

ATTACHMENT B: ISP RECOMMENDED TRANSMISSION AUGMENTATION PROJECTS RELEVANT TO SNOWY 2.0

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SnowyLink South may be brought forward if a large thermal generator – such as Vales Point (NSW) closes earlier than 2028-29 ^{s22}

Pages 1-3 are outside the scope of the request and have not been provided

s22

From: s22
Sent: Wednesday, 9 August 2017 10:45 AM
To: s22
Subject: FW: Meeting brief request: Delta Electricity [DLM=For-Official-Use-Only]

From: s22
Sent: Tuesday, 8 August 2017 10:01 PM
To: s22
Subject: RE: Meeting brief request: Delta Electricity [DLM=For-Official-Use-Only]

Hi s22

Please find a link to the [DE brief](#).

Cheers,
s22

From: s22
Sent: Tuesday, 8 August 2017 2:44 PM
To: s22
Subject: FW: Meeting brief request: Delta Electricity [DLM=For-Official-Use-Only]
Importance: High

From: s22
Sent: Tuesday, 8 August 2017 2:43 PM
To: s22
Cc: Tsr DLOs; s22 McDonald, Hamish; Gaetjens, Philip
Subject: Meeting brief request: Delta Electricity [DLM=For-Official-Use-Only]
Importance: High

Hi s22

As discussed, the Treasurer is meeting with Trevor St Baker and Brian Flannery from Delta Electricity tomorrow at 12 30pm. The Office has requested a meeting brief by 10am tomorrow which includes information on Vales Point Tx and Loy Yang (A), facts about the generators themselves output etc and information on Delta electricity.

They have sent through the attached presentation and below information:

Slide 4 of the presentation pack (excluding the cover page) sets out the current expansion activities for Delta's Vales Point plant as follows:

- **Currently applying for a development approval for a 45 MW solar power generation farm to be constructed on the rehabilitated first stage of the Vales Point ash dam, to be operated in a balancing portfolio with the Vales Point base-load coal-fired generators.**

s 47G(1)(a)+(b)

- Bidding for Loy Yang 'B' to expand the base-load portfolio of Delta Electricity to better compete with the three electricity supply majors, and on which SPI/Delta can become more actively involved in the transition to an internationally-competitive electricity supply system with lower GHG emissions.

s 47G(1)(a)+(b)

- Planning for feasible new 'brownfield' HELE base-load coal-fired power generation developments as possible replacements of essential base-load generating capability lost in event of closures of existing base-load generators in Victoria, South Australia or NSW, in the near-term.

The last 2 points above are of particular interest in the context of the Treasurer's comments last week on coal-fired generation, while the 3rd last point is of interest in the context of the Government's concerns about making the Electricity Generation and Electricity Retail Sectors more competitive.

Apologies again for the short timeframe! Please feel free to give me a call to discuss.

Cheers

s22
Departmental Liaison Officer

The Hon Scott Morrison MP
Treasurer

p 6277 7340 | m s22 [@treasury.gov.au](mailto:s22@treasury.gov.au)

From: s22
To: s22; [TSR Executive Minute Distribution](#); s22
Cc: [SRG Energy](#); [SRG Executive](#); [Tsr DLOs](#); [Gaetjens, Philip](#); s22
Subject: RE: MS17-002434 Brief for Treasurer's Meeting with Delta Electricity [SEC=PROTECTED, DLM=Sensitive]
Date: Wednesday, 9 August 2017 10:59:18 AM
Attachments: [MS17-002434 Brief for Treasurer's meeting with Delta Electricity.pdf](#)

Dear s22,

Please find attached a brief for the Treasurer's meeting with Trevor St Baker and Brian Flannery from Delta Electricity at 12:30 PM today.

The PDMS number is MS17-002434 and the hard copy will be in the mail run.

Kind regards,

s22



s22
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PROTECTED SENSITIVE
TREASURY MEETING BRIEF

FOI 2428
Document 4

8 August 2017

PDR No. MS17-002434

Treasurer

MEETING WITH DELTA ELECTRICITY

Timing: For your meeting on 9 August at 12:30 PM with Trevor St Baker and Brian Flannery from Delta Electricity

KEY POINTS

- We understand that Trevor St Baker, the Chairman of Delta Electricity (DE) met separately with the Prime Minister and Minister Frydenberg yesterday. In these meetings, DE expressed their continued support for investment in coal fired power stations to meet baseload energy demand, a moratorium on new investment in renewable generation, and reduced foreign ownership in the electricity sector.

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- DE currently own the Vales Point black coal power station (1,240 MW) on the New South Wales central coast and is one of several bidders for LYB (owned by Engie). LYB is estimated to be valued at \$1 billion and final bids are due at the end of August.

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Senior Adviser
Structural Reform Group

s22

Contact Officer: s22

Ext: s22

s 47G(1)(a)+(b)

From: s22
To: [TSR Executive Minute Distribution](#); s22
Cc: s22; [SRG_SES](#); s22
Subject: MB - Hunter Vally Visit - Delta Electricity (MS17-003023) [SEC=PROTECTED, DLM=Sensitive]
Date: Wednesday, 20 September 2017 6:00:41 PM
Attachments: [MS17-003023 - Hunter Valley Visit - Delta Electricity.pdf](#)

Good afternoon s22

Please find attached a Ministerial Brief on the Treasurer's upcoming visit to the Vales Point Power Station owned by Delta Electricity, as part of his visit to the Hunter Valley on 25 September.

The PDMS reference is MS17-003023 and the hard copy will be in tomorrow's mail run.

Kind regards,

s22

s22

Analyst | Structural Reform Group

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TREASURY MINISTERIAL BRIEF

20 September 2017

PDR No. MS17-003023

Treasurer

HUNTER VALLEY VISIT BRIEF – DELTA ELECTRICITY

Timing: Prior to your visit to the Hunter Valley on Monday 25 September.

