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8 January 2010

Dear Sir / Madam

**Submission: Application for Authorisation A91198-A91199**

Seed Advisory Pty Ltd (Seed) and Taylor Fry Pty Ltd (Taylor Fry) welcome the opportunity to provide a submission in response to the Australian Consumer and Competition Commission's (ACCC) request for submissions on the New South Wales Treasurer's application in support of application for authorisation A91198 – A91199.

This submission has been prepared by Seed and Taylor Fry on our own behalf, no client has commissioned this work.

If you would like to discuss any items raised in our submission please feel free to contact us on the details below:

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Yours sincerely

A handwritten signature in black ink that reads 'Peter Eben'.

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Encl: Seed Advisory / Taylor Fry submission

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The Australian Competition and Consumer Commission

# Proposed Co-Insurance Arrangement: Application for Authorisation A91198 – A91199

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Submission

8 January 2010



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## 1 Demonstrating the Public Benefit of the Proposed Arrangement

### 1.1 Background

Seed Advisory Pty Ltd (Seed) and Taylor Fry Pty Ltd (Taylor Fry) have prepared this response to the Australian Consumer and Competition Commission's (ACCC) request for submissions on the New South Wales Treasurer's application in support of application for authorisation A91198 – A91199 of a co-insurance arrangement for the Energy Reform Strategy<sup>1</sup>. This submission has been prepared by Seed and Taylor Fry on our own behalf: no client has commissioned this work.

#### 1.1.1. Our understanding of the proposed co-insurance arrangement

Figure 1 on the following page is a schematic representation of our understanding of the relationship between the existing NSW generation portfolios, the proposed Gentrader bundles and the operations of the proposed co-insurance arrangement. Each of the Gentrader bundles has a relationship with all of the other Gentraders as a result of the proposed arrangement both in theory and in practice. For example, the exercise of the co-insurance scheme following the outage of a single unit of the Eraring Power Station requires by at least two of the remaining Gentrader bundles to provide compensation for the loss of firm capacity<sup>2</sup>.

The diagram represents the physical/contractual relationships between the participants. The proposed allocation procedures are structured such that over the course of a year, each of the Gentraders is expected to be broadly in balance (on a volumetric basis) in its calls on the arrangement and its supply of non-firm capacity to other Gentraders under the arrangement. The arrangement is self-funding: there is no proposed recourse to any other party to fund it. However, the size and direction of the net financial transfers between the Gentraders will not necessarily balance out over any given calendar year, as the value of the transfers will be a function of the price prevailing at the time of the operation of the arrangement. Differences in the NSW Regional Reference Price (RRP) from period to period may result in significant value transfers between the Gentraders under the arrangement.

