Contingent Projects

TransGrid

Contingent Project

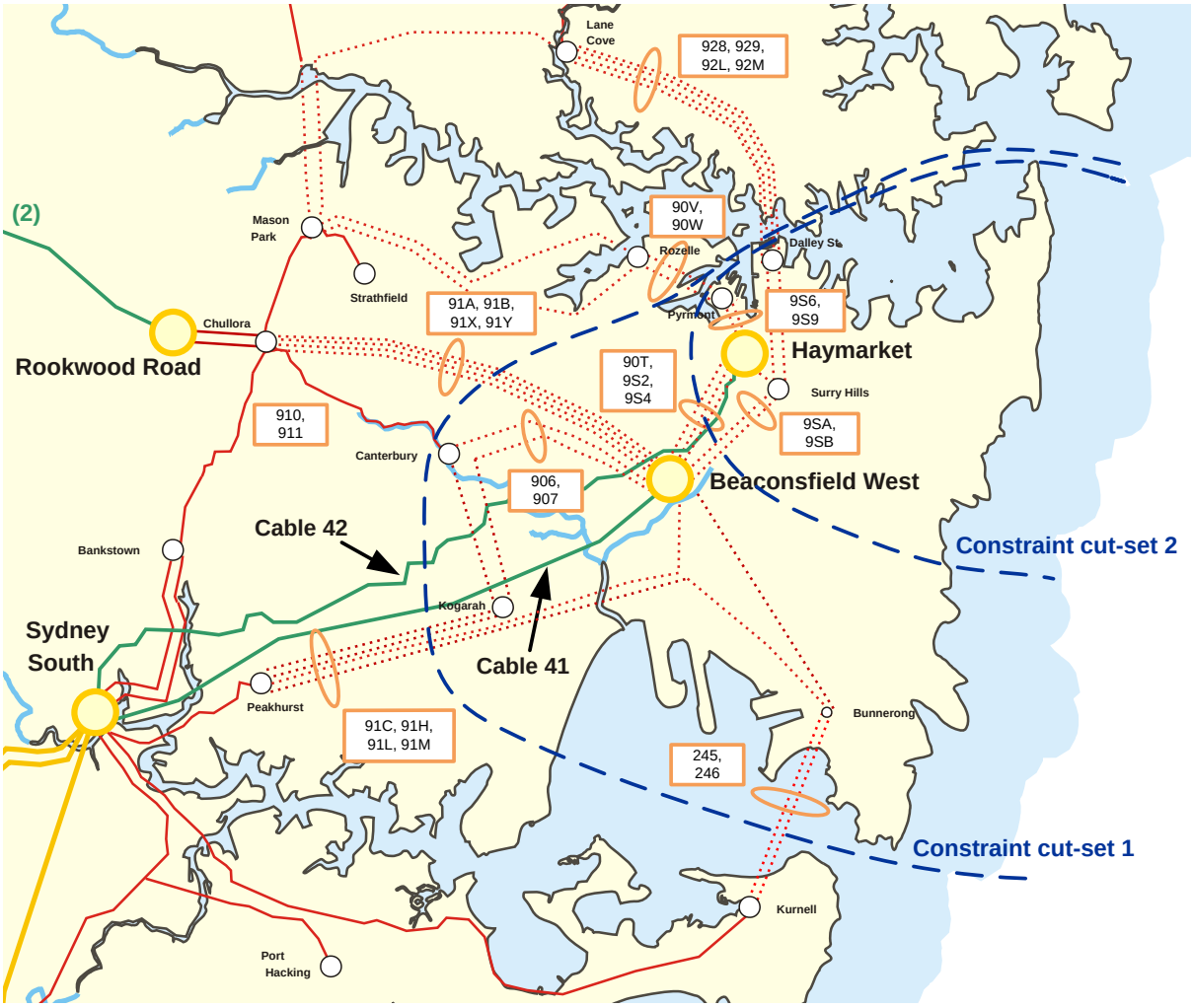
Powering Sydney's Future

Contents

1.1 Background

The capability of the inner metropolitan supply network in Sydney is defined by the combined capacity of the parallel 330 kV and 132 kV networks. These networks have been planned to operate in unison and designed to share the network load in proportion to their respective ratings. The existing transmission network of the Sydney inner metropolitan area is shown in Figure 1 below.