KEY POINTS

- During your travel from Monday 25 September to the Hunter Valley, you will be visiting the Vales Point power station owned by Delta Electricity.
- Vales Point is a coal-fired power station of 1320 MW. At 39 years old it is the second oldest coal plant in New South Wales and the fourth oldest in the NEM. In 2015, the New South Wales government sold Vales Point power station for only \$1 million to Sunset Power International Pty, who operate the plant as Delta Electricity.
- Delta Electricity’s chairman is Trevor St Baker, and its director is Brian Flannery, both of whom you met with on 9 August 2017 (MS17-002434 refers).

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- Treasury advises against providing or hinting at providing any assistance to Delta in relation to LYB or to any of their existing assets including Vales Point.
 - Doing so would further encourage electricity generation companies to try and offset their private investment with public assistance.

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- Treasury considers that s 22, and we should discourage any interest they display in seeking government assistance for LYB, Vales Point, or any of their other generation assets.

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Contact Officer: s22

Senior Adviser
Structural Reform Group
Ext: s 22

Consultation: SRG - Competition; Foreign Investment Review Unit

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s22

From: McDonald, Hamish
Sent: Wednesday, 27 September 2017 3:43 PM
To: 'John Short'
Subject: RE: Follow up on recent meeting with owners of Delta Electricity [SEC=UNCLASSIFIED]

Thanks John

It was great to see you again last week, and it is really useful to receive this sort of information.

The points about the cost of firming up renewables and the need to consider capacity factors are well made. One thing though, I think that most LCOE figures we see do adjust for capacity factors (but generally not additional firming).

I must admit, I find that the complexity of the space, the site and asset specific issues and the changing nature of the technology all tend to highlight to me the value of the principle of trying to set technology neutral policy frameworks that value the things we need to value, and letting the participants identify the most cost effective solutions.

Cheers
Hamish

From: John ShortS 47F
Sent: Tuesday, 26 September 2017 6:19 PM
To: McDonald, Hamish
Subject: Follow up on recent meeting with owners of Delta Electricity

Hamish,

Thank you for meeting with the owners of Delta Electricity, Trevor St Baker and Brian Flannery, and myself last week.

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Also the Treasurer was not able to inspect the Delta Electricity power plant at Vales Point on Monday as originally planned, so I thought it would be appropriate to pass on the information on the cost of re-furbishing an existing plant that we had planned to present to the Treasurer.

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s 47G(1)(a)+(b)

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Best regards,

John Short



JOHN SHORT | PRINCIPAL CONSULTANT

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s 47G(1)(a)+(b)

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Pages 1-3 are
outside the scope
of the request and
not provided

Submission to the Independent Review into the Future Security of the National Electricity Market

by

Trevor St.Baker AO

19 February 2017

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CV - Trevor St.Baker AO

BASE-LOAD OPTIONS WITH UPTAKE OF VARIABLE RENEWABLE ENERGY (VRE)

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- **Alternative Solutions to the South Australian electricity Supply Difficulties following the Northern Closure**
- **Alternative Solutions to the Victorian Electricity Supply Difficulties following the Announced Closure of Hazelwood**

Trevor St Baker AO, BEng (UNSW), BA (Syd Uni), FIEAust, FAIE, FAusIMM, MAICD
Director, StBaker Energy Innovation Trust
Chairman, Sunset Power International, ta Delta Electricity
Founder & Deputy Chair, ERM Power Limited



Trevor has now 60 years' full-time active involvement in the energy industry, including 23 years, to 1980, in planning and leadership roles within NSW and Queensland GOC electricity utilities. These roles included the establishment of the first power station planning department in Queensland in 1971 and subsequently the first Energy Resources Division in 1975, responsible for the deregulation of power station fuel procurement in the State, development of Blackwater and Curragh steaming coal developments, and long-term contract coal procurement to underpin the Gladstone, Tarong, Callide B and Stanwell power station developments.

In 1980, Trevor moved to the private sector, founding companies which have evolved into ERM Power. For the first 15 years, as Principal of ERM Consultants Pty Ltd, Trevor created a successful boutique energy consulting and advisory firm, operating nationally and internationally. In the 1990's, as Executive Chairman of Energy Resource Managers Pty Ltd (now Sunset Power Pty Ltd), Trevor established one of Australia's first private power development companies, developing firstly the Oakey power station in Queensland, and then a further five new gas-fired power stations, in Western Australia, NSW and Queensland and representing 50% of all new power generation developments constructed in Australia in the 2000's. Trevor established ERM Power Pty Ltd in 2006 to undertake the construction and management of the six power stations and to expand downstream into business energy retailing, becoming the 4th largest electricity retailer in Australia, by sales volume, listing as ERM Power Limited on the ASX in an IPO in December 2010 as a fully integrated energy company, and subsequently expanding its business energy retailing business into the USA.. Trevor is currently a Non-Executive Director and Deputy Chairman of ERM Power Limited.

In 2013, Trevor established Sunset Power International Pty Ltd, to bid for new power generation development opportunities, bidding for new developments in Myanmar in 2013, in Victoria in 2014, and in 2015 to successfully bid to acquire the last NSW Govt-owned base-load power generation business, Delta Electricity, owner and operator of Vales Point power station on Lake Macquarie. Trevor is now the Chairman of SPI/Delta Electricity.

In 2013, Sunset Power set up a trust, now the StBaker Energy Innovation Fund, (StBEIF), and began investing in new-start energy R&D commercialisation businesses, providing business input and mentoring to local Australian founders of new disruptive technology businesses aiming to break into global markets in the energy sector, including flat printed light, printed solar pv & printed energy storage, cloud-enabled intelligent controllers & powermetric customer access devices, and electric vehicle fast chargers, all of which are making their mark. and at different stage of marketing, manufacturing and exporting products to world markets. Trevor is a Director of six such StBEIF investee companies, and Chairman of the two most advanced in successful marketing and exporting, namely Tritium Pty Ltd and Southern Cross Printed Electronics Pty Ltd..

Trevor is active in the broader energy industry having chaired the National Generators' Forum for three years to 2013, and with non-executive director roles on the boards of the Energy Policy Institute of Australia Limited, and Queensland Resources Council (to 2015).

In June 2016, Trevor was awarded an Officer (AO) in the General Division of the Order of Australia, for distinguished service to business and commerce as a leader and executive in the energy sector, and through philanthropic support for a range of health, arts and Indigenous youth programs.



