Regulatory Impact Statement: Updating the electricity allocation factor used in the NZ ETS

Coversheet

Purpose of Document	
Decision sought:	This analysis and advice has been produced for the purpose of informing policy decisions to be taken by Cabinet. The specific decisions sought are in relation to the approach taken to update the electricity allocation factor used to inform industrial allocation in the New Zealand Emissions Trading Scheme.
Advising agencies:	Ministry for the Environment
Proposing Ministers:	Minister of Climate Change
Date finalised:	28 July 2021

Problem Definition

The electricity allocation factor (EAF) quantifies the impact of the New Zealand Emissions Trading Scheme (NZ ETS) on electricity prices. It is used to inform allocations to industry. The EAF was last updated in 2013, and there have been significant changes in the electricity market and in the make-up of New Zealand's industrial sector since that time. The current value is no longer an accurate estimate of the pass-through of NZ ETS costs to electricity users. In addition, the methods and process previously used to calculate the EAF are no longer fit for purpose.

Work done in preparation for an update of the EAF in 2018/19 showed that these changes had made a material difference to the pass-through of NZ ETS costs. It is likely that an updated EAF at that time would have been 10-15% lower than the current value.

Executive Summary

Industrial allocation

Industrial allocation is the free provision of New Zealand Units (NZUs) to a number of entities in the New Zealand Emissions Trading Scheme (NZ ETS) and forms a significant source of supply of NZUs into the NZ ETS market. Entities that carry out any of 26 'eligible activities' listed in regulations are currently entitled to receive industrial allocation in proportion to their production in each compliance year. These are calculated by reference to allocative baselines, which reflect both direct and indirect NZ ETS costs faced by the activity.

These activities are eligible because they met a statutory test showing they are emission-intensive and trade-exposed. Firms carrying out eligible industrial activities receive allocations of emissions units to manage the risk of emissions leakage[1].

The indirect cost of the NZ ETS passed on by electricity generators affects operating costs for these eligible activities. The impact of the NZ ETS on electricity prices is measured by the electricity allocation factor (EAF).

This indirect cost may contribute to the risk of carbon leakage, and therefore it is included in the calculation of allocative baselines. Currently about one third of all industrial allocation is attributable to the cost of electricity. The EAF is the means by which the electricity costs can be considered in setting allocative baselines.

Methodology for calculating the EAF used in industrial allocation

The current EAF value and the methodology of determining it have not been updated since 2013. There have been significant changes in the electricity market and in the make-up of New Zealand's industrial sector since that time; as a result the current EAF value and methodology for calculating it are no longer fit for purpose. The work done in preparation for an update of the EAF in 2018/19 showed that these changes had made a material difference to the pass-through of NZ ETS costs. It is likely that an updated EAF at that time would have been 10-15% lower than the current value.

The emissions and NZ ETS costs for electricity generation in New Zealand vary from year to year because of changes in hydrological conditions and the need for thermal generation to meet demand. There is additional uncertainty due to market changes as discussed above.

It is proposed that the methodology used to calculate the EAF is updated, and a new EAF value determined and implemented. The preferred option for this is a methodology that results in annual rolling updates to the EAF, which will be based on actual and modelled data from prior years and will be smoothed by averaging calculating values over the prior three years.

This methodology has the benefits of maintaining accurate estimates of the EAF while allowing acceptable levels of stability and certainty, even in the context of exceptional years.

Constraints in the Climate Change Response Act 2002 (the Act) mean that only one activity, aluminium smelting, will be directly impacted by a new EAF value. Updates to

[1] Emissions leakage (also known as carbon leakage) can occur if the NZ ETS does not reduce emissions as intended, but exports (or leaks) them overseas. This can result when New Zealand firms lose market share or shift production to other countries with weaker climate policies, in order to reduce compliance costs and remain competitive in an international market. If our emissions were exported to countries without a hard emissions cap in place, leakage would undermine New Zealand's commitment to reduce global emissions.

other allocative baselines will require either legislative amendment or a full data collection exercise from eligible industrial activities.

Limitations and Constraints on Analysis

There is only one material consideration that could be considered a limitation on this analysis.

Estimation of price pass-through in the wholesale electricity market involves the use of complex modelling tools to replicate the operation of the market. It also requires us to make decisions on the input data and assumptions that go into the modelling. Some of these inputs are based on presumed behaviour of market participants and inevitably involve some subjective judgement. Also, we are modelling a counterfactual case which does not actually occur and so can never be confirmed by observation.

