



Wambo Power Ventures

5th January 2007

Dr John Tamblyn
Chairman
Australian Energy Market Commission
PO Box H166
Australia Square, NSW 1215

By email: john.tamblyn@aemc.gov.au
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Dear Dr Tamblyn

Regulatory Risks re: Possible Snowy Boundary Changes & Southern Region Constraints

Wambo Power Ventures has already, in submissions of 24 March and 15 May 2006 registered objection with AEMC in relation to a MacGen Rule change proposal for a new Southern NSW Region, to include Wagga. A number of other objectors have also registered their concerns to AEMC, including "that this rule change would impose a profound market disruption to most participants".

The continued currency of the MacGen proposal to AEMC is however creating the uncertainty for market participants which the rule change process was supposed to avoid (at least for the duration that the proposal remains current), while it is patently in contravention of the MCE's stated objective of maintaining a stable wholesale market based on continued reliance on a regional structure, a desire for stability and only staged incremental changes to regional boundaries as may be beneficial to the market.

It has however now, albeit belatedly, come to our attention that in a letter of 21 June 2006 to AEMC, now posted on AEMC's website, Snowy Hydro has quoted a comment in TransGrid's 2005 Annual Planning Report, as follows, and out of context, to claim that new generation at Wagga can displace Snowy Hydro generation on northward flows and that it is an inefficient generation investment.

"At times when NSW is a heavy importer of power from the south the line ratings within the Snowy system and immediately north of Snowy may impose a limitation. The development of any generation in the south west of NSW (such as gas turbines in the Wagga area) will impose greater competition for the limited power transfer capability to the north. Such generation does not provide an effective increase to the net NSW generation at times where the transmission system is limiting."

This TransGrid quotation from their 2005 Planning Report, in the context of "A Possible Yass – Wagga 330kV Line Development" (attached), is however a passing comment in the wider report by TransGrid on interstate interconnection issues in the Southern Region of NSW and in the capability of the network to meet near-term supply and transfer demands, and a product of the TNSP's difficulties in justifying new regulated transmission investments on the basis of the Regulatory Test.

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However, in TransGrid's subsequent 2006 Annual Planning Report, in this same context, TransGrid sets out more detailed analyses of the deteriorating supply/demand balance situation in south-western NSW and the interconnection to Victoria, as also attached, stating:

"..local generation is an option available to address these limitations" and

"..under conditions of high area load and high Victorian import, outages of any one of a number of (network elements) in the area will lead to high loadings in critical system elements and/or low voltages in the Wagga area, which could be addressed by local generation."

While there are clear benefits from the 600MW Uranquinty peaking plant, which the WPV partners are constructing, including an essential contribution to the supply capability available to the State of NSW, we agree with TransGrid's expressed need for the Yass-to-Wagga transmission line to be upgraded to provide improved interconnector capability to Victoria outside peak demand periods in NSW when Uranquinty may not be operating (unless required for local system stability requirements), to prevent Snowy Hydro dispatching out-of-merit hydro generation which drastically reduces the NSW-to-Victoria transfer capability, at the expense of NSW base-load generators, and to the cost of Victorian retailers, when there are high Victorian demands, as is occurring all too frequently at present.

Snowy Hydro's submission that WPV's Uranquinty power station is an inefficient generation investment is incorrect and totally inappropriate and self-serving, as Snowy Hydro has set itself up as a competing gas-fired generation entity.

Further, Snowy Hydro's call for its hydro-generators "to be treated consistently with other generators in the NEM" should not be accepted at face value, as they seek. The 3,800MW hydro-generating capability of the Snowy Hydro scheme has for 50 years provided NSW and Victoria with a different, and valuable, power generation product compared with that from gas-fired generators or from base-load generators. That the Snowy hydro-generating plants can be operated in a manner that can drastically reduce the interconnector capability between NSW and Victoria is something that should be rectified, but hardly at the risk of profound market disruption, nor at the expense of the rest of the NEM participants, nor at the potential significant cost to electricity consumers.

Following the question raised in the TransGrid 2005 Planning Report, that any generation in the south-west of NSW may not provide an effective increase in the net NSW generation at times where the transmission is limiting, WPV engaged independent specialists, HMAc Consulting and ROAM Consulting, to advise on "The Export Capability of Proposed Uranquinty Power Station", and on any extent to which WPV's Uranquinty power station would not provide an effective increase to the net NSW supply capability.