BASE-LOAD OPTIONS WITH UPTAKE OF VARIABLE RENEWABLE ENERGY (VRE).

KEY POINTS

1. Australia's economic prosperity is presently at risk as a result of the impact of excessively escalating electricity prices and fears over security of supply.
2. VRE technologies deserve recognition for the part they are playing in assisting Australia move towards a sustainable future. However, there are technical and economic risks associated with their subsidised and forced introduction to the NEM. There are far more cost-effective ways of reducing GHG emissions in the short and near-term, and it IS still to be seen the extent to which VRE will contribute to longer-term global solutions.
3. The rapid uptake of VRE in South Australia has weakened the reliability of the SA regional power system (one of five NEM regions) by making base-load generation uneconomic and forcing their premature closure. Synchronous base-load generators have received no recompense for essential system support services and back-up spinning reserve capability.
4. Other countries with significant proportionate uptake of intermittent renewable generating capability relative to conventional synchronous generation supply capability, but less than South Australia, are facing similar challenges.
5. The direct economic impact of the closure of the Northern power station has been to increase the base-load wholesale component of all electricity retailed in South Australia by ~7 ¢/kWh, equivalent to a total of ~\$840m per annum additional cost for electricity consumers, and representing an uncompetitive and economically-unsustainable electricity supply cost to industry in that State.



6. This direct impact is the effect of the re-placement with gas-fired generation in existing power stations of the one-quarter of the State's total retailed electricity previously supplied by coal-fired power from Northern power station. The investment in new additional gas-fired generation in South Australia can be shown to only put further upward pressure on the present electricity prices in the State, albeit contribute to improved security and reliability of supply as would any replacement conventional generation.
7. An analysis of all the possible new generation solutions to delivering essential base-load power, complementary to the intermittent renewable generation in the South Australia, at anywhere near the affordable electricity prices prior to the closure of Northern, shows that a reasonably affordable electricity supply price option can only be achieved if the demolition of Northern power station can be halted without delay and a re-build and recommissioning achieved at less than one-third of the as-new replacement cost, for a 15-year business case. Even this would be four times the re-commissioning capital cost possible three months ago, prior to the commencement of serious demolition of Northern.
8. The announced closure next month of Hazelwood power station in Victoria at short notice has nearly doubled forward contract base-load wholesale prices in Victoria in just six months, equivalent to a total additional cost to Victorian electricity consumers of \$1.8billion per annum, and increased contract base-load wholesale prices across the NEM by ~1 ¢/kWh.
9. The scale of the Latrobe Valley brown coal resource and its low cost for power generation however cannot be ignored as an irreplaceable economic energy resource for electricity supply to Victorian and national industry, and for maintenance of jobs and national prosperity. Australia cannot afford for Latrobe Valley's 6,200MW of by far the lowest base-load fuel cost of generation in the country to be reduced plant closures without procurement of replacement Latrobe Valley generating capability. New Latrobe Valley base-load generation to replace Hazelwood could have up to 30% lower GHG emissions than for the Hazelwood plant to be retired, to close to the GHG emissions from sub-critical black coal-fired generation that will otherwise replace part of the lost Hazelwood generation.



10. The advice of the electricity market manager of the threats to reliability of supply and even greater price impacts from the increased volatility of wholesale electricity prices with the seriously reduced generation supply margins resulting from a Hazelwood closure on top of other closures of base-load generation across the NEM, cannot be ignored by authorities, as it is very clear to the public in the light of the experience in South Australia
11. The same phenomenon will undermine all other interconnected regions of the NEM to some degree or other unless three essential preventative measures are taken.
12. The first preventative measure must be to cause no further harm to the power system by allowing further VRE development where it will weaken system reliability. In the absence of large-scale energy storage, VRE should not exceed a moderate proportion of the electricity demand on the system at any time. Given that system demand varies over a wide range, and that VRE is capable of only 25% to 35% of the equivalent base-load capability over time, limits on VRE should be fixed by reference to system generating capability.
13. The second and even more essential measure is to ensure that base-load generating capability cannot be closed before replacement base-load-capable generation plants (or large-scale energy storage facilities) can be brought into service.
14. The third, and of primary importance to Australian businesses, employees of those businesses and all other electricity consumers, is that Australia cannot afford to dilute its most economic base-load energy sources with VRE ahead of its major trading partners and international business competitors, noting the latest IEA projections that coal-fired generation will still be above 30% of total global electricity generation in 2050.



15. Importantly, Australia cannot afford to reduce its reliance on the major capital investment in place in the Latrobe Valley in Victoria for the 6,200MW of base-load coal-fired generating capability, representing 25% of the total coal-fired power generating capability in the NEM, and supplying more than 30% of the total base-load wholesale electricity supplied into the NEM, and with many decades of low-cost Latrobe Valley lignite (brown coal) resource available to support continuing supply of this lowest cost base-load power into the National Electricity Market into the future.
16. Because of the capital-intensity of existing base-load generators essential for reliable and affordable electricity, the determinant of the life of a coal-fired power station becomes the continuation of access to economic coal resources to support on-going operation. Capital investment in such plants are financed on economic lives for the redemption and return on equity of such initial investments; and every ten or fifteen years further capital investment needs to be committed to refurbishment and updating of the plant and equipment. This can proceed virtually indefinitely while the economic supply of fuel continues to be available, with long-term benefit to the power system.
17. Furthermore, any proposal to close down a base-load coal-fired power station capable of economical refurbishment and life extension and replace it with alternative lower-emission” base-load capability, requiring its own new intensive capital investment, would not make economic sense unless it delivered an economic and affordable electricity supply proposition as well as the improved GHG emission outcome sought
18. Regulatory intervention may be necessary to facilitate the achievement of all three of the national policy goals of: reliability and security of supply, affordable prices for customers and environmental sustainability.



BACKGROUND

All Australian NEM regions in 2016/17 are experiencing firming peak power and energy demands, after a flattening of the proportionate uptake of roof-top solar taking energy demand off grid, and with a levelling out of the rate of demand-side energy efficiency being experienced in the NEM. This comes after five or six years of declining power and energy demands.