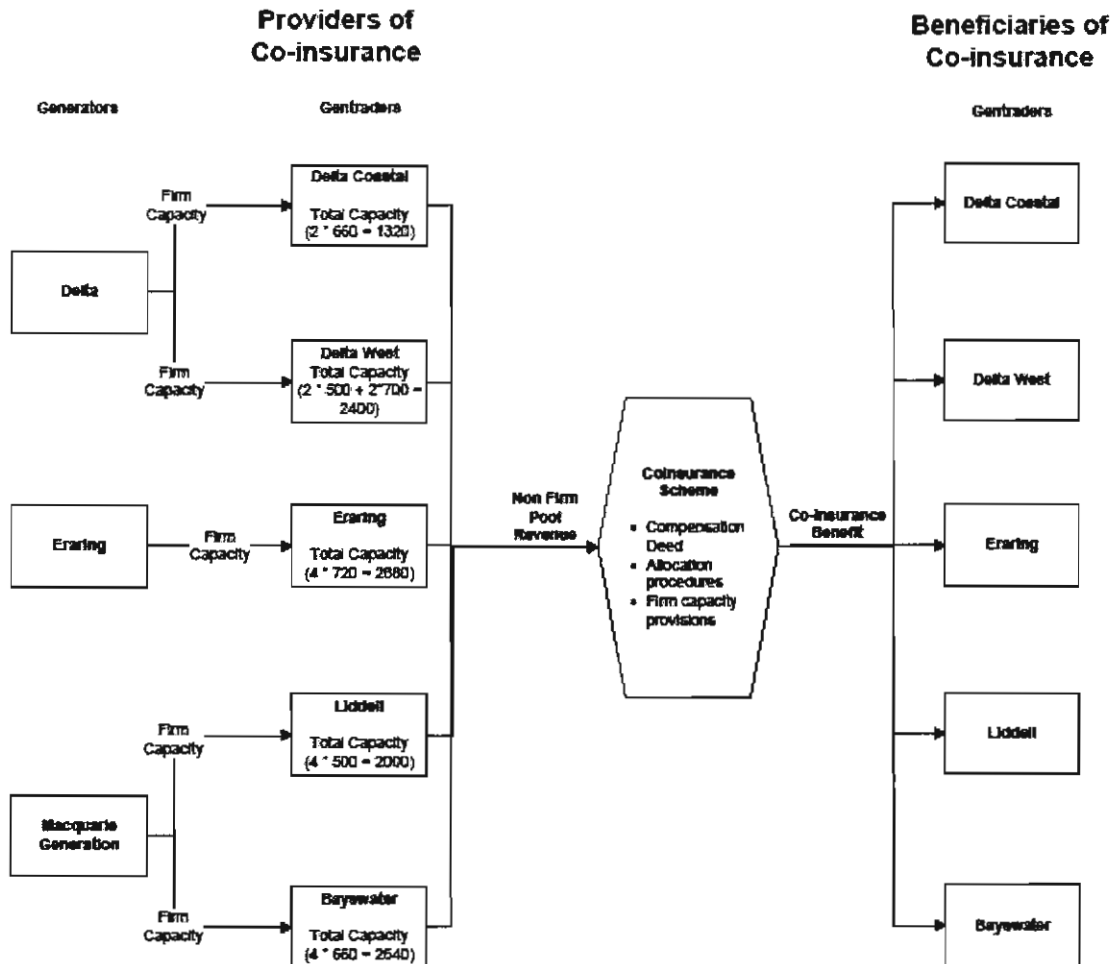
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<sup>1</sup> NSW Treasurer for and on behalf of Delta Electricity, Eraring Energy and Macquarie Generation, *Energy Reform Strategy: Submission in support of application for authorization in relation to the co-insurance arrangement for the Energy Reform Strategy*

<sup>2</sup> The description of the proposed arrangement in the restricted publicly available information is unclear whether compensation is supplied only to the extent that non-firm capacity is being dispatched at the time of the exercise of the co-insurance option or whether compensation is supplied by non-firm capacity regardless of the status of that capacity. In the second case, an outage of a unit of Eraring PS would require two of the other Gentrader bundles to provide sufficient compensation, while in the first case, more than two of the Gentrader bundles could be involved, depending on their status at the time.



Figure 1. Overview of co-insurance arrangement



The diagram significantly simplifies the operation of the scheme, by, among other issues:

- Excluding the other power stations included in the Delta Coastal and Eraring Gentrader bundles
- Not representing the optionality contained in the Gentrader's choice to exercise or not the co-insurance arrangement
- Not representing the detail included within the compensation deed, for example the truncation of the cover provided by the proposed arrangement, which does not cover up to two half hourly bidding periods after the firm capacity failure and also does not provide cover in the event of multiple simultaneous failures where the total demand for co-insurance exceeds the available supply<sup>3</sup>.

<sup>3</sup>Energy Reform Strategy: Submission, pg 20



### **1.1.2. The public benefits of the proposed co-insurance arrangement**

The NSW Government argues that the public benefits provided by the co-insurance arrangement include<sup>4</sup>:

- Co-insurance supports the splitting of the existing generation portfolios into smaller Gentrader bundles, managing the effects on the contract market that might otherwise result from these smaller portfolios
- Co-insurance facilitates liquid markets for firm contracts by providing Gentraders with the opportunity to offer a larger volume of firm contracts for a given level of risk
- Co-insurance enables the NSW Government to offer an increased level of contractual availability, backed by contractual penalties, allowing the NSW Government to offer more valuable Gentrader contracts to the market
- Co-insurance supports potential new generation entrants by helping manage outage risk through the provision of higher firm capacity than would otherwise be available.