Figure 1
Sydney Inner Metropolitan Area Transmission Network



Due to a number of contributing factors, there is a forecast shortfall in the capability of the network to supply the inner metropolitan area under some contingencies. These factors include:

- Retirement of Ausgrid 132 kV cables;
- Reduced rating of TransGrid's 330 kV Cable 41;
- Reduced rating of Ausgrid 132 kV cables;
- The uptake of demand management and energy efficiency in the area; and
- Forecast load growth in the area.

Constraints are forecast to occur on two distinct cable cut-sets. The first is the general supply from the outer ring of bulk supply points (BSPs) into the inner metropolitan area and consists of a

constraint of the parallel 330 kV and 132 kV supply networks (constraint cut-set 1 shown in the above figure). The second (constraint cut-set 2) is the local supply between Beaconsfield and Haymarket areas and consists of a constraint of the local 132 kV network during an outage of the 330 kV Cable 42 supply to Haymarket.

The objective of this contingent network augmentation is to economically resolve this constraint.

The constraints are likely to occur in the 2018/19 summer under the prescribed modified 'n-2' reliability criteria, even if no net load growth is to take place within the Sydney metropolitan region. Constraints are expected under an 'n-1' contingency in the same year, if there is over approximately 75 MW of load increase in the region over the next 4 years. This is based on the assumed scenario of cable retirements indicated in Figure 2, which will be subject to regular review, guided by the assessment of risk posed by a number of 132kV cables that are approaching the end of their serviceable lives.

