The DBP Gas Forecast in AA6

A submission to the ERA

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AEMO has considered the retirement of coal

- AEMO discussed this in its ESOO for the SWIS of June 2025
  - Assumed all coal plants retired
  - Assumed over 500 MW of older gas turbines retired
  - AEMO considered the reliability of the SWIS and outlined capacity additions of batteries, renewables and load shedding as necessary to ensure reliability at peak times.
  - The following is a direct quote from the 2025 ESOO.

“4 Supply forecasts

This chapter presents the forecasts of supply for each Capacity Year in the 10-year outlook period, and a summary of the network limitations identified in the NAQ calculation for the 2024 Reserve Capacity Cycle. The SWIS supply mix is changing, with coal-fired generation, capable of producing electricity irrespective of weather conditions or running hours, largely being replaced by capacity with different operating characteristics, including intermittent renewables and duration-limited ESR and DSP.

In the Expected scenario:

- Supply increases in the first two years of the outlook period (by 353 MW and 319 MW in 2025-26 and 2026-27, respectively) compared to the forecasts in the 2024 WEM ESOO. The increase in 2025-26 is primarily due to the assumed earlier start of committed ESR capacity, while the increase in 2026-27 is due to the additional capacity procured under the RCM, being primarily comprised of ESR.
- A total of 1,695 MW of thermal generation is expected to retire or become unavailable from the SWIS over the next decade. A total of 1,287 MW of committed projects is forecast to enter the market over this same period, including 818 MW of ESR capacity, plus a mix of DSP, renewables and thermal capacity.
- Beyond committed projects, a further 507 MW of probable projects are anticipated to come online in 2027-28. ESR facilities represent 87% of this probable capacity. “

There is a flaw in this plan

- The ESOO is suggesting that about 1930 MW of battery capacity will be added to replace 1695 MW of retiring generation.
- Batteries do not produce energy, they cannot replace retiring generation. They can only shift energy (with losses) from one time to another.
- Retiring coal and gas plants takes energy out of the SWIS. Reliability is not just about capacity at peak time, it's about energy adequacy at all times.
- The ESOO did not adequately consider this, it focussed on reliability at times of summer peak. It did not appear to consider SWIS energy adequacy in each year and for a reasonable number of years (to say) 2035. If it did, the analysis is not shown, and did not influence the conclusions in the ESOO.