For these benefits to be available, prospective buyers need to be convinced that the proposed arrangement offers sufficient certainty of performance at a cost less than the available alternatives to allow a given Gentrader to increase the firm contracts offered to the market. For this to be the case over time, all the Gentrader portfolios must benefit equally or, alternatively, no Gentrader should systematically benefit from the flows. In the absence of these conditions, the proposed arrangement is unlikely to be sustainable as the participants have the ability to discontinue the arrangement given a super-majority vote.

The restricted publicly available material provides only limited theoretical support for these propositions, suggesting a mathematical approach for determining the probability that the assumed level of co-insurance can be provided over a year and illustrating the potential addition to capacity in conceptual diagrams assuming a relatively simple hedging strategy. The arrangement is, however, an insurance problem and the issue of adequacy in particular is an actuarial issue and therefore would benefit from further actuarial type analysis. The critique below focuses on the appropriate modeling approach to the questions of adequacy and sustainability, given the characteristics of the Gentrader portfolios being considered.

## **1.2 Evaluating the potential Public Benefits**

In considering the public benefits provided by the proposed co-insurance arrangement, we have considered:

- The value offered by the scheme design to the Gentraders
- The analysis undertaken
- The available alternatives.

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<sup>4</sup> *Energy Reform Strategy: Submission*, p1.



We have not considered potential second order effects, although a range of second order effects may exist<sup>5</sup>.

### 1.2.1. The Scheme Design and Value Creation

Prospective buyers need to be convinced that the proposed arrangement offers sufficient certainty to allow the given Gentrader to increase the firm contracts offered to the market at a cost less than the available alternatives. For this to be the case over time, all the Gentrader portfolios must benefit equally or, alternatively, no Gentrader should systematically benefit from the flows.

Figure 2 illustrates the most recent equivalent forced outage rate for the proposed Gentrader bundles, taken from the most recent Annual Reports of the current NSW generation companies<sup>6</sup>. The figures suggest that there are very significant differences between the Gentrader bundles' current performance, with the difference between Liddell and the Delta portfolio in the order of 5:1. Given the size of the discrepancy in performance, then, from first principles and assuming that current performance is an indication of future performance, it is difficult to see the Gentraders benefitting equally from the arrangement, and given the relatively long duration of the contract and no obvious ability to re-base or re-price the contract post inception large divergences in outage rates may be highly likely and this will significantly impact on its value.

The difficulty is compounded when you consider that the benefits presented by the proposed arrangement are available to the prospective Gentraders through other measures, including self-insurance. Among the potential purchasers of the Gentraders, some already have generation in NSW providing a level of self-insurance. Importantly, two of the proposed Gentrader bundles, Delta Coastal and Eraring, also include assets that are capable of providing self-insurance for some or all of the firm capacity the arrangement would cover. Also, there is also the ability for Gentraders to go to the wholesale financial market to manage this risk.

