MAJOR ELECTRICITY USERS' GROUP

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Bertrand Ngai
Analyst – Emissions Trading
2009 Industrial Allocation Consultation
Ministry for the Environment
By email to emissionstrading@climatechange.govt.nz

Dear Bertrand

Submission on development of Industrial Allocation regulations under the NZ Emissions Trading Scheme: Electricity Emissions Factor

1. This is a submission by the Major Electricity Users' Group (MEUG) on the Ministry for the Environment Consultation Document "Development of Industrial Allocation regulations under the New Zealand Emissions Trading scheme", published 11th December 2009[1].

2. This submission comments on the proposed Electricity Emissions Factor (EEF) of 0.52 t CO_2/MWh discussed in section 4 of the Consultation Document and in particular questions 3a, 3b and 4. A précis of our submission to each of those questions follows with detailed comments set out in the balance of this submission:

Consultation Document question	MEUG submission
Question 3 a: Do you have any comments on the proposed use of an electricity allocation factor of 0.52 tonnes of CO2 per megawatt hour when adjusting allocative baselines from Australia and creating baselines from New Zealand data?	The proposed EEF value of 0.52 understates price mark-ups. MEUG present a number of arguments as to why the EEF should be higher including an independent analysis by Stochastic Optimization Ltd. Refer paragraphs 4 to 23 below.
Question 3 b: Do you have any comment on the proposed use of an electricity factor of 1 tonne of CO_2-e per megawatt hour when testing activities against the emissions intensity thresholds in the Act?	MEUG agrees with the use of an EEF of 1 for the purpose of deciding eligibility.
Question 4: If you are conducting an activity or activities listed in Annex 1, or an activity that you believe would be eligible, do you consume more than 2000 gigawatt hours of electricity at a single facility in a typical year?	Regulations requiring contracts to be provided to estimate EEF should only apply to consumers using greater than 2,000 GWh pa rule. Refer paragraphs 23 to 24 below.

[1] Refer http://www.mfe.govt.nz/publications/climate/development-industrial-allocation-regulation-ets/index.html and statement by Hon Dr Nick Smith http://www.beehive.govt.nz/release/govt+consult+industry+ets+allocations

3. This submission concludes first with a discussion on the treatment of electricity distribution line losses and finally with concluding comments including future process and timing.

Electricity Emissions Factor

4. The Consultation Document proposes[2] an EEF of 0.52 t CO_2/MWh of electricity based on work by officials and the Stationary Energy and Industrial Process Technical Advisory Group (SEIP TAG) in 2008.

5. The materiality of the regulated EEF can be illustrated by considering a sensitivity analysis of 10%, an assumed 10,000 GWh pa of aggregate eligible power demand and an effective cap price of $12.50/t CO_2. Cost estimates in the balance of this submission also assume 10,000 GWh pa.

EEF	NZU value pa
Consultation Document proposal = 0.52	$65.0m
Sensitivity analysis: 0.52 +10% = 0.572	$71.5m
Change from Consultation Document proposal	+$6.5m
	+10%

6. If the EEF were gazetted at 0.52 but should be 10% higher, that is 0.572; then free allocations to eligible New Zealand emissions-intensive trade-exposed industries will be short by $6.5m per year. Over the 2½ years until the end of Commitment Period 1 on 31st December 2012 a 10% shortfall will put eligible businesses at a competitive disadvantage of approximately $16m. In the highly competitive international markets these businesses operate in, New Zealand could quickly forgo capital replacement or expansion work if the EEF is under-estimated. This highlights the importance of ensuring the regulated EEF is robust.

7. In the following paragraphs MEUG demonstrates that the proposed 0.52:

- Is not consistent with statements by the Minister when introducing changes to the ETS late last year;
- Is not consistent with the work by SEIP TAG in view of the now legislated price cap of $12.50/t CO_2;
- Fails to take into account strategic offer behaviour by electricity suppliers that indicates that the factor is materially higher than the proposed EEF of 0.52.

Ministers statements on pass-through costs equates to a higher EEF

8. The explanatory note to the Climate Change Response (Moderated Emissions Trading) Amendment Bill introduced by the Minister into the House on 24th September 2009 noted[3]:

> "… the increase in electricity prices is estimated to be 0.8 c/kWh …"

9. The Bill subsequently became law on 7th December 2009[4]. The key fiscal drivers underpinning the estimate that the carbon cost-pass through would be 0.8 c/kWh remained unchanged, ie allowing retirement of 1 NZU per 2 tonnes of CO_2 emissions and a cap of $25/t $C0_2$ leading to an effective cap of 12.50/t CO_2 until the transition period expires on 31st December 2012.