Analysis underpinning this submission

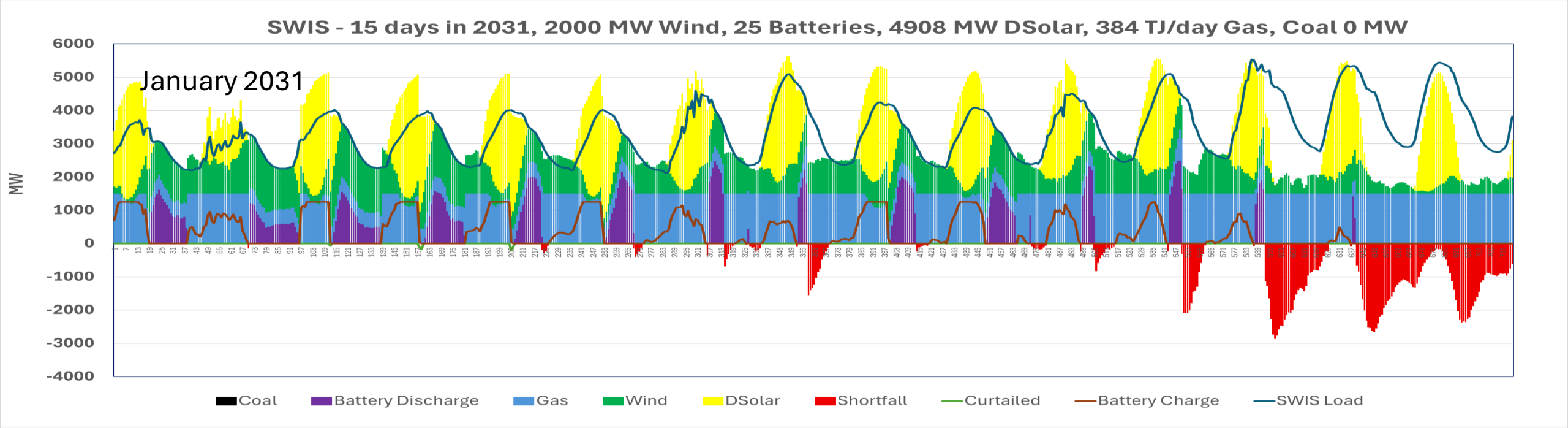
- Only considers the SWIS.
- Examines each year from 2024 to 2035, spanning the retirement of the coal fired units.
- Is simple, based only upon the adequacy of energy in the SWIS. It does not attempt to simply meet peak demand. It does not simulate availability of generation, losses in transmission or batteries, or overhauls. All of these would make the outcomes worse.
- Is based upon the **actual** performance of the SWIS in each half hour of 2024, i.e. it uses the exact wind and solar input, scaled up to reflect additional capacity in each year of study.
- Is focused **only** on reliably meeting energy demand throughout any year during and after the retirement of coal fired generation.
- Is not aiming to achieve a renewable energy target in the SWIS by a certain date, is not focused on system inertia, domestic solar, batteries or EVs, does not discuss transmission expansions or hydrogen or REZs or VPPs or any other technologies.

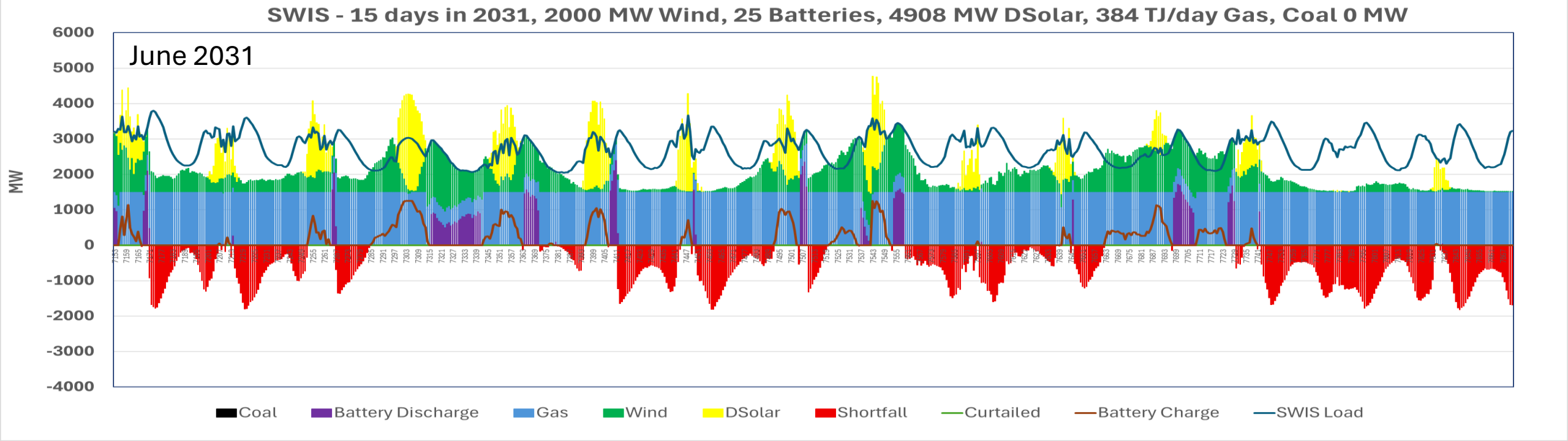
SWIS Modelling

- Projects future loads based upon AEMO's forecasts in the 2025 ESOO, using the 2024 load shapes
- The model determines the frequency and duration of energy shortfalls in each study year, based upon the input mix of generation and batteries, and applying any fuel supply constraints.
- Uses a simple energy balance for every half hour across a year, informed by historic performance of variable renewable energy across the seasons, and within the known constraints of the gas supply chain, esp the DBP.