We intend to minimise this issue by ensuring transparency in the way that the EAF is calculated. Modelling tools used must be publicly available and it should be possible for stakeholders to replicate the calculations themselves.

Responsible Manager

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Acting Manger

ETS Policy

Ministry for the Environment

29 July 2021

Quality Assurance

Reviewing Agency:	Ministry for the Environment
Panel Assessment & Comment:	The Ministry for the Environment's Regulatory Impact Analysis Panel has reviewed this Regulatory Impact Statement. The Panel confirms that the level of information provided meets the quality assessment criteria.

Section 1: Diagnosing the policy problem

What is the context behind the policy problem and how is the status quo expected to develop?

1. Industrial allocation is the free provision of New Zealand Units (NZUs) to a number of entities in the New Zealand Emissions Trading Scheme (NZ ETS) and forms a significant source of supply of NZUs into the NZ ETS market. Entities that carry out any of 26 'eligible activities' listed in regulations are currently entitled to receive industrial allocation in proportion to their production in each compliance year.
2. These activities are eligible for allocation because they met a statutory test showing that they are emission-intensive and trade-exposed (EITE) and consequently they may be exposed to some risk of carbon leakage. The purpose of industrial allocation is to mitigate this risk.
3. Allocation amounts are calculated using an allocative baseline for each activity, equivalent to the average historical emission for the activity. The CCRA lists the emission sources that are taken into account in setting the baselines. Most of these are direct emissions associated with the activity: on-site fuel use and process emissions.
4. The indirect cost of the NZ ETS passed on by electricity generators also affects operating costs for eligible activities. This may also contribute to the risk of carbon leakage and is included in the calculation of allocative baselines. Currently about one third of all industrial allocation is attributable to the cost of electricity.
5. The electricity allocation factor (EAF) is based on estimates of the effect of the NZ ETS on prices in the wholesale electricity market. The EAF is expressed in tonnes of CO_2-equivalent per megawatt-hour, and is used to calculate nominal electricity emissions as part of each baseline. However, it is not an emission factor and has no direct relationship to the emission intensity of electricity generation.
6. Calculating the EAF involves an understanding of the wholesale electricity market, and the use of market modelling tools to estimate the marginal cost the NZ ETS adds to electricity prices. It is calculated as shown below, where the prices used are load-weighted means calculated over any required period:

$$EAF = \frac{Electricity\ price\ with\ ETS - Electricity\ price\ without\ ETS}{NZU\ price}$$

7. An EAF of 0.520 tCO_2e/MWh was calculated and incorporated in baselines when these activities became part of the NZ ETS from July 2010. The current value of 0.537 tCO_2e/MWh in 2012 was introduced for the calendar 2013 compliance year after a review.
8. The EAF is based entirely on spot prices in the wholesale electricity market. Industrial users have the option of contracting for, and/or hedging, their electricity costs from time to time. However, contracts are generally short, and we work on the basis that overall costs will be driven by the market price over time. The exception to this is aluminium smelting, which takes power on long-term contracts. Allocation for the smelter is determined through a separate process, not simply calculated using the EAF.
9. These EAF values were calculated on a forward-looking basis. Both the '*with ETS*' and the counterfactual *'without ETS'* prices were estimated for a modelled forward

period of about five years. This required simulating a range of possible outcomes based on hydrological conditions, with probability weightings.

10. The Ministry for the Environment began a process to review and update the EAF in 2018/19, and commissioned work to estimate a 2021-25 EAF on a similar forward-looking basis. Changes in electricity demand due to the Covid-19 pandemic meant that such a revised value would have been out of date even before its introduction, so this was not progressed in 2020.
11. There is no statutory requirement for the Minister to update or change the EAF, so the status quo is that entities with EITE will have their allocations calculated from the current value of 0.537 tCO_2e/MWh indefinitely. This value is increasingly likely to over-estimate the current effects of the NZ ETS on wholesale electricity prices (see below) and contribute to over-allocation and costs to the Government in excess of the requirements to mitigate any risk of carbon leakage.
12. A consultation underway on industrial allocation looks at options to reform industrial allocation policy to ensure it is aligned with New Zealand's climate commitments while continuing to offset the risk of emissions leakage. This may result in changes that allow better implementation of the options presented in this work.

What is the policy problem or opportunity?