Figure 2
Future Load Versus Capacity for Sydney Inner Metropolitan Area

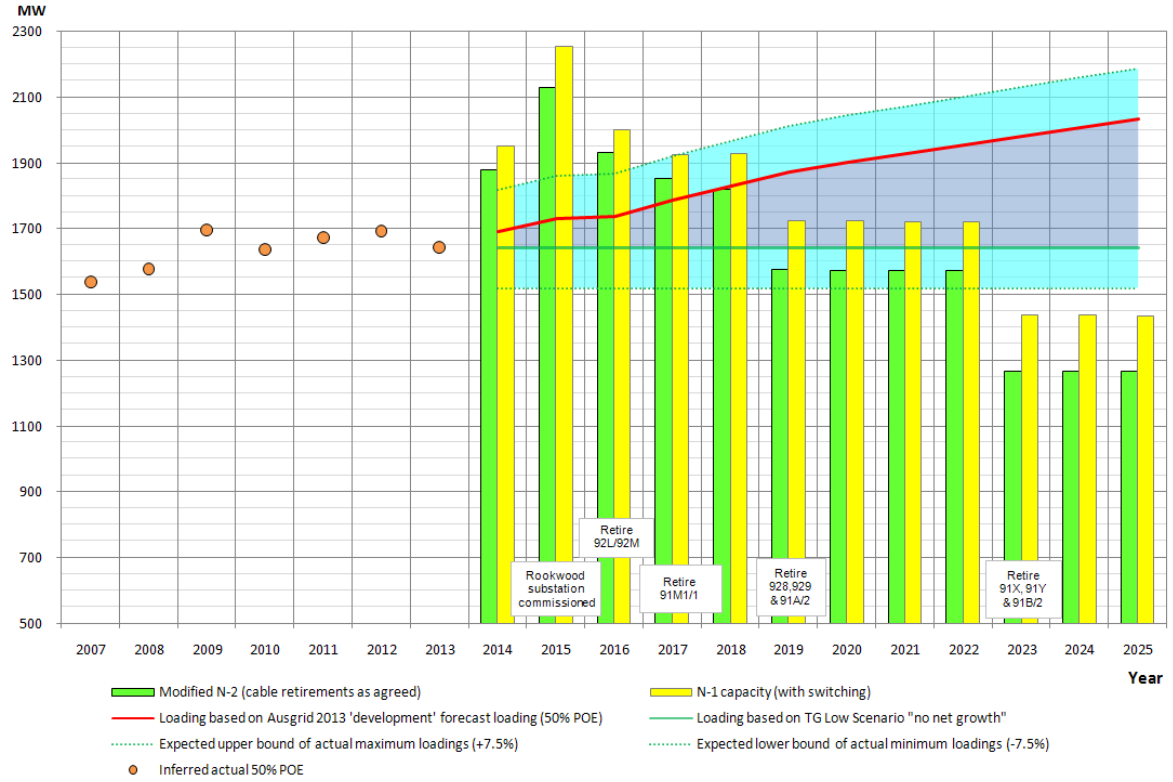


Figure Two – Future Load versus Capacity for Inner Sydney

The current 'n-2' reliability criteria in the inner metropolitan Sydney area reflects the high value that customers in that area place on reliable electricity supply. The area is supplied predominantly from electricity cables owned by Ausgrid (all together around sixteen 132 kV cables and two 330 kV cables comprise the critical cut-set). Out of these, approximately thirteen 132 kV cables are old and assessed to be in poor condition, requiring retirement during the period 2013 to 2024. A cable failure will require a significantly lengthy time for repair ranging from several weeks to several months depending on geographical location and physical access to the cable. Hence the load at risk is expected to increase significantly from 2019.

1.2 Project Description

Given the uncertainties around future demand in the Sydney area, and in particular the impact of demand management and energy efficiency program impacts in this area, it is difficult to predict the most opportune time to commit for transmission capacity augmentation. However, it is currently anticipated that this will be required in the period from 2019 to 2024.

TransGrid considers that the project should be accepted as a contingent project for the 2014-2019 regulatory period because of the uncertainty about the trigger event occurring and the scope and cost of the project.

1.3 Trigger Event

The proposed trigger for this contingent project is:

1. Demand forecasts that draw on external sources (e.g. Ausgrid and/or AEMO connection point forecasts), including the economic application of demand reduction initiatives resulting in the loading of the defined constraint cut-set exceeding its contingent MVA rating (based on the applicable reliability criteria at the time) within the next four years, taking into consideration the necessary actions to manage the risk associated with existing aged cables; and
2. Successful completion of the RIT-T including a comprehensive assessment of credible options showing that an investment is justified; and
3. TransGrid Board commitment to proceed with the project subject to the AER amending TransGrid's revenue determination pursuant to the NER.

The triggers are specific and capable of objective verification, relate to a specific location or locations, and are probable but too uncertain to include the proposed contingent project in the ex-ante capital expenditure forecast.

1.4 Project Requirement

TransGrid and Ausgrid are currently undertaking a short term risk management strategy to allow management of capacity shortfall in the short term only, comprising:

- demand-side initiatives;
- deferral of Ausgrid's retirement of existing cables; and
- management of Cable 41 loading and rating (via back fill remediation and series reactor switching arrangements at Sydney South).

This strategy defers the need to undertake network augmentation. However, this strategy is insufficient to address the long term need and comes with an increased risk to circuit outages and environmental impact.

A number of additional strategies to address the identified needs have been jointly developed between TransGrid and Ausgrid. These include a range of 330 kV and 132 kV network developments to replace lost network capacity due to retirements and cable de-ratings, as well as consideration of non-network options, including demand management and embedded generation initiatives.

The strategies may be generally described as:

- a full 330 kV solution (Strategy 'A');
- a mix of 330 kV and 132 kV solutions (Strategies 'B' & 'C'); and
- a full 132kV solution (Strategy 'D').

Each strategy consists of a program of works that would be implemented over a number of years. The timing of particular projects is different under each strategy as required to meet the prescribed reliability criteria. In addition, under all strategies, TransGrid is undertaking demand management to defer the timing of network augmentation.

These strategies are summarised in the table below. A number of developments within each strategy extend wholly beyond the upcoming regulatory period (indicated in italicised text), but are included to determine the most economic long term strategy. Also, the timing and inclusion of various projects within each strategy varies with different load forecast scenarios.

