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Report to the Australian Energy Regulator

Contingent Project Application by EnergyAustralia

Replacement of 908/909 Cables

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Disclaimer

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1. Summary

EnergyAustralia (EA) has submitted an Application to the Australian Energy Regulator (AER) for a determination in relation to the implementation of a Contingent Project. The AER, in its previous determination of the revenue allowance for EA[1], stated that the replacement of two aged 132 kV cables, referred to as the 908/909 cables, had been triggered, but that the expenditure allowance of $37M should be reviewed as for a Contingent Project. The effect of the requested determination will be to replace the portion of EA's current allowance that was based on a preliminary cost estimate, by a more accurate ex ante allowance that is based on the efficient real expected expenditure.

The fact that this Contingent Project had been triggered was recognised in clause 11.6.19 of the Rule change that was implemented by the AEMC. These Rule changes also had the effect of requiring that eA's Transmission assets be treated in the same manner as its Distribution assets for the purposes of eA's next revenue determination as a transitional arrangement.

The AER engaged CHC Associates Pty Ltd (CHC) to provide technical advice in relation to EnergyAustralia's Application: in particular it determine whether the expenditure currently proposed by eA for this project is efficient.

EA proposes to retire the 908/ 909 cables and replace their electrical function, which is to provide power transfer capacity between TransGrid's Sydney South bulk supply point (BSP) to EA's Bunnerong subtransmission station. However it does not propose to replace them using like-for-like cable infrastructure, although it included this alternative as an option. Rather it proposes to provide this capacity using cables on a new route via Kurnell, rather than via Canterbury as at present.

Further the project proposes to provide additional power transfer capacity to provide for future growth in the Bunnerong and inner-city load areas. EA recognised that this augmentation component triggered the need to undertake the formal processes associated with the Regulatory Test. This process has been completed[2] and EA has determined that the Kurnell to Bunnerong project, including the augmentation component, satisfies the Regulatory Test.

A large part of the reason why the Kurnell to Bunnerong option is more efficient than other options is that it permits a one-year deferral of another major project that is proposed to be implemented by TransGrid and eA. That project provides additional power transfer capacity into the inner west of Sydney from Sydney West to a new BSP located near Chullora/ Potts Hill. This option also simplifies, and reduces the cost of, another project to refurbish the overhead lines that supply Kurnell from Sydney South.

CHC has examined the evidence submitted in its Application and has concluded that:

- The decommissioning of the 908/909 cables is essential, as already recognised by the ACCC;
- The proposal to provide the replacement capacity from Kurnell rather than Canterbury is efficient;
- The proposal to augment the power transfer capacity at the same time is sound and efficient;
- These conclusions of the economic analysis carried out as part of the Regulatory Test are robust for all reasonable perturbations in the assumptions used in the analysis;
- EnergyAustralia has taken reasonable steps to identify the particular implementation of the Kurnell to Bunnerong cables that balances cost and environmental acceptability;

1 Made on 27 April 2005

2 Final Report dated 29 April is on EA's web site, and is also Attachment A in the Application.

- The project costs derived from the tenders called for this specific project are likely to be efficient, but a contingency allowance that is $10.3 M lower than that approved by the EA Board should be considered for the purpose of setting revenue;
- The timing constraints are such that EA is likely to proceed immediately to implementation upon receipt of a favourable determination by the AER; and
- CHC considers that a minor adjustment is required to the proposed opex allowance that would affect the next revenue period.

Consequently CHC recommends that the AER make a determination on the basis of the costs and timing in EA's Application, adjusted as above.

2. Background

EnergyAustralia (EA) has submitted an Application to the Australian Energy Regulator (AER) for a determination in relation to the implementation of a Contingent Project. The AER, in its previous determination of the revenue allowance for EA, stated that the replacement of two aged 132 kV cables, referred to as the 908/909 cables, had been triggered, but that the expenditure allowance should be treated as a Contingent Project. The effect of the requested determination will be to replace the portion of EA's current allowance that was based on a preliminary cost estimate, by a more accurate ex ante allowance that is based on the efficient real expected expenditure.