13. Both the EAF value and its underlying methodology are no longer fit for purpose. because there have been significant changes in the electricity market and in the make-up of New Zealand's industrial sector since they were determined in 2013. The work done in preparation for an update of the EAF in 2018/19 showed that these changes had made a material difference to the pass-through of NZ ETS costs. It is likely that an updated EAF at that time would have been 10-15% lower than the current value.
14. The Covid-19 pandemic has affected electricity demand over the last eighteen months, contributing to volatility in the market. Also, several likely or possible developments may indicate a need for further recalculations of the EAF in the next five to ten years:
    a. The Bluff aluminium smelter may close
    b. Some fossil fuel generation plants may be retired
    c. Changes are coming for the electricity market, particularly real-time pricing and transmission pricing reform.
15. These factors mean that the actual pass-through of NZ ETS costs is likely to be more variable, and any forward-looking estimate is likely to be less accurate, than in the past.
16. An alternative is to evaluate the EAF through an ex-post analysis done after each compliance year, so that it can take account of the actual market outcomes for that year. The '*with ETS*' prices are known, and a modelled outcome is only required to establish the counterfactual '*without ETS*' case – what would have happened without the cost of NZ ETS obligations. This ex-post approach would yield a more accurate EAF.
17. When the current and previous EAF values were set, the Ministry engaged in a collaborative process. Firms that receive allocations, electricity industry participants, and the Ministry worked with economic advisers to achieve a consensus on the

methodology and on the value that was determined. This was successful, and industry has advocated for a similarly open and collaborative process in any future updates.

18. However, the process was onerous and time-consuming both for the Government and for industry. An ex-post approach would mean recalculating the EAF every year, and if this option were taken it would be impractical to repeat such engagement and consensus-building for every update.

What objectives are sought in relation to the policy problem?

19. The purpose of industrial allocation is to mitigate the risk of carbon leakage. Our main objective in updating the EAF is to ensure that it contributes to this purpose by enabling allocations to align with the need. The best way to achieve this is to ensure that the EAF is as accurate as possible – i.e. that it is the closest feasible reflection of the pass-through of the cost of NZ ETS obligations into wholesale electricity prices.

20. A secondary objective is to contribute to the overall objectives of the NZ ETS by facilitating compliance, the operation of the market, and the effectiveness of the NZ ETS in driving emission reduction. The process of setting the EAF can do this if it is predictable and contributes to investor and market confidence.

Section 2: Deciding upon an option to address the policy problem

What criteria will be used to compare options to the status quo?

22. The criteria for this decision will be the same as those used for consultation, and consistent with other changes to NZ ETS regulations.
23. Their application to the specific issue of the EAF means that:
    a. Accuracy is the most important criterion for this issue as the objective is to reflect actual price pass-through.
    b. The relevant matters for 'alignment with ETS objectives' are policy certainty and limiting any impact of changes to the EAF on investments by recipients or on the operation of the NZU market.
24. Clarity is also important because any process that involves economic modelling risks having a 'black box' character so that the workings of the model are not transparent to stakeholders, compromising their confidence in the results.

What scope will options be considered within?

25. Changes to the EAF need to be considered in the context of the Climate Change Response Act (the CCRA) and all legislated requirements for the provision of allocation, including new provisions from the Climate Change Response (Emissions Trading Reform) Amendment Act 2020. Any options requiring anything other than minor and technical amendments to the Act are out of scope. However, a technical amendment to the CCRA may be necessary to allow implementation of a preferred option to be used in calculating and prescribing updates to allocative baselines to incorporate reference to an updated EAF.
26. Industrial allocation is currently being reviewed with a view to adjusting allocative baselines, and considering broader long-term changes to allocation policy. Changes to the EAF will not duplicate this work.
27. To date the EAF has been estimated using a collaborative process, based on forward-looking models, and then set at a single value and held constant for a period of years before being re-assessed. This process has led to some inaccuracy in the past, and may be less accurate in future because of changes in the wholesale electricity market.
28. Therefore, this RIS considers alternatives that involve changing to the use of more frequent updates based on a different process and modelling approach to improve accuracy. These are to update the EAF each year based on outcomes for that year, and to reduce the volatility inherent in that approach by using a rolling average to smooth out variations.
29. Further options are possible, such as doing an annual recalculation but delaying its use, or doing the updates only every two or three years. However, these would sacrifice accuracy without achieving any greater certainty than the rolling average approach, so are not considered further.

What options are being considered?

Option One – *Status Quo*

30. If no change is made, the EAF will stay at 0.537 tCO_2e/MWh indefinitely. This value will have to be used in any recalculation of baselines following the review. For the next five to ten years, the likely outcome is that there will be a small, but increasing, over-estimation affecting all allocative baselines. As the emission intensity of the electricity sector declines the error will increase. Ultimately, substantial numbers of units will continue to be allocated although there may be no significant NZ ETS price effect on electricity.
31. There would be a significant risk that unexpected or ongoing change in the electricity market mean that the Government would feel a need to step in and make an ad-hoc change to update the EAF relatively soon.