Peak power demands are now above previous record peak levels reached across the NEM in 2011, and since when there have been retirements of “base-load capable” generators in all major States, including Wallerawang (1,000MW) in NSW, Collinsville (180MW) in Qld, and Anglesea (120MW) in Victoria. No new “base-load capable” generators have been commissioned in these States since:

- the Uranquinty (660MW) and Colongra (660MW) gas-fired peakers in 2009, and the much earlier Mt Piper (1,400MW) base-load coal-fired power station in 1993, in NSW,
- the Darling Downs (630MW) gas-fired base-load/peaker in 2010, and the Kogan Creek (750MW) base-load coal-fired power station in 2007, and
- the Mortlake (560MW) gas-fired peaker in 2011, and the much earlier Loy Yang ‘B’ (1.070MW) base-load coal-fired power station in 1996

There has however since 2011 been significant uptake of intermittent wind generation in SA, Victoria, and to a lesser extent in NSW, subsidised (off-market) by large-scale renewable energy certificates and government capital and off-take support in various forms, and there has also been major (world-leading) uptake of roof-top solar pv, especially in South Australia and Queensland, and also to a lesser extent in NSW, subsidised (off-market) by small-scale renewable energy certificates and unsustainable feed-in tariffs for solar pv generation surplus to the usage in the particular premises with the installations.

What started out in the early-2000’s as a national subsidised “2% Renewable” scheme, to offer a small but finite market to attract formative investment in zero-GHG emission generation as a means of testing the economics of renewables to reduce Australia’s high per-capita GHG emissions, has now, by political “populist” decision-making, become a greater than 10-times renewables target, of notionally



23%, but converted to a defined LGC (large generator certificate) target, representing an even higher percentage of the much-lower-than-anticipated total Australian electricity demand now expected in 2020, and on top of the GHG emission reduction from “small-scale” residential roof-top solar pv generation, which is additional to the LGC target.

What started out in the early-2000’s at a minuscule “off-market” pass-through charge to electricity consumers, of less than one-tenth of a cent/kWh on their electricity usage, has now increased to a charge to electricity consumers at a three-times market price for LGC’s, for the greater than 10-times LGC target, plus separate pass-through charges for SGC’s, and already equivalent to some forty-to-fifty-times the subsidies and pass-through charges to electricity customers expected at the outset of the “2% Renewable” scheme.

The pass-through renewables energy certificate charges to electricity consumers, now more than \$2billion per annum, and rising, are now resonating “strongly negatively” in the electorate that has been sold the notion that there would be no significant charge to electricity consumers of this “so-called” 23% renewables target.

(Note: 13% renewables in the NEM at the current >\$85/LGC = >\$2 billion per annum charges to NEM customers = >\$12/MWh off-market additional pass-through charge.)

The publicity surrounding the payment to the Clean Energy Regulator of \$123m by a relatively unknown electricity retailer, ERM Business Energy, to meet part of its obligation on behalf of its retail customers under the RET legislation for Calendar 2016, has unintendedly illustrated to the public the enormity of the pass-through of the costs to electricity consumers of the RET scheme in its present form. The fact that the market price for LGC’s was 35% more than this direct payment cap, and that ERM Business Energy retails less than 10% of the total electricity usage in Australia, has raised many eyebrows in the public, sold on the idea of a zero-cost uptake of renewables in Australia

But as is now clear to the public in South Australia, and increasingly nationally, the increasing rate of displacement of low-cost base-load coal-fired power generation by mandated renewables under the RET scheme, both LGC’s and SGC’s, is creating a much larger cost to electricity consumers than just the direct multi-billion dollar LGC cost, as low-cost coal-fired generation is increasingly replaced by gas-fired generation, at 2½-times that previously generated at the base-load coal-fired



Northern power station in SA, and more than ten-times that generated at the Latrobe Valley brown-coal-fired power stations in Victoria.

Worse however, and totally out of left field to even to informed energy analysts, the indifference by governments to the announcements by owners of the closure due to deteriorating financial viability of essential base-load power stations built and still required to meet peak demands under peak summer power demands and to supply affordable power to consumers throughout the year, has resulted in SA having now to rely on gas-fired generation for the 35% of that State's electricity demand that the Northern power station was built to provide.

This additional cost of renewables that the sector has been warning governments about since the "renewables beat-up" began in earnest has resulted in increases in wholesale prices for base-load power in South Australia of +\$70/MWh (presently \$115/MWh), and considerably more for peak power which residences rely on. This is equivalent to an additional cost to SA electricity consumers of \$840 million per annum for the current 12 million MWh's per annum electricity consumption in that State.

- The enormity of these cost increases to electricity consumers as a result of government policies in response to the "renewables obsession" created by the media, is mind-boggling!!!

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It is also clearer to the public that the string of black-outs occurring in South Australia following the closure of low-cost base-load coal-fired power stations in that State, made uneconomic as a result of excessive uptake of (off-market) subsidised intermittent renewables, have been a consequence of both the predictable reduction in available "base-load capable" generation to meet peak demands in the State when the sun is not shining and the wind is not blowing, and the equally-predictable reduction in system support services provided by conventional synchronous "base-load capable" generators to manage system disturbances.

What is not clear to the public is that intermittent renewable generators have been permitted to connect to the electricity supply grids without the same strict system support capabilities required of conventional generators, albeit because such asynchronous generators simply generate randomly and don't generate to follow the system demand. Intermittent renewable generators have not only not been required to provide these essential system support services, but are not even



subjected to the financial penalties, imposed on conventional generators, to fund the recompensing of synchronous generators called on to provide counter-intermittent system support services, including frequency and voltage support and spinning reserve.

Both the Federal and SA State Governments stood back and provided no assistance to SPI/Delta Electricity, nor to me personally, as Chairman, in attempting to rescue the essential (and modern) Northern power station from demolition, as SPI had previously done with the loss-making Vales Point power station in NSW. Our attempts started in March 2016, prior to the closure and following the final irrevocable decision by the foreign owners of the Northern power station and the Leigh Creek coal mine to shut down their Flinders power business in SA.