The fact that this Contingent Project had been triggered was recognised in Rule changes[3] that were implemented by the AEMC. These Rule changes also have the effect of requiring that EA's Transmission assets be treated in the same manner as its Distribution assets for the purposes of EA's next revenue determination as a transitional arrangement.

3. CHC's Brief

The AER engaged CHC Associates Pty Ltd (CHC) to provide technical advice in relation to the Application: in particular in determining whether the expenditure currently proposed by EA for this project is efficient.

4. Outline of the Proposed Technical Solution

EA proposes to replace the electrical function of the aged cables that are to be decommissioned. This function is to provide power transfer capacity from TransGrid's Sydney South bulk supply point (BSP) to EA's Bunnerong subtransmission station. However it does not propose to replace the 908/909 cables using like-for-like cable infrastructure, although it included this as an option. Rather its proposal is to provide this capacity using cables on a new route via Kurnell, rather than via Canterbury as at present. This route has both underground and submarine cable components. It necessarily involves engineering complexities in order to satisfy environmental and security constraints, and is more expensive per kilometre of length than if a route that did not involve these constraints was available. However this is more than compensated by the much shorter route of this option.

Further the project proposes to provide additional power transfer capacity to provide for future growth in the Bunnerong and inner-city load areas. Each of two cable circuits will have roughly double the power transfer capability of the two cables being replaced. EA recognised that this augmentation component triggered the need to undertake the formal processes associated with the Regulatory Test. This process has been completed and EA has determined that the Kurnell to Bunnerong project, including the augmentation component, satisfies the Regulatory Test.

5. Additional context of the economics of the proposal

A large part of the reason why the Kurnell to Bunnerong option is more efficient than other options is that it permits a one-year deferral of another major project that is proposed to be implemented by TransGrid and EA. That project provides additional power transfer capacity into the inner west of Sydney from Sydney West to a new Bulk Supply Point located near Chullora / Potts Hill. This option also simplifies another project that will extend the life of the overhead lines that supply Kurnell from

[3] Specifically Rule 11.1.19

Sydney South. The alternative was to construct a temporary third circuit while the existing line was refurbished. The proposed project will provide this capacity in the reverse direction from Bunnerong.

6. CHC's Considerations

CHC has examined the evidence submitted in EA's Application and other material provided subsequently, and the key considerations for the AER are discussed in this section.

6.1 Decommissioning of 908/ 909 cables

The ACCC previously accepted that these cables need to be decommissioned. EA presented evidence[4] of a number of incidents that required protracted emergency maintenance. These were such that EA responded to conditions that could have resulted in catastrophic failure of a cable if not attended to urgently. Although there have been no such instances listed for the last 16 months the risk of a more serious failure is not diminished. Consequently CHC has concluded that the decommissioning of the 908/909 cables is essential, as already recognised by the ACCC

6.2 Replacement Capacity from Kurnell rather than Canterbury

Kurnell is much closer to Bunnerong than is Canterbury. However the cable route from Kurnell to Bunnerong involves a complex crossing of Botany Bay that includes a crossing of the main shipping channel, a need to avoid damage to sea grasses, and a need to achieve a landing at La Perouse that avoids damage to a historic site and reserve. Thus the cost per kilometre is relatively high, but not so high as to offset the longer route from Canterbury, that would also involve a crossing of the Sydney Airport site.

Furthermore the 132 kV overhead lines that supply Kurnell from Sydney South have a higher spare capacity than those that supply Canterbury from Sydney South. The Canterbury option included a requirement to uprate these lines to provide the additional capacity at considerable cost.[5]

The costs presented show the Kurnell to Bunnerong option to be less expensive. CHC has concluded that the proposal to provide the replacement capacity from Kurnell rather than Canterbury is sound and efficient.