Both the timing and scope of this project, and therefore the transmission requirements, are uncertain at this point in time.

If the trigger event occurs, the proposed contingent project would be reasonably required to meet the NER capital expenditure objectives to efficiently meet expected demand for prescribed transmission services and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

In addition, strategies A, B, C and D would each be coupled with demand management and/or network support, i.e. strategies E and F below.

Option	Option Description	Type of Option	Outcome
A	Development strategy A: • 1st Rookwood to Beaconsfield 330 kV cable; • Convert 9S4 (Beaconsfield to Haymarket) to 330 kV operation; • *2nd Rookwood to Beaconsfield 330 kV cable;* • *Establish Riley St 330 kV BSP;* • *Replace 9S6/1 & 9S9/1 132 kV cables;* • *Replace 91A/1 & 91B/1 132 kV cables;* • *Install PST on 42 cable.* Coupled with demand management and network support strategies, ie, strategies E & F below.	Network	Technically feasible. Long project lead times require short term risk management strategy to be implemented.
B	Development strategy B: • 1st Rookwood to Beaconsfield 330 kV cable; • Convert 9S4 (Beaconsfield to Haymarket) to 330 kV operation; • *2nd Rookwood to Beaconsfield 330 kV cable;* • *Replace 132 kV cables 9SA & 92P (ex 9SB/1);* • *Replace 132 kV cables 9S6/1 & 9S9/1* • *Replace 132 kV cables 91A/1 & 91B/1;* • *Replace 132 kV cable 9S2;* • *Install PST on 42 cable.* Coupled with demand management and network support strategies, ie, strategies E & F below.	Network	Technically feasible. Long project lead times require short term risk management strategy to be implemented.
C	Development strategy C: • 1st Rookwood to Beaconsfield 330 kV cable; • Convert 9S4 (Beaconsfield to Haymarket) to 330 kV operation; • *New 132 kV cables Lane Cove to CBD;* • *Replace 132 kV cables 9SA & 92P (ex 9SB/1);* • *Replace 132 kV cables 9S6/1 & 9S9/1* • *Replace 132 kV cables 91A/1 & 91B/1;* • *Replace 132 kV cable 9S2;* • *2nd Rookwood to Beaconsfield 330 kV cable.* Coupled with demand management and network support strategies, ie, strategies E & F below.	Network	Technically feasible. Long project lead times require short term risk management strategy to be implemented.
D	Development strategy D: • New 132 kV cables Lane Cove to CBD; • New 132 kV cables Chullora to Beaconsfield; • *New 132 kV cables Lane Cove to Pyrmont*; • *New 132 kV feeder Rookwood to Chullora;* • *Replace 132 kV cables 9SA & 92P (ex 9SB/1);* • *Replace 132 kV cables 91A/1 & 91B/1 by looping;* • *1st Rookwood to Beaconsfield 330 kV cable.* Coupled with demand management and network support strategies, ie, strategies E & F below.	Network	Technically feasible. Long project lead times require short term risk management strategy to be implemented.
E	Demand management	Non-network	Required quantity and availability is currently uncertain.
F	Network support	Non-network	Required quantity and availability is currently uncertain.

1.5 Contingent Capital Expenditure

The development strategies 'A' and 'B' are considered the preferred strategies for medium to high load growth scenarios. Both meet the identified need, are technically feasible, and have the lowest cost of the four strategies (in present value terms). They also deliver a number of key benefits over the other strategies, including minimised community impact, management of 132 kV fault levels, and consistency with the longer term strategic supply development plan for the area, as described within TransGrid's outline plan, OLP 12.

For low load growth scenarios, development strategies 'B' and 'C' converge to become the same strategy, as the 2nd Rookwood to Beaconsfield 330 kV cable is not required until some time later, and provide the lowest net present cost.

The initial developments under strategies 'A', 'B' and 'C' are the same, with an estimated cost of $430 million. The differences between the strategies would not be implemented within the upcoming regulatory period, and it is therefore not necessary to discriminate between these options at this point in time. The total estimated cost for this contingent project is therefore $430 million.