The potential re-commissioning of Northern was made possible at the time as a result of the agreement by the departing power station owners to negotiate a sale to SPI/Delta Electricity of the Flinders Power entity, including the full funding for the closure & remediation of the mine and power station sites, which would leave their owners no worse off than proceeding with the closure and rehabilitation.

The negotiations by SPI/Delta with key off-takers, governments and financiers are “commercial-in-confidence”. However it is fair to say that without government consensus and moral support, it is impossible to overcome the present “anti-coal hysteria” in Australia affecting all contract counter-parties, including lending institutions, necessary to mount a viable business case with the risks involved in the energy and environment policy area.

It has also to be said that neither level of government acted to impede our efforts, and that the State government officers and relevant Minister contributed time and access to SPI/Delta Electricity’s personnel to help to complete terms for the transfer of licences, leases and State government approvals to permit the purchase of Flinders Power,

Some measure of government support however seems to be crystallising, on the need for continued operation of essential low-cost base-load power stations, operating at least with minimum-load business plans, to provide essential system support and back-up power for when the sun doesn’t shine and the wind is not blowing, and maintaining affordable power for businesses and residences.

Since then, with the announced closure of Hazelwood by its foreign owners, given the consequences for SA from the closure of Northern, it is totally incomprehensible



for anyone to believe that such serious consequences won't be repeated in Victoria if the Hazelwood power station, presently supplying 25% of the State's electricity generation, is allowed to be closed without similar low-cost base-load power to replace it.

SA obviously is now critically reliant on imported power from Victoria, and NSW has always been a nett importer of power from Victoria and from Queensland. Accordingly, the replacement of sub-\$10/MWh fuel cost of power from Hazelwood presently supplying 25% of the State's electricity generation will not just increase Victorian electricity prices by the +\$50/MWh forward base-load wholesale price increase already factored into the forward market from the announced Hazelwood closure date in two-months' time.

Considering the slim generation margins across the NEM for the peak summer power demands this year, it is gratifying that governments at both levels are at last considering an appropriate response to a foreign owner announcing its intention to close down critical electricity supply infrastructure necessary for security of electricity supplies in Australia and essential for the maintenance of affordability of electricity supplies and the sustainability of industry and internationally competitive businesses in Australia.



OPTIONS FOR REGULATION OF CLOSURE OF CRITICAL BASE-LOAD GENERATION

Australia, and South Australia in particular, have suffered a spectacular failure to meet the paramount objective of security of supply, at the same time as the unplanned and mismanaged excessive uptake of renewables has, in the case of SA, increased electricity prices to internationally unsustainable levels for businesses as a consequence of existing base-load generators being driven out of the market, permanently, creating shortages of low-cost base-load dispatchable generation to meet power demands when the wind is not blowing and the sun is not shining.

Intermittent wind and solar pv generation only provide their nominal supply capability at peak wind flows or in the middle of sunny days in the case of solar, and are not capable of more than 25% to 35% equivalent annual capacity factor. Their output is random and unpredictable, so they do not represent a valuable component of an electricity supply mix. In addition, intermittent renewables cannot be relied upon to supply more than a safe proportion of a region's power supply at any time.

As mentioned in the Preliminary Report of the Finkel Expert Panel, Ireland for example limits to 50% the proportion of system demand that can at any time be provided by wind generators plus DC interconnectors. It is noteworthy that prior to the South Australian State-wide blackout on 28th September, wind generation plus interconnector imports from Victoria represented 83% of the South Australian demand at the time, and close to that proportion of the total generation capability in service or available from the interconnectors.

Mandated renewables are reducing the output demand on existing base-load generators, which are faced with changing economics for their capital-intensive investments as their output factors reduce from full base-load output, their life-extension overhaul costs increase, and as their local economic fuel sources and costs trend adversely, relative to competing base-load capable suppliers to the grid.

A significant contributor to the premature closure of Northern power station in South Australia was the failure to recompense conventional base-load power generation businesses for essential system support and spinning back-up generation capability to cover credible contingencies in the supply/demand balance, which



could have offered the power station owners a viable minimum-load business case in preference to the write-off of the asset value of the business, the closure and demolition of the facility, and a major expense for rehabilitation of the power station and mine sites, capable of at least another twenty years' base-load capable supply to the South Australian grid.

The paramount imperative for continuing high levels of security, reliability and affordability of electricity supply to meet customers' needs should never have been allowed to be put at risk as a result of an owner of critical infrastructure, such as an operational base-load capable power generator, to unilaterally close and demolish the facility without the base-load dispatchable capability and economic power supply capability being replaced, nor to allow this to happen as a direct result of a failure to recompense conventional base-load power generation businesses for essential system support and spinning back-up generation capability to cover credible contingencies in the supply/demand balance, leaving the base-load power owner with no other option but to close the facility.

- If such payments for system security services procured by the market operator and paid for by the market participants that cause system disturbances or cannot provide these services are inadequate, there may be a case for direct assistance from Government where there is a clear need to keep sufficient base-load capable power stations operating to avoid black outs or extreme prices.

-

While any such regulatory interference into the electricity market needs to be mindful of the many new technologies emerging at an increasingly rapid rate that may obviate the need replace or extend the lives of existing conventional base-load generators, the immediate imperative is to ensure the maintenance of at least existing levels of economic base-load supply capability to ensure security and reliability of supply of electricity at affordable prices for residences and at internationally-competitive prices for businesses in Australia.

Any such new technology, alternative network solution, or even replacement conventional base-load generation for a planned retirement and closure of an existing base-load generator, has to recognise that new Greenfield capital expenditure represents a new and additional capital charge, usually over long capital redemption periods, to replace the completely written-off capital charges for the existing base-load generator being retired and closed.



Alternative Solutions to the South Australian electricity Supply Difficulties

- following the Northern Closure

In the case of the closure and commencement of demolition of Northern power station in South Australia, at just half its normal expected useful life, the levelised indicative analysis, following, shows that there is no near-term solution that can deliver the essential replacement base-load power, complementary to the intermittent renewable generation in the State, at anywhere near the affordable electricity prices prior to the closure of Northern, that does not involve Leigh Creek coal, and that reasonably affordable electricity supply can only be achieved if a re-build and recommissioning of the Northern power station at less than one-third as-new cost is possible. If the progress of the demolition did not preclude this option, it would be necessary to halt the demolition without delay.