10. The table below compares the EEF proposed in the Consultation Document with the EEF calculated using the pass-through costs in the explanatory note to the latest legislative change:

[2] Ibid, p 18
[3] Refer http://www.legislation.govt.nz/bill/government/2009/0085/latest/DLM2381636.html, p33
[4] Refer http://www.legislation.govt.nz/act/public/2009/0057/latest/DLM2381636.html

	Pass through	EEF	NZU value pa
Estimate based on Consultation Document	0.65 c/kWh[5]	0.52	$65m
Estimated in ETS Bill and as enacted	0.80 c/kWh	0.64[6]	$80m
Change from Consultation Document proposal		+0.12	+$15m
		+23%	+23%

11. There is a significant difference between the Ministers explanatory note of the likely pass-through in power costs due to carbon costs and the proposed EEF. Either the EEF needs to be amended to align with the statements by the Minister or a reconciliation as to why there is a difference should be published to allow interested parties to evaluate the Government's reasoning.

Work by SEIP TAG supports a higher EEF

12. The analysis by SEIP involved a judgement on the detailed model runs reported by Dr Tom Halliburton, Energy Modelling Consultants Ltd, SDDP Modelling of Carbon Dioxide Emissions from Electricity Generation, 25th November 2008[7]. Dr Halliburton used the SDDP stochastic optimal dispatch model (the "SDDP model").

13. The key results underpinning the SEIP recommended EEF of 0.52 are replicated in the table below[8]:

$/t CO_2	20	40	60	80
2010	0.53	0.52	0.48	0.47
2011	0.64	0.53	0.54	0.49
2012	0.46	0.53	0.52	0.50

14. The 0.52 is approximately the average derived from the $40/t CO_2 column. When the SEIP TAG work and SDDP model was run, the expected carbon charge was approximately $40/t CO_2. The carbon cost is now much lower. Using the SDDP model, the $20/t CO_2 column results and using an average over the years 2012, 2011 and a half year weighting for 2010 gives an EEF equals 0.546, approximately 9% higher than the Consultation Document proposed 0.52. The legislated maximum effective carbon price of $12.50/t CO_2 is lower than $20/t CO_2 and therefore we expect using the SDDP model the EEF would be even higher than 0.546.

15. As the table above demonstrates, on the basis of the SDDP model analysis alone the Consultation Document proposed EEF is too low. Dr Halliburton in his report also noted the SDDP model results would give a lower bound on electricity prices[9]:

> "*Interpretation of these results must be within the context of the SDDP least cost dispatch methodology. The results of this model can be expected to differ from actual market outcomes. The causes of this difference include the following:*
>
> 1. *SRMC calculated by SDDP will generally provide a lower bound on those observed in the market. Because an overall system wide optimum strategy is calculated by SDDP, other strategies will result in either the same or higher costs*
>
> 2. *SDDP is risk neutral – it seeks to minimise expected system costs without regard to the volatility of revenues or prices. Generation companies are not risk neutral, and so expected costs are likely to be increased.*

[5] Calculated using the example in paragraph 5 of this submission, ie $65m/10,000 GWh = 0.65 c/kWh.
[6] Calculated by deriving an EEF to have a pass through of 0.8 c/kWh for 10,000 GWh @$12.50/t to give $80m pa.
[7] Refer http://www.mfe.govt.nz/publications/climate/sddp-modelling-of-carbon-dioxide-emissions-from-electricity-generation/sddp-modellling-of-carbon-dioxide-emissions-from-electricity-generation.pdf
[8] Ibid, Table 1: North Island Emissions Factors (t/MWh), p5
[9] Ibid, p3

3. *Marketing strategies will increase market prices above SRMC. This is due to the ability of generation companies to achieve prices above the SRMC of their plant, depending on market conditions*."

16. During briefings by officials of the SEIP TAG analysis MEUG discussed the need for further modelling to assess a more realistic estimate for EEF to take into account market behaviour.

17. It was very disappointing that while officials had been requested to consider further analysis, the Consultation Document included no further new analysis to assess sensitivities to the values estimated from the results of the SDDP model.