6.3 Augmentation of Power Transfer Capability

The laying of new cables necessitates a review of the power transfer capacity being provided. A large proportion of the cost of laying large cables is the same whatever capacity is chosen. In other words the incremental cost of additional capacity is small.

EA therefore reviewed the medium to long- term power transfer requirements for the Bunnerong and nearby areas, and concluded that it would be economic to double the capacity of the cables. CHC notes that the current firm capacity to Bunnerong is 320 MW, and that the area load is expected to exceed this after 2014/15, i.e. within 5 years of installing these cables. Hence it would not be prudent to install cables with the same rating as those being replaced.

This argument was pursued in the application of the Regulatory Test[6], and CHC has no reason to question this result. CHC therefore concluded that the proposal to augment the power transfer capacity at the same time is sound and efficient.

6.4 Economic Evaluation

EA undertook an economic evaluation as part of the Regulatory Test. CHC considers that this satisfies the AER's requirements for an economic assessment of options as part of the Contingent Project determination. This analysis showed that the selected option, taken in the context of the impact on the timing of other projects, has the least net present value cost under the base case assumptions, as well as under a range of perturbations of those assumptions. CHC concurs that the conclusions are robust for all reasonable perturbations in the assumptions used in the analysis.

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4 Section 3.1 of the Application

5 It was noted that although a notional cost was included the uprating may not have been technically achievable had this turned out to be a more economic solution.

6 Attached to the Application.

6.5 Evaluation of Engineering Options

The selected option for forming a cable connection between Kurnell and Bunnerong is the result of an engineering evaluation of a range of possible methods of achieving the required connection, while optimising the trade-off between cost and acceptability of the works.

The Botany Bay crossing posed particular constraints because of existing and planned works that compete for the available routes. Existing works include pipelines for the conveyance of petroleum products between the refinery at Kurnell and storage facilities on the other side of the Bay. Planned facilities include a pipeline for the conveyance of treated water from the desalination plant that is under construction at Kurnell.

There are also environmental concerns about damage to sea grass communities in shallower parts of the Bay, and there are constraints in achieving suitable landing locations on either side of the Bay.

Finally there are concerns about the danger of physical damage to the cable by shipping activities within the Port of Botany. This is overcome by burying the cables at depth below the current seabed level.

EA made available engineering reports on these matters. Having reviewed these reports CHC considers that EnergyAustralia has taken reasonable steps to identify the particular implementation of the Kurnell to Bunnerong cables that balances cost against environmental and engineering acceptability.

6.6 Estimate of Capital Expenditure

The current revenue allowance for the project is based on an engineering estimate of the costs of the works at the time of EA's revenue Application.

EA has called tenders for the actual proposed works, and claims that the cost estimates now submitted are based on those tenders, but they are adjusted to 2004 dollar levels for consistency with the previous estimates for the purposes of this Application. The cost in nominal dollar terms is stated as $160.3 M (or $142.6 M in 2004 dollar terms) for the cables and necessary works at both ends.

EA advised that its Board has approved this expenditure, and that this approval includes a contingency sum of approximately [redacted], in addition to the sum of the contracted and estimated costs. As this is an unusually large sum for a project that is at this stage of development, the AER sought additional information. EA advised that it had applied a contingency of approximately [redacted] to the portion of costs attributable to the land portion of the costs, and a higher contingency of approximately [redacted] to the portion attributable to the submarine portion, resulting in an average of [redacted] to the total costs. EA advised that these percentages represent its estimate of the residual risks to EA that could not be managed under the cable "design and construct" contract.

EA highlighted that it has no experience in this type of cable installation. However it has chosen a contractor that has considerable experience world-wide. Many of the project parameters are fairly closely determined at this stage, and EA claimed that the contractor has accepted the "site conditions". It would be surprising if the contractor intended to rely upon justifying that a variation had occurred to recover its expected costs, and therefore the tendered amount should represent an upper boundary for the base cost that is not dependent on EA's experience.