The “South Australia/Northern Closure” spreadsheet, attached, compares (on the basis of indicative levelised costs) the new capital requirements, capital charges, unit costs of fuel, O&M and capital, and relative long-run levelised costs and relative short-run marginal costs, for a range of alternative solutions to restoring, in the near-term, reliability & security of electricity supply at affordable prices, as follows:

- with written-off Northern, prior to closure;
- post-Northern closure, without any base-load-capable supply replacement;
- Northern re-build & re-commission, if demolition halted;
- with new Greenfield CCGT replacement of Northern;
- with new Greenfield OCGT replacement of Northern;
- with new 520MW Greenfield Leigh Creek coal-fired sub-critical power station;
- with new imported coal-fired sub-critical power station;
- with new imported coal-fired super-critical power station;
- with new imported coal-fired ultra-super-critical power station; and
- with SMR (small modular reactor) nuclear power station.

While a halt of the Northern demolition, re-build and re-commission was assumed to be financed at 6%pa IR on 65% debt finance over 15 years, an OCGT assumed similar gearing and debt redemption, sub-critical coal-fired options and CCGT assumed 70% debt financing over 25 years, super-critical and USC coal-fired options



assumed 75% debt financing over 25 years, all at the same 6%pa IR, and SMR Nuclear assumed 80% debt finance over 35 years, at 4.5%pa IR.

The additional long-run levelised costs compared to the “Written-Off Northern, prior to Closure” case, for each alternative, at low (55%) annual capacity factor business case, of 2.5TWh/a wholesale sales for each 520MW installation, in order of ranking were as follows:

- | | |
|---|-----------------|
| 1. Northern Rebuild; | at +\$9.6/MWh |
| 2. New Imported Super-Critical Coal-Fired Power Station: | at +\$56.0/MWh |
| 3. New Imported Sub-Critical Coal-Fired Power Station: | at +\$56.2/MWh |
| 4. New Sub-Critical Leigh Creek-Fired Power Station: | at +\$68.3/MWh |
| 5. New Imported USC Coal-Fired Power Station: | at +\$70.5/MWh |
| 6. No replacement capability, & reliant on Gas-fired gen: | at +\$85.0/MWh |
| 7. SMR Nuclear facility: | at +\$86.7/MWh |
| 8. New Sub-Critical CCGT: | at +\$94.8/MWh |
| 9. New OCGT: | at +\$109.8/MWh |

The additional long-run levelised costs compared to the “Written-Off Northern, prior to Closure” case, for each alternative, at a base-load (90%) annual capacity factor business case, of 4.1TWh/a wholesale sales for each 520MW installation, in order of ranking were as follows:

- | | |
|---|----------------|
| 1. Northern Rebuild; | at +\$5.9/MWh |
| 2. New Imported Super-Critical Coal-Fired Power Station: | at +\$34.2/MWh |
| 3. New Imported Sub-Critical Coal-Fired Power Station: | at +\$34.9/MWh |
| 4. New Imported USC Coal-Fired Power Station: | at +\$42.5/MWh |
| 5. New Sub-Critical Leigh Creek-Fired Power Station: | at +\$43.4/MWh |
| 6. SMR Nuclear facility: | at +\$47.5/MWh |
| 7. New Sub-Critical CCGT: | at +\$58.3/MWh |
| 8. No replacement capability, & reliant on Gas-fired gen: | at +\$68.0/MWh |
| 9. New OCGT: | at +\$85.4/MWh |

The short-run marginal (fuel) costs sent-out for each alternative, at a base-load (90%) annual capacity factor business case, in order of ranking were as follows:

- | | |
|---|----------------|
| 1. SMR Nuclear facility: | at +\$10.5/MWh |
| 2. New Imported USC Coal-Fired Power Station: | at +\$31.5/MWh |
| 3. Northern Rebuild; | at +\$33.0/MWh |



- | | |
|---|-----------------|
| 4. New Imported Super-Critical Coal-Fired Power Station: | at +\$33.6/MWh |
| 5. New Imported Sub-Critical Coal-Fired Power Station: | at +\$35.7/MWh |
| 6. New Sub-Critical Leigh Creek-Fired Power Station: | at +\$38.5/MWh |
| 7. New Sub-Critical CCGT: | at +\$73.8/MWh |
| 8. No replacement capability, & reliant on Gas-fired gen: | at +\$108.0/MWh |
| 9. New OCGT: | at +\$108.0/MWh |

The new capital requirements, compared to the “Written-Off Northern, prior to Closure” case, for each alternative, in order of ranking were as follows:

- | | |
|---|--------------|
| 1. No replacement capability, & reliant on Gas-fired gen: | at no extra |
| 2. Northern Rebuild; | at +\$186m |
| 3. New OCGT: | at +\$520m |
| 4. New Sub-Critical CCGT: | at +\$832m |
| 5. New Imported Sub-Critical Coal-Fired Power Station: | at +\$1,248m |
| 6. New Imported Super-Critical Coal-Fired Power Station: | at +\$1,378m |
| 7. New Sub-Critical Leigh Creek-Fired Power Station: | at +\$1,378m |
| 8. New Imported USC Coal-Fired Power Station: | at +\$1,768m |
| 9. SMR Nuclear facility: | at +\$3,068m |

All options except new gas-fired plants offer reductions from the current post-Northern closure situation, of nearly +\$70/MWh higher long-run levelised base-load wholesale generation cost compared to the pre-Northern closure market, relying mainly on additional gas-fired generation from existing power plants to make up the ~3TWh/a low-cost Leigh Creek-fired generation at Northern, supplying one-quarter of the State’s electricity demand prior to its closure.

The current plan by governments to construct new gas-fired generating plants to replace the 520MW base-load capability lost with the closure of Northern will deliver reliability and security of supply, but at no reduction in the ~\$115/MWh base-load wholesale price that is now injuring businesses in SA and creating hugely accelerated financial hardship in the SA community.