HMAc's conclusions, as set out following, thoroughly rebutted any notion that gas turbines in the Wagga area are anything other than a significant positive non-network contribution to remedying south-west NSW region supply and voltage limitations, interstate interconnection limitations, and to improving marginal supply/demand balances in NSW in the near term. HMAc report on the effect of the 600MW Uranquinty power station on existing power transfer limits in the southern NSW region and in relation to interstate interconnector power flows concluded:

- that there would be no significant restrictions imposed by transfer limits of the existing 330kV transmission system, based on load flow studies undertaken by ROAM;



- that there was a probability of only 0.37% of an outage of a 330kV line in the supply network from the Southern NSW Region to the North, a rare event in itself, occurring at a time of high NSW pool prices, and restricting power flow north from Snowy, Victoria or the Uranquinty power station; and
- that when there are high power transfers north from Snowy, Uranquinty improves transient stability of the Snowy region quite significantly, and reduces damping of the existing Snowy Hydro generators.

In fact, in the rare circumstance of a northerly constraint from the Southern Region, Uranquinty would most likely displace Victorian import, but in any case would continue to provide hedge protection to NSW participants of the NEM, which the other sources would not offer.

As a result of certain continued currency which the Snowy Hydro's comments in their 21 June 2006 submission to AEMC have had, WPV engaged HMAc to set out further clear responses to a number of questions relevant to these concerns, as follows:

- Does Uranquinty add aggregate MW capacity to the State of NSW during times of peak system demand?
- Does Uranquinty add to the reliability of power supplies in the State of NSW?
- The circumstances, if any, under which the northward flow to Sydney West node of the combined output of Uranquinty Power Station and Snowy generation would be constrained;
- The extent and probability of any such constraints and whether these constraints would apply to Snowy generation in the absence of Uranquinty Power Station (and any associated works);
- The extent to which peak generation from Uranquinty Power Station would displace energy transfers to Sydney West from Snowy and/or southern imports;

Importantly, as attached, HMAc advised that *"Uranquinty does add MW capacity to the State of NSW (and to the Sydney West node) at time of peak demand"*, and ROAM Consulting's generation scheduling demonstrated even *"increasing the transfer limit north from Snowy from 3,000MW to 3,500MW has negligible effect on output of Uranquinty"*, and that *"any network contingency would have more impact on generation restriction than northward flows to Sydney West."*

Yours faithfully
Wambo Power Ventures Pty Ltd

Trevor St. Baker
Managing Director

Trevor St Baker
ERM Power PTY LTD
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22nd December, 2006

Dear Trevor,

Below is our response to questions raised from Snowy Hydro regarding the export of 600MW from the proposed Uranquinty Power Station.

- Does Uranquinty add aggregate MW capacity to the State of NSW during times of peak system demand;

Uranquinty does add MW capacity to the state of NSW at time of peak demand. From ROAM Consulting's generation scheduling studies Uranquinty bidding at \$50 would have a capacity factor of approximately 5%. A sensitivity study changing the transfer limit north from Snowy from 3000MW to 3500MW has negligible effect on output of Uranquinty thus indicating that on a probability basis Uranquinty availability is not significantly affected by the Snowy NSW transfer limit.

- Does Uranquinty adds to the reliability of power supplies in the State of NSW;

In simple terms Uranquinty would add to the reliability of power supply in NSW as indicated by the relative insensitivity of its availability to the Snowy - NSW transfer limit. Further, Uranquinty could be a valuable back up if Snowy runs short of water in a drought year. The constraints on water supply may make this more valuable than historical analysis may suggest.

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- The circumstances, if any, under which the northward flow to Sydney West node of the combined output of Uranquinty Power Station and Snowy generation would be constrained;

Under system normal conditions there will be minimal constraints. Obviously under significant network contingencies there will be constraints. Our studies indicate there is a very small probability of a network contingency in the NSW and Snowy region around Wagga causing a requirement for reduction in generation at Uranquinty. Any contingency would have more impact on generation restriction than northward flows to Sydney West.

However in the very rare occasions when maximum output is required from both Uranquinty and Snowy there would be restrictions during a transmission contingency.

