Other States have either moratoria or local bans on fracture stimulation in defined areas where the ag-businesses are well established.

Best
Barry