Floor 11, 452 Flinders Street
Melbourne VIC 3000
PO Box 312, Flinders Lane
Melbourne VIC 8009 Australia
T +61 3 8668 3000
F +61 3 8668 3001
www.jacobs.com

1 March 2016

Ms Kathryn Smith
Review Director
Climate Change Authority
GPO Box 1944
Melbourne 3001

Subject: Response to Peer Review Comments

Dear Kathryn

Thank you for the opportunity to respond to the Peer Review comments on our draft report of 17 December 2015 entitled *Modelling Illustrative Electricity Sector Emission Reduction Policies*. Below sets out our responses and actions taken in light of their comments.

In summary, HoustonKemp assessed 39 aspects of the modelling and assumptions. They found all but six reasonable and none that presented major issues for the robustness of the modelling. They suggested 17 minor changes with 7 relating to approaches or input assumptions they judge not reasonable (or where they judge reasonableness to be mixed or unclear), and 10 are for assumptions they judge to be reasonable in their current form but where feasible alternatives exist.

Table 1 set out our responses and action taken to the 7 minor changes suggested. Table 2 outlines our response and actions taken to the 10 assumptions where feasible alternatives exist.

Yours sincerely

Walter Gerardi
Principal Consultant
+61 3 8668 3081
walter.gerardi@jacobs.com

Table 1: Alternative modelling approaches identified and Jacobs' response – assumptions or inputs assessed as not reasonable

Approach or input assumption	HK assessment	HK's observations and/or potential actions	HK's assessment of potential to misrepresent policy comparisons	Jacobs' response
Inclusion of Regulated Closure scenario in Phase 1	It did not meet the emissions constraint and cannot be directly compared to other policies	Could remove from comparison or signal lack of comparability	Low, this is already signposted in Jacobs' report but could be highlighted further	We consider that the inclusion of the RC scenario in Phase 1 is very informative even if it does not meet the emissions constraint. We have highlighted the shortfall in the report and have included additional notes in the comparative charts to clarify further that the RC breaches the emissions' budget.
Basis for annualising capital costs used in resource costs	Generator weighted average cost of capital (WACC) is used	Office of Best Practice (OBPR) Regulation WACC should be used to annualise capital costs.	Low, based on email communication from Jacobs.	We agree with the suggestion and we have revised the annualised capital costs using the Office of Best Practice Regulation (OBPR) WACC.
Calculation of demand adjustment	Adjusting for dead weight loss appropriate	Could take into account social costs of emissions in calculating deadweight loss	Low, deadweight loss is likely to be small relative to resource costs	The evaluation of social costs of emissions is quite complex and was not considered a vital part of this exercise. We have included a note at the Appendix highlighting that emissions are not valued.
Costs for new solar thermal generation	Costs with storage are reasonable but without storage appear high	ACIL Allen estimates lower cost for solar without storage	Low, affects all scenarios	Jacobs' estimate of solar thermal generation is based on the actual costs of the most recent projects. For example, the Alinta study for Port Augusta solar thermal project (by PB, July 2014) lists $6969/kW while we are quoting $6500/kW.
Battery storage costs	Small scale battery costs appear high but broadly reasonable. The cost discount for large scale battery appears too low	Calculation of Powerwall costs suggests lower estimates	Low, affects all scenarios. Phase two sensitivity costs are reasonable.	We consider that the small scale battery costs are aligned to the recently announced battery installation costs in Australia. We also estimate that the large scale storage (Powerblock) that is not yet commercially available in Australia will have installation costs close to the costs we quote. Furthermore, in Phase 2 we have investigated the sensitivity of the results with lower costs in both small and large scale storage.