Option Two – *a one-off update to reset the EAF on an ex-ante basis*

32. This option proposes to recalculate and update the EAF as before. The recalculation would use ex-ante modelling to simulate the expected pass-through of costs for a future period. A practical horizon for modelling purposes is about five years, so the process would need to be repeated at five-year intervals.
33. The emissions and NZ ETS costs for electricity generation in New Zealand vary from year to year because of changes in hydrological conditions and the need for thermal generation to meet demand. There is additional uncertainty due to market changes as discussed above. The ex-ante modelling needs to simulate a wide range of outcomes and weight them by probability, both for the *'with ETS'* and *'without ETS'* cases.
34. All allocative baselines would be amended to incorporate the new EAF value. Apart from any changes that may emerge from the review of industrial allocation, they would be kept constant until the next update in at least five years' time. However, there is a risk that unexpected or ongoing change in the electricity market would mean that the Government feels pressure to make ad-hoc changes earlier.

Option Three – *a process to update the EAF annually on an ex-post basis*

35. This option proposes to use actual ex-post data from each compliance year to recalculate the EAF. We expect that this approach would result in greater accuracy for two reasons:
    a. Only the counterfactual *'without ETS'* case needs to be estimated by modelling. The actual *'with ETS'* case is known and is based on real data for the latest compliance year.
    b. The various parameters that affect the market – structural changes and hydrological conditions – are also known. Therefore, there is only one market situation to model instead of a probability-weighted range of projected outcomes.
36. All allocative baselines would then be recalculated to reflect the results. For the greatest possible accuracy, the updated EAF for a particular calendar year would be

put into new baselines soon after the end of the year and used in final allocations for the same year.

37. It would not be feasible to reassess the method of calculation or the modelling approach, on a first-principles basis, every year. A collaborative process of engagement and consensus building would also be impractical. Instead, we would decide on a modelling methodology and any necessary assumptions up front, and apply them consistently for annual updates.

Option Four – *as for Option Three but mitigating annual variations*

38. Under Option Three, any variation in hydrology or other conditions in a particular year would be fully reflected in allocations for that year. This is the most accurate option as it would mean costs in each year are reflected in that year's allocations. However, there is a risk that this would result in very high or very low EAF values in some years, because of exceptional hydrology or one-off events like plant shutdowns.
39. A rolling average of the last three years would reduce the impact of any exceptional year while still making use of the most up to date information available to keep the EAF current and accurate.
40. This option would result in a less accurate reflection of pass-through in any particular year. However, such very short-term changes are unlikely to be relevant to the risk of emission leakage in any case.

How do the options compare to the status quo/counterfactual?

	Option One – *Status Quo*	Option Two – one-off ex-ante	Option Three – annual ex-post	Option Four – annual rolling average
Alignment with NZ ETS objectives	0	++ Stable for at least 5 years or until an ad-hoc update is required; this is less likely than under the status quo	+ Durable process resulting in policy certainty, but annual outcomes variable	++ Good balance between accuracy and certainty
Accuracy	0	+ Improved c.f. status quo	++ Reduces errors and reflects changes year to year	++ EAF would follow the medium to long term trend in actual pass-through
Efficiency	0	+ Cost for initial process to recalculate EAF, no further cost likely over 5 years	+ Ongoing cost to Government for updates but this is small once a process is in place	+ Same as Option Three
Clarity	0	0 Initial assumptions clear, as they were in earlier updates, and modelling could be made more open but is more complex than for other options	++ Depends on model used but open source is feasible and would allow any user to replicate calculations	++ Same as Option Three
Overall assessment	0	+ Removes current known inaccuracy but leaves other EAF issues in place	+ Maximises accuracy	++ Same benefits as Option 3 with only inconsequential loss of accuracy and more certainty for businesses

What option is likely to best address the problem, meet the policy objectives, and deliver the highest net benefits?