- The extent and probability of any such constraints and whether these constraints would apply to Snowy generation in the absence of Uranquinty Power Station (and any associated works);

From our studies any restraints would be very rare. It is unknown if Snowy generation has any pre-existing constraints in the NSW network. This information would have to be obtained from Snowy Hydro.

- The extent to which peak generation from Uranquinty Power Station would displace energy transfers to Sydney West from Snowy and/or southern imports;

The extent to which peak generation from Uranquinty Power Station would displace energy transfers to Sydney West from Snowy and/or southern imports would be determined by the market and not related to system capacity. This is therefore outside the scope of studies we performed. Our studies focused on Uranquinty and did not evaluate effects on Snowy output or southern imports. However we would expect that the effects would be largely due to market forces and not due to transmission restrictions.

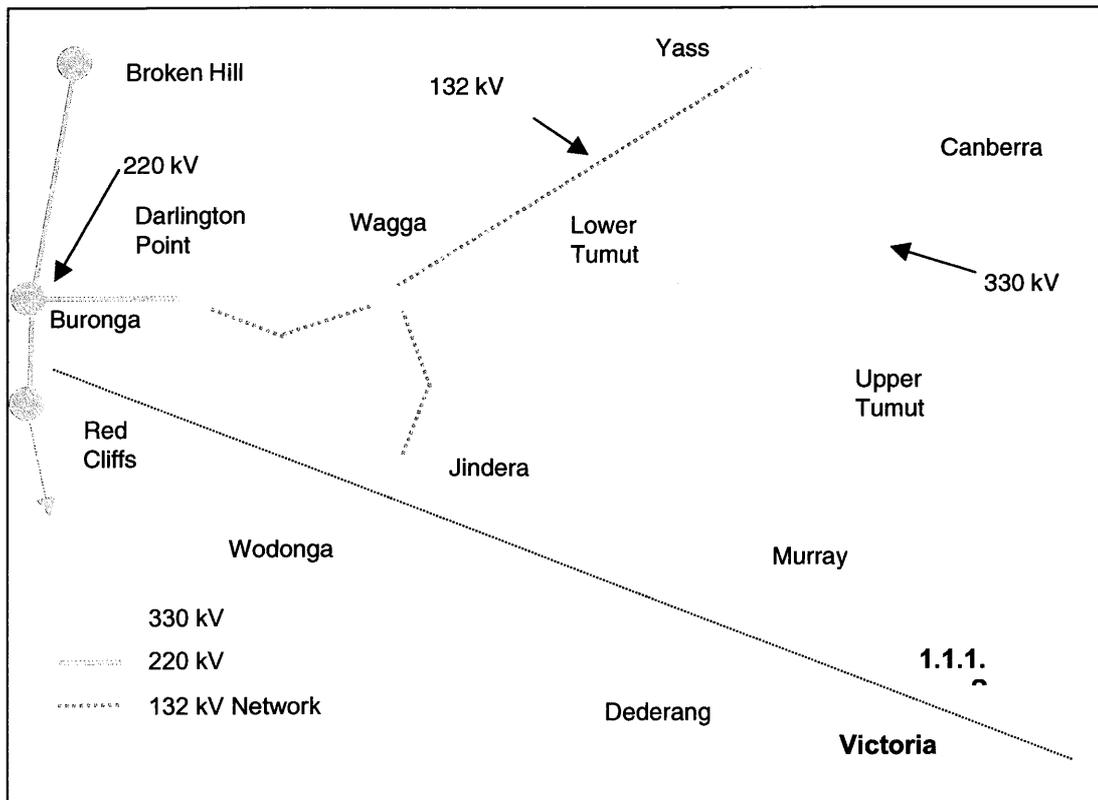
Yours sincerely,

Chris Knightly

Peer Reviewed by Max Michael

7.3.15. Possible Yass – Wagga 330 kV Line Development

The 330 kV and 220 kV system and underlying 132 kV system in the south of the state is shown in stylised form in the Figure below. The 132 kV system is shown as simple links operating in parallel with the 330 kV system. Yass and Canberra are connected to the north to the remainder of the NSW system. Dederang is connected to the Victorian 330 kV and 220 kV system. Similarly Red Cliffs is connected to the western Victorian 220 kV network.