Base Case in 2031

- Assumptions;
  - Wind capacity 2000 MW (currently 1079 MW)
  - 25 batteries, each battery 100 MW discharge capacity for 4 hours
  - Domestic Solar 4908 MW
  - All coal plants retired
  - T1 Gas supply for electricity generation of 320 TJ/day, 8 TJ/half hour
  - Expected SWIS load as per 2025 ESOO central scenario
  - **Ignore battery cycle losses, generation forced outages etc**
- The following graphs show the SWIS performance over 15 days in early January and early June, 2031. (June was a low wind month in 2024 but seasonally representative)


SWIS - 15 days in 2031, 2000 MW Wind, 25 Batteries, 4908 MW DSolar, 384 TJ/day Gas, Coal 0 MW
January 2031
MW
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
Coal
Battery Discharge
Gas
Wind
DSolar
Shortfall
Curtailed
Battery Charge
SWIS Load


SWIS - 15 days in 2031, 2000 MW Wind, 25 Batteries, 4908 MW DSolar, 384 TJ/day Gas, Coal 0 MW
June 2031
MW
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
Coal
Battery Discharge
Gas
Wind
DSolar
Shortfall
Curtailed
Battery Charge
SWIS Load

Modelling Results in 2031 **without coal**

- The SWIS failed to supply 1.805 TWh or 6.8% of the energy demanded over the year 2031.
- The SWIS failed to supply in 2476 hours over the year.
- The largest shortfall was 3229 MW.
- The shortfalls occurred throughout the study year, not just at peak load times.
- The shortfalls were triggered by lack of wind and solar, exhausted batteries and gas consumption hitting its upper limit.
- This is a totally unacceptable outcome.

The reliability of the SWIS until 2035 – base case

* = all coal generation retired
**UE = Unserved Energy

Year	UE**	Wind	Solar	Batteries	DBP T1 Gas	Gas Used
	TWh	MW	MW	#	TJ/day	PJ
2025	0.098	1100	2847	10	320	39.4
2026	0.084	1100	3117	25	320	41.9
2027	0.100	1100	3414	25	320	44.5
2028	0.191	1500	3738	25	320	60.5
2029	0.166	2000	4093	25	320	51.8
2030	0.629	2000	4482	25	320	80.9
2031*	1.805	2000	4908	25	320	105.9
2032	1.542	2500	5374	25	320	95.7
2033	1.356	3000	5884	25	320	88.7
2034	1.227	3500	6443	37	320	82.2
2035	0.867	4000	7056	50	320	77.2

Discussion of base case

- In all years to 2035, the reliability of the SWIS is unacceptable, and deteriorates as the coal plants are progressively retired by 2030
- This analysis assumes a constant T1 nomination in the SWIS of 320 TJ/day. (see technical discussion in appendix)
- The existing gas fired generation is increasingly loaded, within the terms of the T1 nomination, as each year passes
- At the outer years, gas consumption is reduced as wind and solar capacity are increased, but SWIS reliability remains unacceptable.

There are several ways to address this reliability issue

- 1. Increase renewable input and storage without increasing the supply of gas. The results are shown in the following table.

Increased renewable inputs

* all coal retired

Year	UE	Wind	Solar	Batteries	DBP T1 Gas	Gas Used
	TWh	MW	MW	#	TJ/day	PJ
2025	0.098	1100	2847	10	320	39.4
2026	0.118	1100	3117	25	320	41.9
2027	0.100	1100	3414	25	320	44.5
2028	0.106	2000	3738	50	320	49.6
2029	0.021	3000	4093	150	320	36.7
2030	0.016	4000	4482	250	320	51.3
2031*	0.017	6000	4908	350	320	59.9
2032	0.007	7000	5374	450	320	56.6
2033	0.008	8000	5884	550	320	54.6
2034	0.006	9000	6443	650	320	53.0
2035	0.006	10000	7056	750	320	51.8

Discussion of increased renewable inputs.