On the face of it, a new CCGT gas-fired plant has a marginally better economic base-load option, however at the anticipated low-load business case, and if expected to operate at minimum load to offer spinning reserve to cover the intermittent output of renewables as well as credible supply/demand contingencies, this low-load production cost is not so attractive, and ranks as an unattractive option, as mentioned above. The high short-run marginal cost of gas-fired generation, even at



full rated output for CCGT, of \$74/MWh further illustrates the low prospect of gas-fired generation being a viable solution to offering South Australia any relief to the current wholesale electricity supply process.

A new Greenfield power station based on imported coal if obtainable at less than \$4.50 landed at Pt Augusta, would be a more economic new Greenfield power generation option than a new Leigh Creek coal-fired power station, at a delivered coal cost of \$3.50/GJ, and a much more economic proposition than new CCGT gas-fired plant

A new rebuild of the 520MW Northern power station could take \$25/MWh off the current ~\$115/MWh base-load wholesale price, and is a similarly ~\$25/MWh lower base-load generation cost option than new gas-fired power stations, at the currently expected forward gas price of \$9/GJ (@ current costs), New coal-fired plants would likely produce base-load wholesale prices in SA at \$40/MWh higher than prior to Northern closure, at close to \$90/MWh, compared to the ~\$45/MWh prior to Northern closure.

The only hope of salvaging affordable and internationally-competitive wholesale electricity prices in SA is shown to be by a rebuild of Northern, If the state of the Northern plant would enable a re-build and re-commissioning at one-sixth of a new Greenfield price, of \$240m, and a 10-year extension of the operating licences granted to enable a 15-year business case to be banked, and if the demolition can be halted without delay. South Australia could accordingly return to electricity price competitiveness with the other States, and the return to service of Northern would restore generation spare plant margins sufficient to reduce the price volatility that comes with marginal reserve generation. Such a Northern re-build, if possible, would offer a ~\$25/MWh lower base-load generation cost than new coal-fired power plant options, and at ~\$50/MWh lower base-load wholesale price than the present \$115/MWh forward market price reported at present.

A quick sensitivity on the re-build and re-commissioning option, based on a re-build capital costs of double the above indicative figure, to nearly \$500m, or one-third of a Northern re-build cost, Showed that this would add ~+\$10/MWh to the base-load generation cost, which would be still much cheaper than any gas-fired option, and probably still offer SA electricity price competitiveness with the other States, even if they disband unattainable renewables targets.



Alternative Solutions to the Victorian Electricity Supply Difficulties

- following the Announced Closure of Hazelwood

In the case of the announced closure in two months' time of Hazelwood power station in Victoria, the levelised indicative analysis, following, confirms an even greater replacement energy cost for Latrobe Valley coal-fired power than for Leigh Creek coal-fired power in South Australia, although the age and state of the Hazelwood plant, after more than 50 years' commercial operation, and hardly a modern generator nor efficient plant, is not such a good prospect for further economic life extension.

The scale of the Latrobe Valley brown coal resource and its ultra-low cost for power generation however cannot be ignored as an irreplaceable energy resource for Victorian and national industry, and jobs and national prosperity. The levelised indicative analysis, following, shows that with the demise of Hazelwood, Victoria will start to lose the its energy supply cost advantage over NSW unless economical life extension refurbishment of Hazelwood is possible, or a full rebuild can be undertaken which captures significant economies relative to full new Greenfield cost estimates.

At worst however, progressive new Greenfield power generation development of the Hazelwood site with much more efficient and modern plant should be able to be delivered at a lower cost than the indicative \$66/MWh long-run production cost for a Latrobe Valley Greenfield plant, and at the long-term low short-run marginal (fuel) cost, such plant would be expected to operate at a very high annual capacity factor, and also be well placed to most economically provide spinning reserve, with low minimum load costs, to support the uptake of renewables.

The "Victoria/Hazelwood Closure" spreadsheet, attached, compares (on the basis of indicative levelised costs) the new capital requirements, capital charges, unit costs of fuel, O&M and capital, and relative long-run levelised costs and relative short-run marginal costs, for a range of alternative solutions to restoring, in the near-term, reliability and security of electricity supply at affordable prices, as follows:

- with written-off Hazelwood, prior to closure;
- post-Hazelwood closure, without any base-load-capable supply replacement;



- Hazelwood re-build of six Units, involving full boiler replacements;
- with new Greenfield CCGT replacement of Hazelwood;
- with new Greenfield OCGT replacement of Hazelwood;
- with new 1,200MW Greenfield Hazelwood sub-critical coal-fired power stn;
- with new imported coal-fired sub-critical power station;
- with new imported coal-fired super-critical power station;
- with new imported coal-fired ultra-super-critical power station; and
- with SMR (small modular reactor) nuclear power station.

While a Hazelwood 6-unit boiler re-build and re-commission has been assumed to be financed at 6%pa IR on 65% debt finance over 15 years, an OCGT assumed similar gearing and debt redemption, sub-critical coal-fired options and CCGT assumed 70% debt financing over 25 years, super-critical and USC coal-fired options assumed 75% debt financing over 25 years, all at the same 6%pa IR, and SMR Nuclear assumed 80% debt finance over 35 years, at 4.5%pa IR.

At the extremely low Latrobe Valley brown coal-fired SRMC, a rebuilt and re-commissioned Hazelwood power station, or a new Greenfield Hazelwood power station is likely to be dispatched at full base-load capability for the foreseeable future, although imported coal-fired power station options for Victoria and new CCGT gas-fired options will probably have to find viable investment cases at lower load outputs.