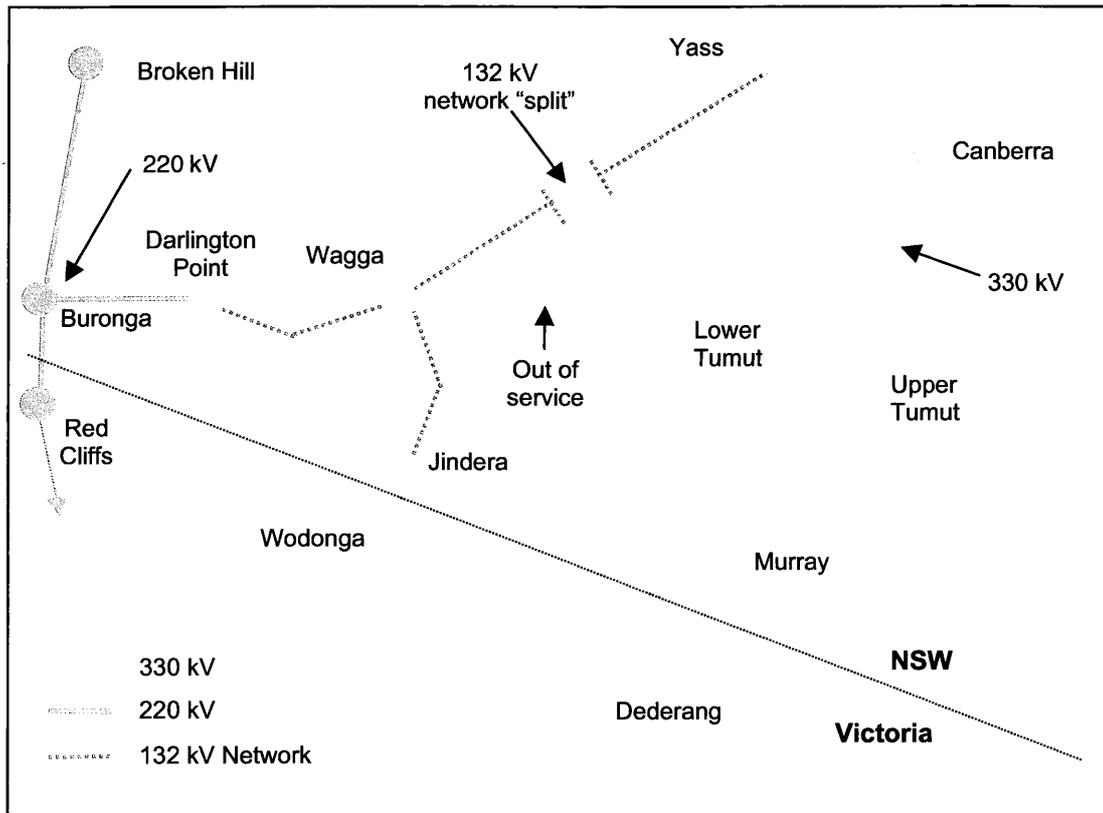


At times when Victoria is importing power and the NSW system load is relatively high there will be a relatively high power flow from Murray towards Dederang and from Lower Tumut to Wagga, Jindera and thence to Victoria. Part of the overall Victorian import is also carried west from Wagga to Buronga and thence Red Cliffs.

If all network elements are in service, the 330 kV network is expected to be capable of adequately supplying the loads in the immediate Wagga - Yass area over the next ten years, with only minor upgrading of existing elements and the installation of voltage support plant being required.

However, under conditions of high area load and high Victorian import the following become critical contingencies:

- i) An outage of the Lower Tumut - Wagga 330 kV line results in a high loading in the Yass 330/132 kV transformers and 132 kV lines from Yass to Wagga. High loadings in the Murray - Dederang lines also occur.
- ii) An outage of one of the two Yass 330/132 kV transformers causes a high loading in the remaining transformer.
- iii) An outage of the Lower Tumut - Wagga 330 kV line leads to reactive power deficiencies (low voltages) in the Wagga area.
- iv) An outage of a Murray - Dederang line results in a high loading in the Lower Tumut - Wagga line and the remaining Murray - Dederang line.



Continuing growth of NSW loads in this region, coupled with a requirement for power transfer from Snowy to Victoria, will exacerbate the potential overloading of lines and transformers. Unless new generating developments can be made available in Victoria it is expected that the frequency of high power flows through the Wagga area will rise.