Analysis by Stochastic Optimization incorporating generator strategic behaviour

18. One aspect of pricing that the SDDP model approach cannot estimate is the potential exercise of market power by electricity suppliers. This affects how carbon charges are reflected in prices. As noted by Tom Halliburton, SDDP is a least-cost dispatch model and so it will result in lower estimates of market prices than models that assume strategic bidding. To assess if the EEF might be materially affected by strategic pricing behaviour by suppliers, MEUG commissioned Dr Andy Philpott and Tony Downward of Stochastic Optimization Limited to estimate a range of EEF values under such conditions.

19. Dr Philpott and Mr Downward have previously published several theoretical articles on this subject. Examples of their papers published as Electric Power Optimization Centre reports are attached:

- Philpott, A.B., On models for estimating the effect on prices of CO2 charges, 2004
- Philpott, A.B., On carbon charges and electricity prices, 2008
- Downward, A. Carbon charges in electricity systems may increase emissions, 2008

20. The analysis by Stochastic Optimization Limited titled Estimating a New Zealand Electricity Emissions Factor dated 8th February 2010 is attached. Based on CDS offer data from 2008 the analysis concludes that with strategic behaviour, and the other assumptions that underlie the report, the EEF for 2008 is estimated to range between 0.613 and 0.689. The table below compares this result with the Consultation Document proposed EEF of 0.52 in terms of the materiality on NZU allocated:

	Consultation Document	Stochastic Optimization	
		Low	High
EEF	0.52	0.613	0.689
NZU value pa	$65.0m	$76.6m	$86.1m
Change from Consultation Document proposal	Base	+$11.6m +18%	+$21.1m +33%

21. The numeric results in the table above need to be considered in the context of the overall analysis, assumptions and trends observed by Stochastic Optimization as summarised in section 4 (p28) of the report:

> "*This report presents a new perspective on the impact of CO_2 charges on New Zealand wholesale electricity prices. Experiments with a model of strategic behaviour by generators applied to a selection of wet, dry and uncertain trading periods in 2008, predict higher markups under CO_2 charges than those predicted by Energy Modelling Consultants for 2010 under a central planning model."*

22. The important outcome of the analysis by Stochastic Optimization is that it demonstrates that strategic behaviour by generators is likely to be a very material factor in estimating EEF compared to results using the SDDP model.

23. MEUG recommends officials commence their own work on how strategic behaviour can be quantified. The work by Stochastic Optimization is a good place to start and we suggest officials discuss the analysis directly with Dr Philpott and Mr Downward.

Use of contracts to establish an EEF

24. Referring to the method to calculate the EEF, the Consultation Document states (p18):

> "*The same approach will be used regardless of whether the electricity is generated on site, via distributed generation or purchased from the grid. The only exception will be for very large users (greater than 2000 gigawatt hours per annum at a single facility) with contracts for electricity. These contracts will be examined to establish an appropriate emission factor*."

25. MEUG agrees with this generic approach of using an standard EEF for all except the very largest consumer. Accordingly regulations setting out information that the Minister may obtain[10] in deciding allocations should be limited only to consumers using greater than 2,000 GWh per year.

Accounting for distribution network line losses

26. The EEF is the expected price markup per unit of electricity consumed as a result of the carbon charge. For grid connected consumers a robustly estimated EEF will compensate for the increase in power prices. For consumers connected to distribution networks, a robustly estimated EEF will compensate for the increase in power prices for power consumed at that site, but not for the higher line loss costs incurred by distribution networks.

27. Consistent with the approach of keeping eligible companies indifferent to the additional carbon charges, MEUG suggests the allocation methodology provide for the EEF to apply to direct electricity use and line loss quantities allocated by distributors in supplying those consumers.

Concluding comments

28. In this submission MEUG note that the proposed EEF value of 0.52 understates price mark-ups. MEUG present a number of arguments as to why the EEF should be higher including an independent analysis by Stochastic Optimization Ltd that takes into account strategic behaviour by generators. The differences in EEF estimates compared to the proposed value of 0.52 are material. We have suggested officials discuss the results of incorporating strategic behaviour with Dr Philpott and Mr Downward of Stochastic Optimization Ltd.

29. MEUG agree with the proposal to limit use of contracts to determine EEF only to consumers using greater than 2,000 GWh per year.

30. MEUG note that consumers connected to distribution networks will not be compensated for additional costs on line losses. The allocation methodology needs to account for distribution network line losses.

Yours sincerely

Ralph Matthes
Executive Director

[10] As provided in s161D(1)(e)(ii) of the Climate Change Response Act 2002 (last amended December 2009)