EA described the kinds of events that might trigger a claim for a variation of the amount payable under the contract. These include events that exceed the site conditions that are defined under the contract, the consequence of which will cause delays, that will need to be paid for, or extra work.

In a supplementary letter [7]EA pointed out that it would not be useful to attempt to determine an appropriate level of contingency by reference to other projects worldwide, because there is a vast range of individual circumstances. CHC agrees that there is no way of determining the appropriate level of contingency for the submarine portion of the project with any more accuracy. However it considers that some of the risks have been exaggerated.

CHC agrees that the events and conditions that have been identified by EA have the potential to result in extra costs under the contract. It also agrees that it is appropriate for a contingency allowance to be included as part of the capital costs that are subject to the AER's determination. This

[7] Dated 26 June 2008

project is being examined as a stand-alone activity, and is therefore not subject to the diversity of cost outcomes that would apply to a portfolio of capex projects. Hence the suggested lower allowance of [redacted] is reasonable, except as discussed below.

In its supplementary letter EA claimed that it believed that the contingency for the submarine portion might lie in the range of [redacted] of the base cost, and that the budgeted amount of [redacted] represents an average expectation. CHC observes that this would be quite unusual business practice, and therefore considers that the total cost outcome will have only a small probability of exceeding the full level of contingency that has been approved by the EA Board. The mean expectation would be in the general range of about half this amount of contingency. This does not imply that the budget approval was inappropriate.

CHC notes that not all of the expenditure on the submarine portion of the contact is subject to an extraordinary level of high risk. Expenditure that relates to cost items that prepare for, and precede, the laying of the cables are not subject to risk due to undefined site conditions. In particular it is unlikely that a high contingency sum would be payable by EA in respect of:

- Marine survey;
- Submarine Cable Manufacture;
- Submarine fibre optic cable manufacture; or
- Mobilisation (marine).

In its supplementary letter EA stated that the impact on these items would be due to an increase in the required submarine cable length due to a range of factors. CHC considers that the project is currently fairly well defined, and that there are actually few viable route options available. Consequently this factor is unlikely to exceed [redacted].

The cost estimate for these items is about $20.5 M, and reducing the contingency on this sum from [redacted] to the level of [redacted] would result in a cost reduction of about $4.1 M.

If it is postulated that the probability of incurring a level of contingency cost for the remaining submarine cable has a normal distribution with a mean of [redacted] and a standard deviation (SD) of [redacted][8] then a [redacted] contingency allowance would encompass about 84% of the outcomes. Selecting a contingency level of [redacted] for the purpose of revenue allowance would result in a further reduction of approximately $6.2 M in the capital allowance.

A reduction in the contingency allowance for this project by $10.3 M (the sum of the above adjustments) would arguably result in a more appropriate sharing of the project risk between EA and its customers.

Even with this adjustment the cost revealed by the tender process remains much higher than the original estimate adjusted to current values. In addition to the higher contingency allowance the contributing factors are likely to include the complex engineering works that are now more fully scoped, the selection of a larger cable to achieve higher capacity and the cost increases in raw materials used for cable manufacture (mainly copper).

CHC has no reason to believe that the basic project costs are not realistic, but as noted above recommends a contingency allowance that is $10.3 M lower than that submitted by EA for the purpose of setting revenue.

6.7 Overall efficiency

In summary, there are three aspects of the efficiency of the project:

1. The first is whether it is necessary to undertake any works at all. EA has established that the existing 908/909 cables must be decommissioned, and that there will not be sufficient transmission capacity to meet its reliability obligations in the Bunnerong and surrounding areas.

2. The second is whether this option is more efficient than competing options. This was determined by applying the Regulatory Test and is not disputed. EnergyAustralia points out

[8] Such that [redacted] and [redacted] contingencies would be 3 SDs from the mean, and have probabilities of exceedence of about 99.85% and 0.15% respectively.

that this outcome does not rely upon the cost outcome being less than the estimate that included [redacted] average contingency. In addition to lower construction costs than its alternatives, including direct replacement of the 908/909 cables, this option has the ability to defer another high-cost project. Application of the Regulatory Tests means that EA did not have an option to select an alternative project solely on the grounds that it had a lower contingency risk.