- This case highlights the continued unreliability of the SWIS with large renewable and storage increases over the study period
- Gas consumption remained elevated despite the renewable and storage capacity increase, with the gas generation increasingly required to compensate for the intermittency of the wind and solar inputs.
- As coal is retired, the task in 2031 becomes massive, as shown in the following table
- This case is not achievable in terms of cost, reliability and resources.

A renewables solution which solves the problem in 2031, **without coal or DBP expansion**, i.e UE* =0

Number of 4 hour, 100 MW batteries (currently 25)	Wind Capacity MW (currently 1100)
290	10000
316	9000
370	8000
485	7000
889	6000

In summary, by 2031 (without coal) the SWIS will require an additional 5 to 9 GW of wind capacity, accompanied by hundreds of batteries. This is an impossibility and is completely unaffordable as the resulting **curtailed energy** would need to be underwritten on a take or pay basis to achieve financial close.

* = unserved energy

Learning from the renewables only solution

There is no sensible number of 100 MW/4 hour batteries that can maintain reliability in the SWIS after coal generation is retired.

The proposed 100 MW/6 hour batteries are an attempt to deal with the “evening peak load problem” and will still fail to provide adequate deep storage to preserve SWIS reliability.

The renewables only solution cannot sustain the SWIS through and after the retirement of the coal fired generation. The use of gas cannot be eliminated from the SWIS.

Another way to address this problem

- 1. ***Without increasing the supply of gas via the DBP***, then it is necessary to increase renewable input and storage. **Not feasible**.
- 2. ***Increase the supply of gas to the SWIS, and the gas fired capacity of the SWIS***. This can be done by either:
  - expanding the DBP, building gas turbines and buying more domgas

  Or
  - building an LNG terminal in the SWIS to supply an expanded gas generation fleet, and buying LNG. The LNG tank is like a large battery, but will be much more effective than hundreds of 100MW 4 hour batteries.

  In this case, **examine an increase in gas supply via the DBP**.

SWIS reliability to 2035 with increased reliance on gas

* = all coal generation retired

Year	UE	Wind	Solar	Batteries	DBP T1 Gas	Gas Used
	TWh	MW	MW	#	TJ/day	PJ
2025	0.098	1100	2847	10	320	39.4
2026	0.084	1100	3117	25	320	41.9
2027	0.100	1100	3414	25	320	44.5
2028	0.191	1500	3738	25	320	60.5
2029	0.166	2000	4093	25	320	51.8
2030	0.629	2000	4482	25	320	80.9
2031*	0	2000	4908	25	950	129
2032	0	3000	5374	25	950	105.1
2033	0	3000	6651	25	950	104
2034	0	3000	7382	25	950	106.5
2035	0	3000	8195	25	950	109.5

Observations on the increased reliance on gas in the SWIS

- Reliability was restored when the DBP T1 booking took effect.
- This will require the installation of gas turbines in the SWIS to complement the T1 booking in the DBP
- The T1 booking increase is timed to coincide with the retirement of coal
- If the SWIS gas generators call for additional T1 capacity by 2031, the DBP will have to work during the period of AA6 to achieve the nominated capacity increase. This is not included in the current AA6.
- In this scenario, there is no decline in gas usage below current levels during the term of AA6, with a large increase in gas consumption thereafter
- SWIS reliability becomes a major public issue in the years before the DBP capacity increase is achieved, as coal is phased out of service