At times when NSW is a heavy importer of power from the south the line ratings within the Snowy system and immediately north of Snowy may impose a limitation. The development of any generation in the south west of NSW (such as gas turbines in the Wagga area) will impose greater competition for the limited power transfer capability to the north. Such generation does not provide an effective increase to the net NSW generation at times where the transmission system is limiting.

Network Maintenance Issues

The network must be maintained whilst ensuring ongoing supply to consumers. Maintenance outages are normally only taken at times of off peak load. Nevertheless in the Wagga area the opportunities to take lines out of service for maintenance are becoming increasingly limited.

A maintenance outage of any of the 330 kV lines from Dederang to Wodonga, Wodonga to Jindera, Jindera to Wagga or Wagga to Lower Tumut normally requires special measures. Should a remaining critical 330 kV line be forced out of service during maintenance outages it would not be possible to retain supply to loads in the Wagga to Albury/Wodonga area even at times of moderate to light load.

The existing direct 132 kV line from Yass to Wagga is considered to require substantial expenditure to maintain and rebuild to a serviceable condition.

Interconnection Issues

Victoria presently relies on a capability for import from NSW/Snowy of 1,900 MW at times of peak summer load. NSW demand and future industrial developments in the Wagga area will result in this

capability being progressively reduced. A number of projects to increase the capability to supply power to Victoria and South Australia have been proposed. These projects would increase the capacity by between 400 MW and 1,600 MW.

All of these projects would result in higher power flows through the Wagga area and it has been necessary to include works within each project to reinforce the network in the NSW south west.

Supply Augmentation Options

TransGrid has considered a range of options for addressing the limitations on supply capacity in the Wagga area including:

- Construction of a new line to Wagga;
- Upgrading of the Yass to Wagga 132 kV system;
- Power flow control over lines in the area;
- Limiting Victorian import capability;
- Demand management; and
- Development of local generation.

The new line to Wagga could originate at Yass or Lower Tumut. The route from Yass is longer than the route from Lower Tumut but there are expected to be loss and capability advantages with a line from Yass.

Possible Yass – Wagga 330 kV Line Development

The development of a Yass - Wagga 330 kV line would firm up supply to the south west area and support increased power transfer capacity to the Victorian and South Australian regions.

For many years the direct 132 kV line No.990 from Yass to Wagga has been seen as a candidate for reconstruction to 330 kV. Careful consideration needs to be given to the type of line developed to fully utilise the capacity of this valuable route to minimise the need for further line developments over this sector.

Planning for a new Yass – Wagga 330 kV line must also take into account possible options for augmenting the interconnection with Victoria involving power flow control equipment and new transmission line development.

A number of possible projects have been considered. Some of these schemes involve alternating current and HVDC links from southwest NSW to Victoria.

New interconnecting line options would aim to provide a high power capability connection from south west NSW to near Melbourne. Virtually all of the options involve the development of a transmission line that passes through the Wagga area. In most of the options it may be possible to integrate the development of the interconnecting line with the reinforcement of the supply to the Wagga area.

There is a range of possible line developments that may meet the short and longer term needs of an interconnection augmentation and a Yass - Wagga connection, including:

- A single circuit 330 kV line;
- A double circuit 330 kV line;
- A double circuit 500 kV line initially operating at 330 kV;
- A hybrid dc/ac line consisting of a bipole HVDC line and a single circuit 330 kV line sharing common towers.