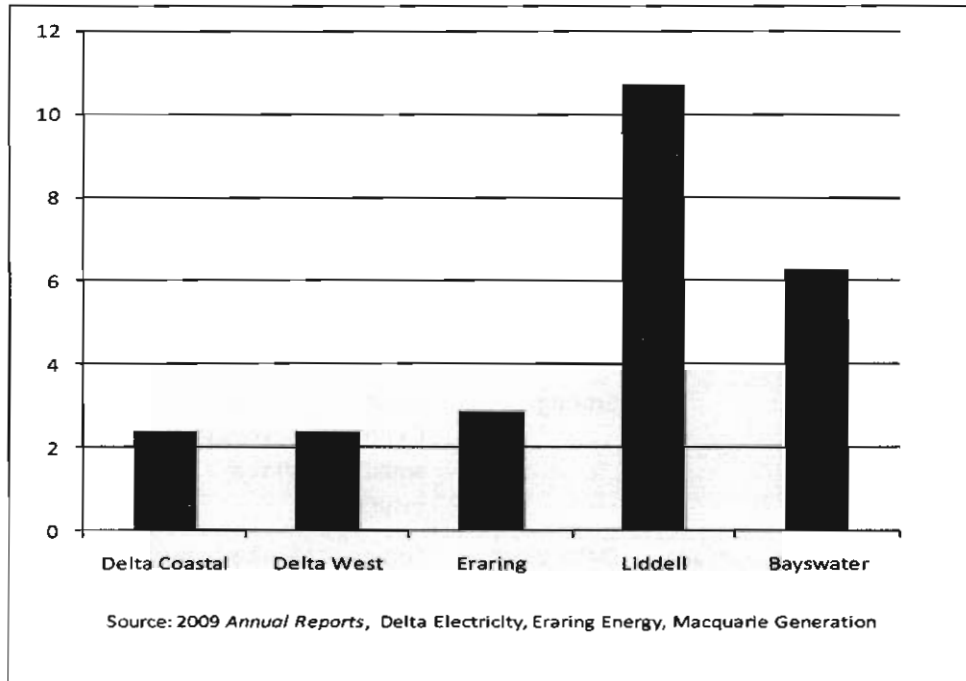
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<sup>5</sup> In addition to the competitive disadvantage intended by these arrangements to affect new generation entrants and existing non-government owned generation, potential second order effects may include impacts on the NSW RRP in the event of a unit outage and perverse incentives affecting the incentive to maintain and improve the performance of the Gentrader power stations covered by the arrangement.

<sup>6</sup> For the Delta Coastal and Delta West Gentraders, the figures are identical, as Delta Electricity provides no information at the individual station level. However, the discussion in the Annual Report suggests that Delta West's performance may be better than that given, as Wallerawang's performance is apparently the best of the existing assets.



**Figure 2. Proposed Gentrader Bundles, Equivalent Forced Outage Rate, % of availability, 2009**



If we consider just these two characteristics, then a simple evaluation of the relative benefits can be developed, such as that in Table 1 on the following page. The benefits to a particular Gentrader depend on the likely outage rate, the total asset portfolio included in the Gentrader bundle and the characteristics of the potential purchaser. In this simple evaluation, the Liddell and Bayswater Gentrader portfolios would most likely benefit from co-insurance, as the units are large, there is no self-insurance provided in the Gentrader bundles and other assets owned by the potential purchaser may not be able to provide sufficient self-insurance. However, even in this case, the value to the Liddell and Bayswater Gentraders is dependent on the willingness of the other Gentraders to remain in the arrangement. Scenarios can be developed where a super-majority votes for the discontinuation of the arrangement. Given this, potential purchasers are likely to discount the contribution of the proposed arrangement to the sale value, even in circumstances where the Gentrader bundle in question is likely to unambiguously benefit.



**Table 1. Benefits of co-insurance by potential participant type**

Gentrader Bundle Type	Gentrader Bundle	Co-insurance benefits by purchaser type	
		New entrant	Existing market participant
<b>Gentrader portfolio, with self insurance</b>	Delta Coastal	Limited - Gentrader possesses a level of self-insurance	Limited – Gentrader possesses a level of self-insurance and existing portfolio may also provide a level of self-insurance
	Eraring	Somewhat limited - Gentrader possesses a small level of self-insurance	Limited - existing portfolio may provide a level of self-insurance
<b>Gentrader portfolio without self insurance</b>	Delta West	Somewhat limited - recent forced outage performance suggests benefits from scheme may be low	Somewhat limited - depends on extent to which existing portfolio provides a level of self insurance
	Liddell	Yes - trend forced outage experience suggests benefits may be high	Yes - trend forced outage experience suggests benefits may be high and existing portfolio may not provide sufficient self insurance
	Bayswater	Yes - trend forced outage experience suggests benefits may be high	Yes - trend forced outage experience suggests benefits may be high and existing portfolio may not provide sufficient self insurance