Approach or input assumption	HK assessment	HK's observations and/or potential actions	HK's assessment of potential to misrepresent policy comparisons	Jacobs' response
Weighted average cost of capital	The calculation of WACC is not set out although its level seems plausible	Clarify cost of capital assumptions	Low, the WACC assumption affects all scenarios	The WACC that is used is based on our analysis and is aligned with the industry's expectations. We added a clarification of the WACC calculation in the appendix.
Technology availability		Availability of new technologies is inherently uncertain	Low, based on alternative scenarios modelled by Jacobs	We have used the latest data and consulted different technical and industry groups to determine the availability of new technologies. Also, this issue was explored through the technology availability sensitivity where geothermal, nuclear and CCS technologies were excluded from the analysis.

Table 2: Alternative modelling approaches identified and Jacobs' response – assumptions or inputs assessed as reasonable

Approach or input assumption	HK assessment	Observations and/or potential actions	Potential to misrepresent policy comparisons	Jacobs' response
Specification of policy scenarios		Policy scenarios could be developed with cost minimisation in mind	Low, there may not be much scope to vary policies given emissions constraint	Through the discussions with CCA we agreed that the approach used in this modelling exercise was the most appropriate for the aim of the analysis. Sensitivities to alternative assumptions was investigated in phase two and the results are included in the report.
Basis for calculating Australian dollar emissions prices	2009/10 exchange rates are used	Could use up-to-date forecasts of exchange rates, which are much lower than in 2009/10	Medium, higher emissions prices might be expected to favour "technology pull" scenarios over "regulated" scenarios with emissions pricing policies remaining least cost.	There is an inherent uncertainty around future exchange rates and we consider the rates used are reasonable for a long term modelling exercise.

Approach or input assumption	HK assessment	Observations and/or potential actions	Potential to misrepresent policy comparisons	Jacobs' response
Lower weighted average cost of capital for feed-in tariff (FiT)scenario	The extent of difference is not clear	Could vary WACC adjustment for FiT scenario	Low, but could affect comparison with LET which is very similar in cost	The lower WAC was limited to a 0.5 percentage point reduction. In the modelling this affected the choice of plant. Social welfare costs do not incorporate the reduced WACC.
Network and retail tariffs	Simplifying assumptions are made	Low	Could take into account finer detail of tariffs	The main aim of this work was to focus on relative impacts on representative tariffs. We added a sentence in the report to explain the limitations of this approach.
Comparison of price outcomes between policies	Conforms with expectations	Report does not include a comparison of net consumer outcomes after government compensation for CP	Low, this doesn't affect comparison of resource or abatement costs	Real incomes are assumed to be constant across policies when calculating bills. It is difficult to determine the form of any compensation to consumers so this the calculation of compensation effects was not undertaken
Costs for new geothermal generation		More accurate modelling could take into account geothermal fields.	Low, Jacobs already takes into account step changes in resource availability	Our assumptions are based on the available data acquired from previous studies. A sensitivity on the availability of geothermal was performed.
Costs for new nuclear generation		OECD data suggests slightly higher costs	Low, affects all scenarios	The nuclear costs in Australia are highly uncertain and the quoted costs used in the modelling were chosen after consultation with the industry and technical groups. In a world where there is concerted action to reduce emissions, uptake of nuclear generation may be more rapid than in the past inducing higher learning rates than assumed.
Technology learning rates		Report could provide more transparency on these assumptions	Low, affects all scenarios	We added more information on technology learning rates in the Appendix.
Gas prices		Review against updated gas prices	Low, affects all scenarios	We used the latest available information at the time the modelling began (the gas prices used were based on the 2014 World

Approach or input assumption	HK assessment	Observations and/or potential actions	Potential to misrepresent policy comparisons	Jacobs' response
				Energy Outlook). We added a note in the Appendix that the 2015 Outlook was published as the modelling concluded.
Coal prices		Review against updated coal prices	Low, there have not been significant changes in coal prices	We have used the latest available information at the time the modelling began (the coal prices used were based on the 2014 World Energy Outlook). We added a note in the Appendix that the 2015 Outlook was published as the modelling concluded.