It is proposed that the common initial developments of strategies 'A', 'B' & 'C' (establishment of 330kV GIS at Beaconsfield, first Rookwood to Beaconsfield 330 kV cable, and conversion of 9S4 Beaconsfield to Haymarket 132 kV cable to 330 kV operation), including any required property acquisitions, be progressed to project scoping stage.

TransGrid notes that, by definition, it is generally not possible to accurately define the scope of a proposed contingent project at this early stage. Therefore, the estimated cost of the project is indicative only. In accordance with clause 6A.8.2(b)(3), a detailed project scope and cost estimate will be required before any amendment to the revenue determination is considered by the AER should the specified trigger event occur during the regulatory period.

Consistent with clause 6A.8.1(b)(iii) of the NER, the estimated contingent capital expenditure exceeds the applicable contingent project threshold of the larger of either $30 million or $46.6 million.[1]

[1] This represents 5% of the value of the maximum allowed revenue for the first year of the regulatory control period.

1.6 Demonstration of Rules Compliance

TransGrid considers that this project should be accepted as a contingent project for the forthcoming regulatory control period as it complies with the provisions set down in clause 6A.8.1(b) of the NER as:

(a) it is reasonably required to achieve the capital expenditure objectives as set out in 1.4 above;

(b) it is not otherwise provided for in the total forecast capital expenditure;

(c) it reasonably reflects the capital expenditure criteria, noting that the costs are an estimate at this point;

(d) it exceeds the contingent project threshold as set out in 1.5 above;

(e) it complies with the requirements of the Submission Guidelines; and

(f) it has an appropriately defined trigger event as set out in 1.3 above.

TransGrid

Contingent Project

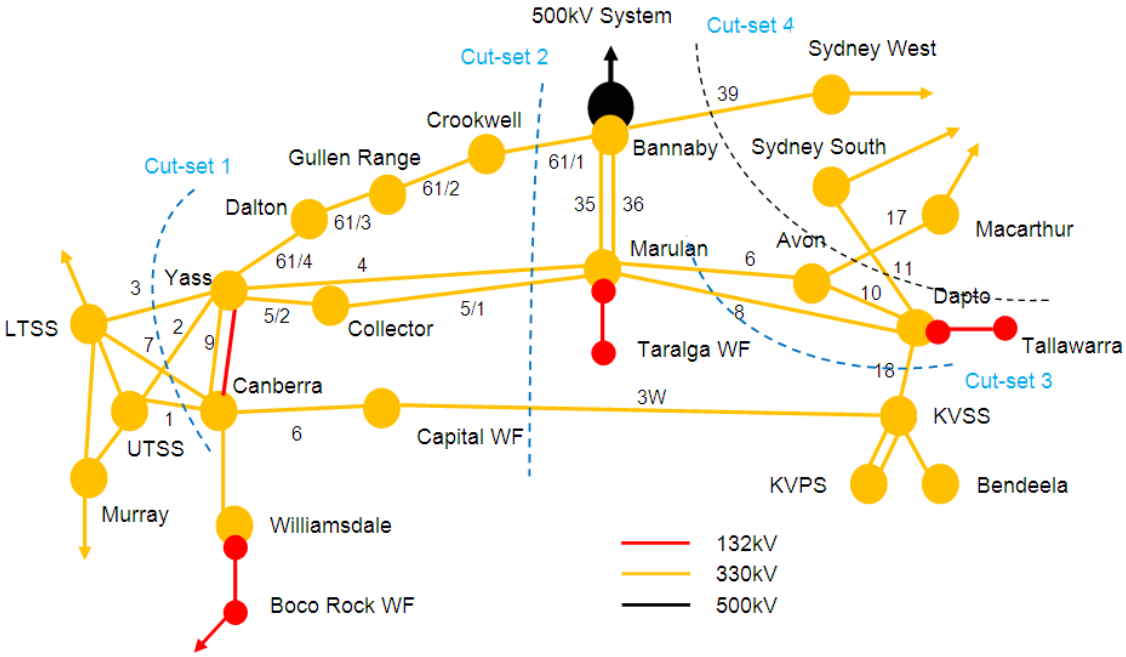
Southern NSW Network Upgrade

Contents

1.1 Background

The existing transmission network between the Snowy area and Sydney is shown in Figure 1 below. The dotted lines represent the four groups of transmission lines (known as 'cut-sets') discussed below. The capacity of a cut-set defines the allowable flow through a regional part of the network served by multiple transmission lines.