The additional long-run levelised costs compared to the “Written-Off Northern, prior to Closure” case, for each alternative, at a base-load (90%) annual capacity factor business case, of 9.5TWh/a wholesale sales for each 1,200MW installation, in order of ranking were as follows:

- | | |
|---|-----------------|
| 1. Hazelwood 6-Unit boiler replacements & Refurb; | at +\$14.1/MWh |
| 2. New Sub-Critical Hazelwood Coal-Fired Power Station: | at +\$38.4/MWh |
| 3. New Imported Super-Critical Coal-Fired Power Station: | at +\$53.4/MWh |
| 4. No replacement capability, & reliant on Gas & Imports: | at +\$53.6/MWh |
| 5. New Imported Sub-Critical Coal-Fired Power Station: | at +\$54.1/MWh |
| 6. New Imported USC Coal-Fired Power Station: | at +\$61.7/MWh |
| 7. SMR Nuclear facility: | at +\$66.8/MWh |
| 8. New Sub-Critical CCGT: | at +\$77.5/MWh |
| 9. New OCGT: | at +\$104.6/MWh |



The additional long-run levelised costs compared to the “Written-Off Hazelwood, prior to Closure” case, for each alternative, at low (55%) annual capacity factor business case, of 5.8TWh/a wholesale sales for each 1,200MW installation, in order of ranking were as follows:

1. Hazelwood 6-Unit boiler replacements & Refurb; at +\$23.6/MWh
2. No replacement capability, & reliant on Gas & Imports: at +\$60.8/MWh
3. New Sub-Critical Hazelwood Coal-Fired Power Station: at +\$64.4/MWh
4. New Imported Super-Critical Coal-Fired Power Station: at +\$76.1/MWh
5. New Imported Sub-Critical Coal-Fired Power Station: at +\$76.3/MWh
6. New Imported USC Coal-Fired Power Station: at +\$90.7/MWh
7. SMR Nuclear facility: at +\$106.9/MWh
8. New Sub-Critical CCGT: at +\$114.9/MWh
9. New OCGT: at +\$129.9/MWh

The short-run marginal (fuel) costs sent-out for each alternative, at a base-load (90%) annual capacity factor business case, in order of ranking were as follows:

1. New Sub-Critical Hazelwood Coal-Fired Power Station: at +\$6.5/MWh
2. Hazelwood 6-Unit boiler replacements & Refurb; at +\$7.8/MWh
3. SMR Nuclear facility: at +\$10.5/MWh
4. New Imported USC Coal-Fired Power Station: at +\$31.5/MWh
5. New Imported Super-Critical Coal-Fired Power Station: at +\$33.6/MWh
6. New Imported Sub-Critical Coal-Fired Power Station: at +\$35.7/MWh
7. No replacement capability, & reliant on Gas & Imports: at +\$71.8/MWh
8. New Sub-Critical CCGT: at +\$73.8/MWh
9. New OCGT: at +\$108.0/MWh

The new capital requirements, compared to the “Written-Off Hazelwood, prior to Closure” case, for each alternative, in order of ranking were as follows:

1. No replacement capability, & reliant on Gas-fired gen: at -\$40m
2. Hazelwood 6-Unit boiler replacements & Refurb; at +\$1,140m
3. New OCGT: at +1,1620m
4. New Sub-Critical CCGT: at +\$1,880m
5. New Imported Sub-Critical Coal-Fired Power Station: at +\$2,840m
6. New Imported Super-Critical Coal-Fired Power Station: at +\$3.140m
7. New Sub-Critical Hazelwood Coal-Fired Power Station: at +\$3,740m
8. New Imported USC Coal-Fired Power Station: at +\$4,040m
9. SMR Nuclear facility: at +\$7,040m



Only a Hazelwood refurb and life extension or a new modern Hazelwood or other Latrobe Valley replacement power station offer reductions from forward base-load wholesale price increases which the market has factored in from the closure of Hazelwood in two months' time. A post-Hazelwood reliance on interstate imports and local gas-fired generation, has produced a total of nearly +\$50/MWh in Victorian forward base-load wholesale prices, including a \$10/MWh increase in prices across the combined NSW/Victorian forward market.

New imported coal-fired power replacement generation in Victoria would result in the same increased cost of replacement production, and not offer relief for Victorian electricity consumers from the post-Hazelwood closure forward market.

New gas-fired generation in Victoria, at the present forward gas prices, ramping up to \$9/GJ, would struggle to achieve significant dispatch, and would not represent economic minimum-load capable generators to provide economic spinning reserve. Open-cycle gas-turbine generators with rapid start features may represent a contribution for system support in credible supply/demand contingencies, but Mortlake OCGT offers some 560MW of such plant which would take up such opportunities first.

A progressive replacement of the Hazelwood base-load generating capability with larger and more efficient super-critical generating plant, or new replicate Loy Yang 'B' boiler turbo-generators, while extending the lives of a number of the existing Hazelwood units until such new developments are commercially operating, would seem to be the only way to get some relief from the increased wholesale prices in Victoria. Such relief is indicated to be of the order of \$20/MWh to \$25/MWh base-load wholesale price increases on the pre-Hazelwood closure announcement, representing half the price increases for a post-Hazelwood market.

In reality, this would still represent an internationally-competitive wholesale base-load electricity offering, of the order of \$60/MWh, and still represent a lower wholesale price in real terms than when the NEM started two decades ago.

s22

From: McDonald, Hamish
Sent: Friday, 6 October 2017 5:11 PM
To: Trevor St Baker
Cc: Brian Flannery S 47F John Short
S 47F s22
Subject: Re: Options for essential new base-load generating capability in NSW, Victoria and South Australia

Hi Trevor

Thanks for this. I hadn't received it before - it may have got caught in our rather zealous firewall.

Sorry I didn't manage to call back today - I've been on the road. I will have a look, and digest, and let's talk again.

Thanks

Cheers
Hamish

On 6 Oct 2017, at 3:13 pm, Trevor St Baker S 47F wrote:

Hamish

s 22

s22

In addition, it is not as though Delta Electricity nor Sunset Power/ERM Power is a coal-fired power station junkie. Sunset Power/ERM Power built six major gas-fired power stations across the country in the 2000's, and Delta Electricity is currently completing the development application for a large-scale solar generation facility at Vales Point, and is also undertaking development planning for a 230MW pumped storage facility in South Australia. We are Energy Analysts, Investors, and specialist power station managers. We are fuel and technology agnostic, and averse to investments that rely on government subsidy.

s 22