### 1.2.2. The Analysis of the Scheme

The analysis undertaken and models as they stand do not provide an appropriate indication of the risks of the proposed scheme, and they provide little insight and evidence to support the assertion that the scheme has a positive value creation potential. There are alternative, more sophisticated approaches to the analysis and modeling that utilise actuarial techniques that could be undertaken to better assess the public benefits, value creation potential and risks of the scheme. These approaches are discussed in further detail later in our submission.

The assumptions implied by the binomial model used by the NSW Government and described in Appendix 1<sup>7</sup> of their submission could materially underestimate the probability of multiple outages and therefore, underestimate the probability of a shortfall of co-insurance and therefore the public benefits.

In particular:

- The binomial theorem requires that units are identical, outages are independent, and the only difference between generators is the number of units in each bundle. If the assumption of identical units does not hold<sup>8</sup>, then the impact of exceptional events can be underestimated. For example, two (or even one) large unit outages will remove substantially more capacity than two average unit outages. This underestimation is amplified under the co-insurance arrangement, where (in the event of an outage by a large unit) the insurance flows are underestimated as the affected units are larger than average capacity and the contributing units are smaller than average capacity.
- Multiple units from the same generator cannot be treated realistically as independent. Generators should be modeled as conditionally independent: the outage rate is not linked to other generators after taking account of common information (e.g. weather). However, units within an individual generator cannot be modeled in this way: units are more likely to suffer outages together. Given this, a binomial model is incorrect and likely to severely underestimate the likelihood of multiple outages.

Rather than a binomial distribution, it would be appropriate to aggregate independent but non-identical Bernoulli distributions, treating each power station separately. This would allow each Gentrader bundle to exhibit different behaviour, in a similar way to their current forced outage experience, and be uniquely identified. While large, 2<sup>18</sup> unique combinations are manageable on modern modeling systems. Modeling the Gentrader bundles separately would allow consideration of unit-specific performance and outage duration, providing a more realistic view of the balance of the flows between the Gentraders and the extent of the cover provided by the proposed arrangement.

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<sup>7</sup> *Energy Reform Strategy: Submission*, Section 3.1

<sup>8</sup> Which it doesn't for the proposed Gentrader bundles.



Given the complexities of the proposed arrangement and the complex relationship between the arrangement, the other existing and future generation assets and the wider electricity market, any appropriate model of the proposed arrangement should:

- Apply a revised model for the probability of unit outage, taking into account the different characteristics of units and the correlation between them.
- Apply a model to measure the uncertainty in the duration and severity of outages. Such an analysis, combined with a revised probability model, would be required to determine the range of likely outcomes and to form an informed decision about the probability of a shortfall in the proposed scheme.
- Be stressed-tested against unlikely but possible events. Stress testing is designed to determine the effectiveness of any insurance arrangements when needed most and the extent of any flaws in the system of transaction and, consequently, the potential for conflicts.
- Undertake scenario analysis to test for the implications of different ownership possibilities and behaviour. This is particularly pertinent where there is a potential for a co-insurance scheme to provide perverse incentives to participants to perform below potential. It is also likely that the modeling described above would result in reductions to the bids for some of the proposed Gentrader bundles, as co-insurance would be seen by potential bidders as reducing the value of those bundles. These would offset the value placed on co-insurance by other potential bidders. Scenario analysis would test the combined effect of a range of different ownership possibilities.
- Compare the value and benefits of this scheme to alternative approaches.

### 1.2.3. The Availability of Alternatives

The proposed co-insurance arrangement offers benefits to the Gentraders, including new entrants, only to the extent that it is a more effective and/or less costly alternative to other available alternatives.

Alternatives exist to the proposed co-insurance scheme.