The DBP forecasts in AA6

- DBP has forecast SWIS gas demand into the future
- The requirements for the forecast are set out in Attachment 2 of the ERA's draft decision.
- The DBP forecast does not meet the standard required under the Regulatory Requirements in Attachment 2, item 4, point 2.
- The DBP approach described in Attachment 2 item 8 is flawed. The contracted quantities of current shippers in the SWIS were not developed with the knowledge that coal was to be retired from the SWIS, therefore they should not be used as the contracted quantities going forward, especially since they cannot preserve SWIS reliability in the future.
- The DBP approach described in Attachment 2 item 9 point 3 is flawed, since it fails to acknowledge the role that gas will have to play in the SWIS in the future to maintain SWIS reliability as coal is retired and intermittent renewable sources are introduced.
- DBP's benchmarking against AEMO's GSOO of 2024, as described in Attachment 2 item 12 is unsound, since the GSOO and its corresponding ESOO of 2024 did not adequately explore the implications of coal retirement in the SWIS by 2030.
- Consequently, DBP 's forecasts as shown in Attachment 2, item 13 are incorrect and must not be relied upon. They must be revised.
- DBP appears intent on under forecasting future gas demand from the SWIS in order to avoid expenditure during AA6, with a consequent impact on the tariff and revenue arrangements it is seeking via AA6.

The 2025 ESOO is not an adequate platform for forecasting the gas needs of the SWIS

- **Solving for peak capacity as per the 2025 ESOO will not produce a reliable SWIS**, due to the intermittent nature of renewables and the limited capacity of batteries and the existing gas infrastructure, i.e. the DBP.
- The DBP future demand forecasts underpinning its outlook in AA6 are based upon a Consultant's view of the future, which in turn is based in part on the 2025 ESOO. The ESOO did not adequately outline and analyse the future supply of energy via the DBP into the SWIS. Hence the DBP outlook in AA6 is flawed, and should be revised with a view to ensuring SWIS reliability in each year of the outlook period.
- Given the long lead time for expansion of the DBP, the capital requirements for the DBP must be based upon gas demand forecasts through to 2035 as a minimum.
- If this is done, the outlook for gas via the DBP will not be one of decline, as described by the DBP.

Final Word

- Without coal, the future SWIS cannot be sensibly planned and reliably operated without adequate access to gas. The current gas supply chain is clearly insufficient.
- The gas demand forecast produced by DBP to support its position in AA6 is flawed, as it fails to deal with the inevitable increase in gas demand by the SWIS due to the retirement of coal, growth in demand in the SWIS, and the unavoidable intermittent performance of wind and solar generation, which will have to be backed by gas fired energy production due to the limited and expensive storage capacity of grid scale batteries.
- DBP should be requested to revise its SWIS gas forecast for the next 10 years so that the resulting capital and operating costs, and additional tariff revenues, can be factored into a revised tariff arrangement.
- It will then be positioned to respond to the inevitable requests from potential shippers for capacity in the DBP to support the rapid expansion of gas fired capacity in the SWIS to complement the retirement of coal fired generation by 2030.

Appendix: Technical Note

- The DBP gas supply to the SWIS in any year is estimated as follows:
  - Estimate the total T1 bookings by all gas fired generators in the SWIS
  - Multiply the TI booking by 1.2 to establish the seasonal maximum gas flow in the SWIS
  - Divide by 24 to establish the MHQ in TJ/Hr
  - Calculate the energy produced by gas turbines at an assumed efficiency in 24 hours burning gas at the MHQ rate
  - Divide this energy by 24 to calculate the gas turbine capacity that would produce this energy if operated at full load for 24 hours on gas conveyed by the DBP and complying with the DBP regulations.
  - Note in this analysis a base case T1 gas nomination is assumed (320 TJ/day). This is an estimate only. The modelling result is relatively unchanged if either a higher T1 nomination is assumed, or a higher efficiency is assumed for gas generation in the SWIS. Neither assumption makes a material difference to the outcome of the modelling.