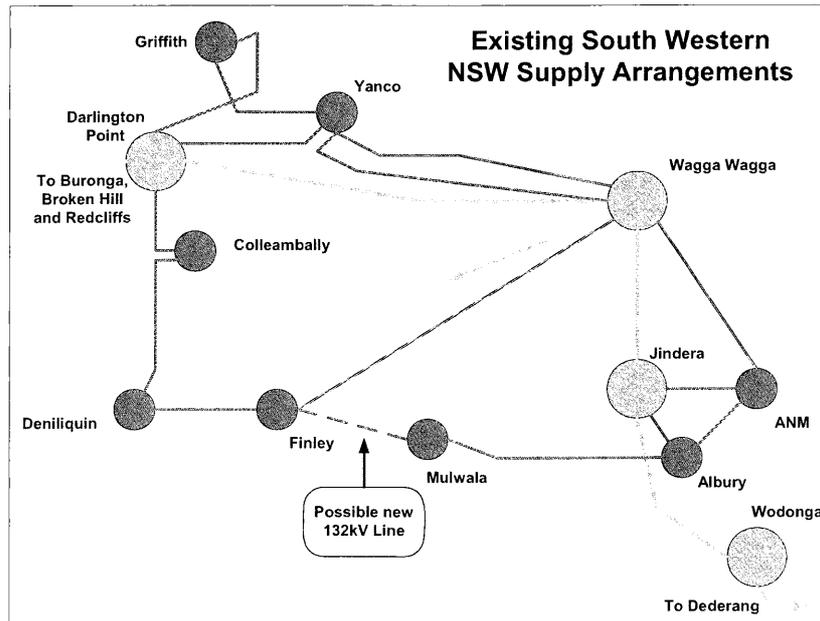
It should be noted that a Yass – Wagga 330 kV line development provides an alternative path to the Snowy 330 kV lines and the 330 kV lines from Snowy to Yass and Canberra. Hence it provides an increased NSW import capability from the south.

Project Status

TransGrid is undertaking planning analysis to identify the optimal network development and has carried out preliminary environmental studies associated with a Yass – Wagga line. At this stage a

double circuit or hybrid ac / dc line is the preferred development but a single circuit line may be developed depending on environmental requirements. Other options will be addressed in turn. It is not expected that a Yass – Wagga development would take place in this decade.

7.3.12. South Western NSW and Possible Further Interconnection to Victoria



The South Western transmission system, west of Wagga and Albury is depicted in the diagram above. It supplies:

- A 132 kV system supplying Yanco and Griffith;
- A 132 kV system supplying Colleambally, Deniliquin and Finley;
- A 132 kV system supplying Mulwala;
- A 220 kV system supplying Balranald, Broken Hill and Redcliffs; and
- Interconnections to Victoria via Redcliffs (220 kV) and Wodonga (330 kV).

The limitations of the 132 kV network supplying Deniliquin and Finley are described in Section 6.5.11. In addition, the loading on the 330 kV and 132 kV network supplying Darlington Point (from which one of the supplies to Deniliquin and Finley originates) is approaching the capacity of that network.

Darlington Point 330/220/132 kV substation is the primary supply point for the 132 kV system in the south west of the State and for the 220 kV system supplying both Broken Hill and interconnecting to the Victorian and South Australian systems at Red Cliffs.

An outage of the Wagga to Darlington Point 330 kV line may, under the current arrangements, require the splitting of the 220 kV system at Darlington Point to prevent voltage stability problems on the South Western 132 kV system.

A number of factors may further exacerbate the adverse impacts of an outage of the Wagga to Darlington Point 330 kV line including:

- Increasing loads on the 132 kV system supplied from Darlington Point;
- Increasing power flows between New South Wales and Victoria on existing lines;
- The operation of Murraylink connection between Victoria (Red Cliffs) and South Australia (Berri) drawing load through the Darlington Point substation; and
- Possible further interconnection to Victoria from Darlington Point.

It is planned to install an additional capacitor at Deniliquin (refer to Section 5.2.8). In the longer term there is a need to further reinforce supply to the area.

Options available to address these limitations include:

- Establishment of a Mulwala - Finley 132 kV line (refer to Section 6.5.11). This may be required within the next several years to provide adequate supply reliability to Country Energy's Mulwala substation. It would also increase supply capacity to the Finley/Deniliquin area. However, it would only marginally increase capacity to the Darlington Point area.
- Construction of Darlington Point - Deniliquin/Finley 132 kV line. This would improve supply capacity to the Finley/Deniliquin area, but would have negligible impact on the capacity to the Darlington Point area;
- Construction of a Jindera - Finley 132 kV line. This would improve supply capacity to the Finley/Deniliquin area, but would have negligible impact on the capacity to the Darlington Point area;
- Construction of a Wagga - Finley 330 kV line and Finley 330/132 kV Substation, either as a stand-alone project or as part of an additional interconnection with Victoria;
- Construction of a 330 kV line from Victoria to the Finley/Deniliquin area either as a stand-alone project or as part of an additional interconnection;
- Construction of a 330 kV line from Darlington Point to the Finley/Deniliquin area as a stand-alone project or as part of an additional interconnection. This would improve supply capacity to the Finley/Deniliquin area, but would have limited impact on the capacity to the Darlington Point area;
- Establishment of a second 330 kV line to Darlington Point from Wagga. This may involve rebuilding one of the Wagga - Yanco 132 kV lines and the Yanco - Darlington Point 132 kV line. This would increase supply capacity to Darlington Point, but would have limited impact on capacity to the Finley/Deniliquin area;
- DM and/or development of local generation; and