- For market participants with existing generation portfolios, the potential exists for self-insurance and, over time, assuming that the generation development sites being sold by the NSW government come on stream, the potential for self-insurance could increase.
- For new entrants, new generation sites (including those on sale by the NSW Government) also offer the potential for self-insurance in the medium term.
- Alternatively, new entrants can replicate the swaption underlying the co-insurance arrangement in a market based transaction<sup>9</sup>. The cash flow implications of a market-based transaction are likely to be less favourable than the proposed co-

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<sup>9</sup> A swaption would, however, present less complexity from the perspective of the number of counterparties, but would typically be shorter than the proposed 10 year arrangement and would need to be replaced from time to time.



insurance arrangement. However, a comparison of a typical swaption with the proposed co-insurance arrangement would need to consider the additional value offered by the swaption, where the swaption provides cover in the excluded first two bidding periods after the outage event and in the event of multiple simultaneous failures. These differences can be modelled, but this would require data on the frequency and duration of outages at a power station level data (which is not publicly available).

- The Gentrader may choose to manage the risks of a stand-alone power station, in a similar way to the way in which Loy Yang A has operated in the Victorian market on a stand alone basis for in excess of 10 years.

#### **1.2.4. Conclusions**

The public benefits advanced by the NSW government in support of the proposed arrangement have not been demonstrated by the analysis undertaken and available in the publicly available information.

- The characteristics of the Gentrader bundles are sufficiently different to suggest that the total value offered by the scheme design to the Gentraders is uncertain. If some Gentrader bundles are likely to have a larger call on the arrangement than others, then the co-insurance arrangement is not likely to be stable and its value to the sale process and the related public benefit uncertain.
- Because the characteristics of the Gentrader bundles are not consistent with the modeling approach chosen to illustrate the likelihood of a shortfall, the analysis undertaken is insufficient to provide comfort that the proposed arrangement is sustainable, reducing its value to the Gentraders.
- Alternatives are available. Two of the five Gentrader bundles offer the potential for self insurance from their asset mix. Potential purchasers may bring their own generation portfolios, offering the potential for self-insurance. Finally, market contracts are available providing at least as much cover as the proposed co-insurance option.



## 2 Proving the potential Public Benefits

### 2.1 Evaluating the proposal as an insurance scheme

#### 2.1.1. Modeling the operation of the proposed arrangement

If the ACCC wanted to consider the operation of the co-insurance arrangement and, in particular, to consider the likelihood that the arrangement will be stable and sustainable over time, then we recommend that consideration be given to undertaking actuarial analysis and using an integrated model, where the occurrence and duration of outages are part of the same stochastic process, and the severity of potential outages can be considered as well. To achieve this, time must be considered explicitly, which would allow the model to capture the seasonal characteristics of the electricity market explicitly. This modeling approach would consider the arrangement as an insurance scheme, consistent with its intent.

A basic Markovian process could be constructed analytically, incorporating the co-insurance rules which would determine the frequency of claims, the cost of claims, and relative measures such as the percentage of outage losses covered by the scheme. Also, variation and confidence measures for these statistics would be available. The model would also allow for the severity of an outage (i.e. total outage versus some percentage outage), incorporated as a random variable when the unit enters the outage state. This could allow for the different capacities of the units covered by the proposed arrangement.

Furthermore, this model structure can be easily extended to include the additional features, such as seasonal weather adjustments, the relationship between the severity of an outage and its duration and the performance of the proposed arrangement under extreme events, such as heat waves and other adverse conditions.

These modeling approaches are widely used in practice, the statistical techniques and tests are robust, the results easy to interpret, and the limitations well understood.

#### 2.1.2. Evaluating the alternatives

Given that alternatives to the proposed arrangement exist, then the ACCC should consider whether the proposed arrangement represents a preferable alternative. One approach to this may be to consider the benefits and costs of an alternative derivative portfolio offering a new market entrant equivalent protection (MWs), considering the trade-off between the cash flow implications of a market based transaction and the restricted cover offered by the co-insurance arrangement.