Figure 1
Existing system and likely generation developments in southern New South Wales[1]



The power transfer over the system north of Snowy reaches the limit of the capability at times of high import from the Snowy area, coupled with high Uranquinty and Snowy generation[2].

In recent years the Snowy generators have been upgraded making additional generation available for export to NSW. Also the potential upgrade of interconnection between Victoria and NSW will enable the increased transfer level from low cost South Australia and Victoria renewable generation.

There are also several renewable generation and gas turbine generation developments in southern NSW that may lead to additional power flows into the southern network.

The Snowy generation and wind farms in southern NSW, Victoria and South Australia are renewable generation sources and have a lower operating cost than the gas-fired and coal-fired generation in NSW and Queensland. Therefore, there is opportunity to increase benefits to the market participants by reinforcing the transfer capability between Snowy and Yass/Canberra area.

[1] With the connection of new generators, the segmented line sections are shown as ../1, ../2, etc.
[2] Upper Tumut and Lower Tumut Power Stations.

Three specific potential market benefits are:

- reduced energy costs by the dispatch of lower cost generating plant to meet the energy needs of the NEM;
- increased sharing of generation sources across the regions, thereby reducing the overall need for new generation; and
- increased benefits to the NEM participants due to increased competition of generators.

The level of generation south of cut-set 1 is presently determined mainly by the generation from Snowy and imports from Victoria. The Snowy generation is dependent on the annual rainfall and storage capacity available. Past experience shows that Snowy generation could be significantly higher than at present under favourable conditions and could lead to constraints in the lines between Snowy and Canberra/Yass. Planned and proposed transmission augmentations, such as Heywood transformer upgrade, and wind generation developments in South Australia, Victoria and Tasmania are likely to increase the power export from Victoria to NSW and trigger an augmentation of the transmission capacity.

Planning studies indicate that the transmission lines forming cut-set 2 and cut-set 4 will be constrained if:

- the proposed wind and gas-fired generation in southern NSW are to be operating above a certain level; and
- the transmission capacity between Snowy and Canberra (cut-set 1) is upgraded and operating near the limit.

Therefore, there may be an opportunity to increase the net market benefit to those in the NEM by allowing the proposed generation to generate at their installed capacities. Otherwise, the new generation in southern NSW will be constrained under various operating conditions. These constraints are likely to arise from 2015 onwards.

Adequacy studies found that the transmission lines forming cut-set 3 have adequate capacity to accommodate the proposed generation expansion.

1.2 Project Description

Preliminary market modelling suggests that market benefits are dependent on the level of generation in southern NSW and south of the Snowy to Yass/Canberra constraint. Benefits could significantly exceed the augmentation costs, depending on the level of generation developed.

Given the uncertainties presently around generation developments, decommissioning, mothballing and re-powering, it is difficult to predict the most opportune time to commit to transmission capacity augmentation. However, it is probable that significant market benefits may be accrued from 2015 onwards.

TransGrid considers that the project should be accepted as a contingent project for the 2014/15 to 2018/19 regulatory control period because of the uncertainty about the trigger event occurring and the scope and cost of the project.

1.3 Trigger Event

The proposed trigger for this contingent project is:

1. AEMO classification of generation developments as being at the 'committed' stage of development on their 'Generator Information' webpage:
   (i) exceeding 350 MW;[3]
   (ii) in southern NSW around Yass/Canberra/Marulan area, or any additional connection points established in this vicinity; and
2. successful completion of the RIT-T, including a comprehensive assessment of credible options showing a transmission investment is justified; and
3. TransGrid Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the NER.

The triggers are specific and capable of objective verification, relate to a specific location or locations, and are probable but too uncertain to include the proposed contingent project in the ex-ante capital expenditure forecast.