41. Our assessment is that establishing a process to update the EAF annually, based on ex-post assessment rather than forward projections, will best meet the objective of accurately reflecting cost pass-through. Option Four will meet this objective, with minor loss of accuracy, while providing additional certainty and is our preferred option.
42. Industry stakeholders proposed the notion of assessing the EAF on an ex-post basis in the context of preparation for an update of the EAF in 2018/19. Businesses with EITE activities want to ensure that allocations accurately and fully reflect the effect of the NZ ETS on electricity prices, and that changes in allocation from time to time do not create investment uncertainty and unpredictability. These concerns are in tension to some extent, because accuracy requires the EAF to reflect market changes that may themselves be unpredictable.
43. Stakeholders were consulted on these options in April and May 2021. Only eight submitters had views on any aspect of proposals to update the EAF. Seven of them expressed a preference, and all supported moving to an ex-post approach with an overall preference for Option Four.
44. The consultation document proposed that the Electricity Authority's vSPD model would be a preferred choice for the implementation of this option, and discussed the input parameters that would be used. Stakeholders were asked for their views on these details and this model use, but did not provide detailed feedback. Our view is that the available information is sufficient to provide confidence that this model will be sufficient for successful implementation and that suitable input parameters can be identified.
45. The resulting EAF to be used to update allocative baselines where applicable for 2022 is the average of the annual EAFs for 2019, 2020 and 2021.
46. The Climate Change Response Act 2002 allows the Minister to recommend the making of regulations to update allocative baselines for electricity consumption information from large electricity contracts. These grounds are used to update the allocative baseline for aluminium smelting each year. Other allocative baselines can only be updated following a data collection exercise. The review of industrial allocation policy is proposing to amend that requirement to enable annual allocative baseline updates for EAF recalculation.
47. The following assessment of costs and benefits assumes all allocative baselines are updated annually for a recalculated EAF value, despite only aluminium smelting being impacted initially.

What are the marginal costs and benefits of the option?

Affected groups *(identify)*	**Comment** *nature of cost or benefit (e.g. ongoing, one-off), evidence and assumption (e.g. compliance rates), risks.*	**Impact** *$m present value where appropriate, for monetised impacts; high, medium or low for non-monetised impacts.*	**Evidence Certainty** *High, medium, or low, and explain reasoning in comment column.*
Additional costs of the preferred option compared to taking no action			
Regulated groups (firms who receive industrial allocation)	All options will increase net emissions costs due to reduced free allocations, but amounts are very unpredictable	Individual cost impact depends on the importance of electricity to the emissions cost profile of the firm.	Low: Difficult to determine impact on NZAS due to simultaneous project reviewing other allocative baseline methodology
Regulators	Modelling cost and regulatory administration – small and hard to isolate in overall ETS costs	Not possible to determine	Medium
Others (e.g. wider govt, consumers, etc.)	A marginal reduction in free allocation allows more NZUs to be auctioned, likely increasing the market price of NZUs, impacting all emitters	Not possible to determine	High
Total monetised costs			
Non-monetised costs		*(High, medium or low)*	
Additional benefits of the preferred option compared to taking no action			
Regulated groups	Confidence that their NZ ETS costs are accurately reflected in allocations	Not possible to determine	Medium
Regulators			
Others (e.g. wider govt, consumers, etc.)	Increased emissions trading scheme revenue through increased auction volume	Not possible to determine	High
Total monetised benefits			
Non-monetised benefits		*Medium*	

Section 3: Delivering an option

How will the new arrangements be implemented?

48. Any changes to the EAF need to be implemented by amendment regulations that will change the allocative baselines specified in Schedule 2 of the Climate Change (Eligible Industrial Activities) Regulations 2010. Drafting of such amendment regulations is straightforward, but they must go through the normal processes of regulation making and there is an expectation that affected stakeholders will be consulted. Amendment regulations will need to be in force in time for businesses to complete their allocation requests by 30 April each year.
49. In parallel with changes to the EAF, there will be other requirements to change allocative baselines over the next two to three years. The baseline for aluminium smelting is updated routinely every year. The review of industrial allocation is likely to lead to an update covering most or all the current baselines.
50. Due to current wording in the CCRA, it may not be feasible to update baselines (other than for large-user contracts, which have special provisions) by regulation. This was not the policy intention and solutions to this problem are being explored through the review of industrial allocation policy.
51. Consequently, only an update to the baseline of aluminium smelting for a new EAF can be progressed at this stage. There are no equitable treatment concerns from most industrial activities retaining the current EAF and aluminium smelting using a different value, as aluminium does not compete against the output of those activities, only against other aluminium producers offshore.

How will the new arrangements be monitored, evaluated, and reviewed?

52. This proposal will be integrated into the existing regulatory and monitoring framework of the NZ ETS. There is no requirement to set up any specific additional provisions to monitor its implementation and outcomes.