S2: Reserve margin - IRP 2010 Input Parameter

Parameter	**Reserve margin**
Parameter Value	The Reserve margin is not a direct input into the IRP model. This is used as a benchmark for supply adequacy after the fact. A key issue in determining the reserve margin is the individual capacity credits for different technology options. These capacity credits still need to be calculated, but will be published as soon as possible.
Rationale	The optimisation inherent in the IRP model will determine the appropriate generation adequacy for the system based on the cost of unserved energy. If this is correctly modelled (with an appropriate value for the cost of un-served energy) the optimal expansion plan would incorporate the negative impacts of not meeting load. This should suffice to negate the need for explicit adequacy criteria, along with appropriate sensitivity studies to accommodate uncertainties in the underlying assumptions. The reserve margin will be published as an indicator, both with and without adjustment for capacity credits.

Responses to Public Inputs

Summary of specific comments	Response
More detail is required on the methodology for determining the capacity credits for each technology (90x2030, CJN!-WC, SAWEA)	Noted. This is being developed and will be published as soon as it is complete.
It is not clear what the assumed reserve margin will be (90x2030, CJN!-WC, Coega Development Corporation)	There is no assumed reserve margin. The model will indicate what the preferred reserve margin is.
It is not clear whether total generation capacity includes IPP, co-generation and own generation capacity (90x2030, CJN!-WC)	All generation capacity, regardless of ownership, is included in the calculation. If it is self-supply that is not included in the IRP, but it does reduce the consumer's demand the outcome will be the same.
The 15% reserve margin is not enough, given the issues with ageing plant and funding problems, and is at the bottom of the international norms scale. It is recommended this be set at 20% (ACMP)	Noted. If there is a minimum required that exceeds the model's preference, a modification will be made to meet the minimum requirement.
The inclusion of DSM in the calculation of reserve margin is questionable given the uncertainty regarding DSM results. (CIC)	Noted.
Consideration should be given to test the IRP results against a 19% rather than 15% reserve margin requirement as this is line with NIRP3 (CIC)	Noted. If there is a minimum required that exceeds the model's preference, a modification will be made to meet the minimum requirement.
The reliability of wind depends on the interconnection of a number of wind farms in varying locations with suitable wind speeds. Studies indicate that reliability increases as more sites are added and that transmission losses were reduced by connection farms to a common point (Energy Caucus)	Noted. However there are studies in Germany suggest that with increasing proportion of the total system capacity the credit for wind should reduce, whereas at low penetrations the credit may be higher due to the lower impact on system security. SAWEA also makes use of this approach (as noted below).
This measure is only a subset of supply and too simplistic. This should be broadened to include stability and security of supply (Exxaro).	Noted. The reserve margin is a weak indicator of adequacy, thus the model looks at expected unserved energy and the cost of this to the economy, and will indicate what level of adequacy is required from the system to balance this cost against the cost of new capacity.
Inconsistency between the COUE indicated and the value indicated in the COUE document (R10/kWh) (IPC)	The value is being set at R75/kWh.
The capacity credit for wind (of 5-25%) requires revision. The European Wind Energy Association indicates that at low penetration the capacity credit of wind should be close to the capacity factor over the period in consideration – in SA these are assumed at 28-40%. With increasing penetration this	Noted. The methodology for calculating capacity credits is making use of this same approach.

	relative capacity credit reduces, meaning that additional wind power will substitute less conventional capacity than the first wind plants in the system. Geographic dispersion is also a major determinant of the capacity credit. (MainstRenPower, SAWEA, Windlab Developments SA)	
	A capacity credit is not stated for solar photovoltaic which is the most proven and fastest growing form of solar power. (MainstRenPower)	Noted.
	Storage technologies applied to clean generating technologies can improve reliability for these technologies (Mbani Wesizwe)	Noted.
	The capacity credit for CSP without storage in SA is a maximum of 25%, with storage the capacity credit is still less than 100%. (NIASA)	Noted.
	The list of technologies only considers existing technologies and excludes developing technologies, in particular Solar Hydrogen technology which could have a capacity credit of approx. 100% (as hydrogen could be extracted at a higher capacity than the need, leaving sufficient hydrogen storage to provide a 24/7 supply). (Private-DK)	We are not investigating technologies not being considered in the IRP. When additional information and commercialisation takes place with this technology it will be considered as an alternative in future iterations of the IRP.
	100% capacity credit for any technology cannot be true since there must be an allowance for decreased efficiency over time as well as planned and forced outages. (Private-WB)	Noted.
	Wind penetration is likely to remain below 10% in the short term and 20% in the longer term, indicating that the lower penetration rates should apply, i.e. close to the capacity factor of wind at 25-35%. (Windlab Developments SA)	Noted.
	Wind is variable, not “intermittent” (Windlab Developments SA)	Noted.