1.4 Project Requirement

The project is contingent on the generation developments in the regions south of Sydney. In order to assess the adequacy of the augmentation options, the generation development is assumed to take place in three stages as outlined below:

- Stage 1: Upgrade of the 330kV transmission lines between Snowy and Yass/Canberra, Yass and Marulan, and installation of phase shifting transformers to control power flows at Bannaby and Marulan.
- Stage 2: Construction of a new 330kV single circuit transmission line between Yass and Bannaby.
- Stage 3: Reinforcement of southern supply to the Newcastle – Sydney – Wollongong area by increasing the capacity of the Bannaby to Sydney West transmission line through minor works.

A range of transmission capacity augmentation options was identified and considered to meet or partly meet the identified needs at different stages, including upgrade of existing transmission lines, construction of new transmission lines and installation of equipment to control power flows on transmission lines.

Both the timing and scope of this project, and therefore the transmission requirements, are uncertain at this point in time.

If the trigger event occurs, the proposed contingent project would be reasonably required to meet the NER capital expenditure objectives to efficiently meet expected demand for prescribed transmission services and to comply with all applicable regulatory obligations associated with the provision of prescribed transmission services.

[3] Increase in generation from Snowy up to the existing Snowy – Canberra transmission capacity (2690 MW) and approximately 50% of generation from the existing, committed and planned wind generation (which is likely to reach 925 MW during 2014 – 2018) will exceed the present transmission capacity across cut-set 4 (3120 MW).

1.5 Contingent Capital Expenditure

The identified options have been evaluated based on their costs and the adequacy for meeting the needs. The following options are recommended for accommodating the staged generation expansion.

For accommodating the generation presently under construction (stage 1):

- line 01 Upper Tumut to Canberra to be upgraded to 100°C ($5.4 million); and
- line 39 Bannaby to Sydney West to be upgraded to 100°C ($7 million).

For accommodating the under construction and advanced generation (stage 2):

- upgrade of lines 4 and 5 Yass to Marulan to 100°C ($28.5 million);
- acquisition of easement for new Yass – Bannaby line ($22 million);
- installation of phase shifting transformers at Bannaby on line 39 ($42 million); and
- installation of phase shifting transformers at Bannaby on line 61 and Marulan on line 5 ($72 million).

The additional work required to accommodate the proposed generation as outlined above:

- construction of a new 330 kV single circuit line between Yass and Bannaby ($128 million);
- replacing low rating equipment and HV connections and drops at Sydney South and Dapto for reinforcing Line 11 transfer capability ($2 million); and
- replacing low rating equipment and HV connections and drops at Avon and Macarthur for reinforcing Line 17 transfer capability ($2 million).

The total estimated cost for this contingent project is $308.9 million ($2013).

TransGrid notes that, by definition, it is generally not possible to accurately define the scope of a proposed contingent project at this early stage. Therefore, the estimated cost of the project is indicative only. In accordance with clause 6A.8.2(b)(3), a detailed project scope and cost estimate will be required before any amendment to the revenue determination is considered by the AER should the specified trigger event occur during the regulatory period.

Consistent with clause 6A.8.1(b)(iii) of the NER, the estimated contingent capital expenditure exceeds the applicable contingent project threshold of the larger of either $30 million or $46.6 million.[4]

These proposed projects are subject to a positive net economic benefit, confirmed through a RIT-T.

[4] This represents 5% of the value of the proposed maximum allowed revenue for the first year of the regulatory control period.

1.6 Demonstration of Rules Compliance

TransGrid considers that this project should be accepted as a contingent project for the upcoming regulatory control period as it complies with the provisions set down in clause 6A.8.1(b) of the NER as:

(a) it is reasonably required to achieve the capital expenditure objectives as set out in 1.4 above;

(b) it is not otherwise provided for in the total forecast capital expenditure;

(c) it reasonably reflects the capital expenditure criteria, noting that the costs are an estimate at this point;

(d) it exceeds the contingent project threshold as set out in 1.5 above;

(e) it complies with the requirements of the Submission Guidelines; and

(f) it has an appropriately defined trigger event as set out in 1.3 above.