3. The third is whether the project will be constructed efficiently. This is a challenge given that there are many constraints, largely beyond EA's control, attributable to environmental, engineering and future seaport and desalination plant developments that compete for space at the entrance to Botany Bay. EA needs to manage the project in such a manner that additional costs do not arise, or at least are minimised. This will include the application of a rigorous approach to claims for project variations on the grounds that the site conditions have been exceeded.

6.8 Timing of the works

The preparatory work for this project has been more complex and time-consuming than originally expected by EA. Consequently the commissioning date is now anticipated to be one year later than the original proposal, meaning that the bulk of the expenditure will occur during the currency of the following revenue period. This later date will be of no consequence unless there is a serious failure of the existing cables.

The result is that, even though the project will ultimately be more expensive, there will be lower incidence of capex in the current period. For this reason EA is proposing a reduction in its allowed revenue in the final year of this reset.

CHC understands that EA has no reason to further delay the project, and that it will move to the construction phase as soon as possible when the regulatory position is clear and final environmental approval has been obtained. Hence the estimated incidence of expenditure detailed in the Application is reasonable.

The timing constraints are such that EA is likely to proceed immediately to implementation upon receipt of a favourable determination by the AER.

6.9 Impact on Opex

EA has used a model to estimate its opex for various classes of assets. Rather than calculating opex as a simple function of the value of the assets in the class, the model also includes an age factor that results in older assets being allocated a rapidly increasing amount of annual opex[9]. EA has stated that its methodology was reviewed favourably by the ACCC's consultants at the last revenue reset. CHC has not conducted its own review, but notes that the model may not have been validated for assets that have exceeded their nominal lives, such as the 908/ 909 cables. Indeed these cables might be the only source of the data from which the model was constructed.

CHC notes that these cables have not been particularly unreliable since 2006, and that it is unlikely that the amounts of opex indicated by the model would have been used in practice in the intervening period. CHC considers that the opex allowance for the extra year for which these cables will need to be maintained (year 2009/10) could be capped at the value in the previous year (2008/09). This would reflect the expectation that EA would be unlikely to undertake a major costly repair within a few months of the commissioning of the new cables. This would affect the next revenue period.

Further CHC notes that an opex allowance for the replacement cables was included for the year in which they are commissioned. CHC considers that any expenditure in this year would be likely to be covered by the manufacturer's warranty.

CHC considers that a minor adjustment would be warranted to the proposed opex allowance that would not affect the determination but would apply to the first year of the next revenue period.

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9 This is illustrated conceptually in Figure 3 of the Application.

7. Recommendations

CHC has concluded that:

- The decommissioning of the 908/909 cables is essential, as already recognised by the ACCC;
- The proposal to provide the replacement capacity from Kurnell rather than Canterbury is efficient;
- The proposal to augment the power transfer capacity at the same time is sound and efficient;
- These conclusions of the economic analysis carried out as part of the regulatory test are robust for all reasonable perturbations in the assumptions used in the analysis;
- EnergyAustralia has taken reasonable steps to identify the particular implementation of the Kurnell to Bunnerong cables that balances cost and environmental acceptability;
- The project costs derived from the tenders called for this specific project are likely to be efficient, but a contingency allowance that is $10.3 M lower than that approved by the EA Board should be considered for the purpose of setting revenue;
- The timing constraints are such that EA is likely to proceed immediately to implementation upon receipt of a favourable determination by the AER; and
- CHC considers that a minor adjustment is required to the proposed opex allowance that would affect the next revenue period.

Consequently CHC recommends that the AER make a determination on the basis of the costs and timing in EA's Application, adjusted as above.