Load growth in the Murray River areas of Moama and Echuca may also eventually require augmentation to supply. There is potential to integrate any network developments in the Murray River area with a new interconnector between the south west NSW system and northern Victoria.

7.3.13. Interconnection Development with Victoria/South Australia

A deteriorating supply/demand balance situation in Victoria/South Australia and/or NSW, or further generation development, may justify enhanced interconnection with NSW.

Interconnection augmentation options between New South Wales and Victoria continue to be under consideration. Small increments in capacity can be achieved by installation of control equipment and reinforcement of critical sections of the interconnected network.

The capability of the existing interconnection between NSW and Victoria is limited by line thermal ratings and consideration of voltage control.

Options to augment the interconnection capability could involve combinations of:

- Conversion of the Darlington Point - Balranald - Buronga 220 kV line to operation at its design voltage of 275 kV;
- Series compensation of existing lines;
- Installation of additional shunt capacitors;
- Provision of additional transformer capacity at strategic locations;
- Upgrading existing lines; and
- Construction of additional lines.

A number of options for upgrading the interconnection have been considered and jointly analysed with VENCORP.

NEWVIC Stage 1

The existing interconnection capability will degrade over time due to the effect of load growth in the NSW south west area on voltage control in the Wagga to Dederang area. This may be partially remedied through installation of shunt capacitor banks across a number of sites including Jindera, Wodonga and Dederang. The installations however do not provide a high benefit to cost ratio and at this stage the project is unlikely to pass the regulatory test.

NEWVIC Stage 2

Installation of line series capacitors, upgrading of 330 kV lines and installation of a fourth Dederang 330/220 kV transformer would enable an increase in the interconnection capability by about 180 MW.

The benefit to cost ratio for this option is again not sufficiently high to ensure that the regulatory test would be satisfied. At this stage the project will not proceed but will be kept under review.

Interconnection Upgrades Involving New Line Development

Further upgrades of the interconnection capability are possible but would be expected to require the development of new transmission lines to overcome the power transfer limitations in the southern NSW network. One critical link is the transmission path between Yass and Wagga.

The NEWVIC 2500 proposal included thermal upgrading of existing lines, re-configuration of line connections, installation of line series compensation, transformer augmentation and reactive power support. A new Yass - Wagga 330 kV line is a basic component of the proposal. This option would raise the interconnection capability from the present nominal 1900 MW to about 2500 MW.

Development of a new interconnecting line from the Wagga area towards Melbourne could further increase the interconnection capability. Such an interconnector could be developed in association with support to the growing Murray River area loads (refer to Section 7.3.12) and could connect to intermediate 220 kV substations in the Victorian network. Two notional schemes, NEWVIC 3500 and one involving HVDC transmission would provide a capability of about 3500 MW between NSW and Victoria.

7.3.14. Possible Yass – Wagga 330 kV Line Development

The 330 kV and 220 kV system and underlying 132 kV system in the south of the State is expected to be capable of adequately supplying the loads in the immediate Wagga - Yass area over the next ten years, with only minor upgrading of existing elements and the installation of voltage support plant being required.

However, under conditions of high area load and high Victorian import, outages of any one of a number of 330 kV lines and 330/132 kV transformers in the area will lead to high loadings in critical system elements and/or low voltages in the Wagga area. The affected system elements are:

- Yass 330/132 kV transformers;
- Yass - Wagga 132kV lines;
- Murray - Dederang 330 kV lines; and
- Lower Tumut - Wagga 330 kV line.

These network limitations are presently addressed using control schemes to manage post contingent system conditions and/or by limiting maximum power import from Snowy to VIC/SA.

Options for augmenting the network to address these limitations include:

- Construction of a new line to from Yass - Wagga;
- Upgrading of the Yass - Wagga 132 kV system;
- Power flow control over lines in the area;
- DM and/or development of local generation.