TOLVIK CONSULTING

The Waste and Bioenergy Experts

Response to Call for Evidence on Inclusion of EfW in the UK Emissions Trading Scheme

Department for
Business, Energy
& Industrial Strategy

Developing the UK Emissions Trading Scheme (UK ETS)

A joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland

Closing date: 17 June 2022

27 May 2022

1. INTRODUCTION AND BACKGROUND

1.1. Introduction

This response provides a summary of the key issues detailed in Tolvik's evidence to the ETS Authority with respect to its consultation on *"Developing the UK Emissions Trading Scheme ("UK ETS")".*

Tolvik is providing this response independently and not on behalf of a client. In making the response Tolvik's objective is to help ensure decisions made by the ETS Authority in respect of the inclusion of waste incineration and Energy from Waste plants (collectively referred to in this response as "EfW") is supported by the best available market information.

Tolvik is a leading provider of independent market analysis and commercial due diligence to the European waste and bioenergy sectors. Since 2009 Tolvik has provided waste companies, local authorities, project lenders and equity investors with thoroughly researched, authoritative market assessments upon which they can rely. The team has a wide range of commercial, operational and financial experience across the Residual Waste sector and Tolvik has had some involvement, generally under confidentiality, with the majority of EfWs in the UK.

1.2. Scope of Response

The consultation includes nine chapters and covers a wide range of subjects in respect of the ETS, including proposed adjustments to existing arrangements as well as the inclusion of additional industry sectors including from EfW.

This web version of key issues in included in our response primarily considers the matters raised in Chapter 8 in respect of the inclusion of EfW although aspects of other chapters are considered where relevant to EfW.

This key issues document is available via www.tolvik.com. Third parties are entitled to freely use the contents of the response, subject to appropriately acknowledging its source.

1.3. Key Terms

The term "**EfW**" (and "EfWs") is used in this response to define both waste incineration and Energy from Waste assets. The consultation document clearly articulates the differences in classification which are not repeated in this response.

EfW Asset and EfW Operator – due to the way in which EfWs have often been funded it is quite common for EfWs to have complex corporate structures. In these structures the ownership of an EfW is separate (and different) from the operation of the asset. Furthermore corporate responsibility for asset management, operation, environmental permit compliance and waste supply can be split in various. As a result to prevent confusion and potential disputes the ETS Authority will need to unambiguously specify the activity at an EfW which will give rise to any obligations under the ETS so that this obligation can then be allocated to the correct corporate entity involved with the EfW.

"ETS carbon cost" - is used in this response as a descriptor of any direct costs incurred under the UK ETS either by EfW and/or, if applicable, passed through to their waste suppliers (including Local Authorities).

"Residual Waste" – used to describe solid, non-hazardous, combustible mixed waste which remains after recycling activities and which can be thermally processed alongside Residual Household Waste. Residual Waste is the term used to describe waste supplier to non-specialist EfWs.

2. FIVE KEY ISSUES TO CONSIDER

2.1. Heat – *should free allocations be available?*

The generation of useful heat is a key part of the UK's Net Zero and decarbonisation plans.

Chapter 8 calls for evidence regarding the inclusion of EfWs within the UK ETS and states that *" .. if heat from the EfW process is utilised, EfW is an even better option…"*.

Elsewhere the consultation states *"… the UK ETS may help raise the efficiency of conventional EfW plants by incentivising more plants to supply heat (i.e. heat offtake).."*

However the consultation does not provide a clear view as to whether heat generation from EfW (either for industrial or district heating) is to be incentivised under the proposed MRV protocols. This seems somewhat perverse – in that after many years of government, regulators and operators seeking to make better use of heat from EfW, there is the potential that an opportunity for a relatively simple incentive for greater deployment of heat could be missed - for an example through inclusion of heat in free allocation system.

It is noted that the consultation includes other matters of heat in relation to "electricity generators". Proposals 5 and 6 deal with definition changes which include electricity generators with a heat offtake. Chapter 9 considers some technical amendments to the ETS systems for the timing of free allocations in respect of heat exports that are measured(1). Under the existing ETS, an electricity generator / CHP plant, under certain criteria, can receive free allocations for measured heat exports.

In Tolvik's opinion. if EfWs are to be included in the ETS, it would be consistent with the Government's decarbonisation ambitions if similar opportunities are provided to EfW for heat exports as they currently are provided to other electricity generators.

2.2. Who pays what - *some known knowns*

Tolvik's most recently published projection(2), of Residual Waste fuelled EfW capacity in the UK in operation or construction is 19.4Mtpa by 2026.

As shown in Figure 1, it is further estimated that the Local Authority waste supply to these EfWs is likely to increase from 11.4Mtpa in 2021 to around 14.0Mtpa by 2026 (~70% of UK EfW capacity).

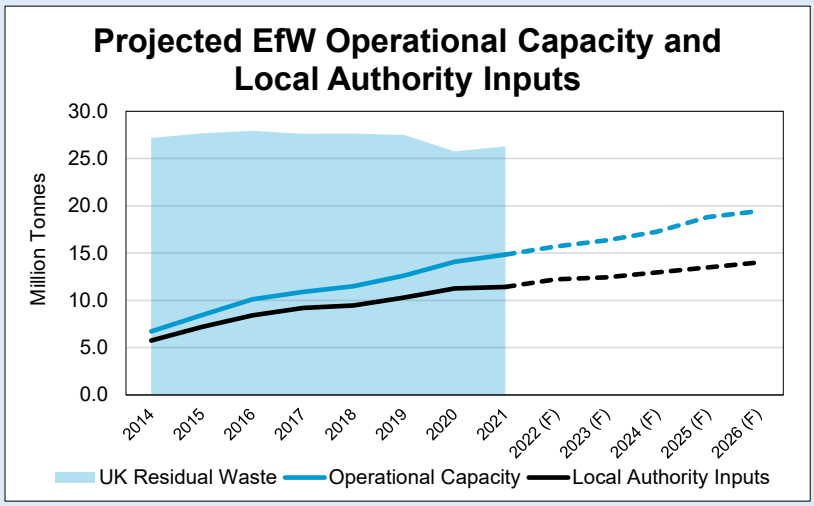


Figure 1: Projected UK EfW Capacity and Local Authority inputs Source: Tolvik analysis

Assuming ETS is extended to include EfW as set out in the consultation, Figure 2 shows Tolvik's high level estimate of the associated total annual ETS carbon cost to be £0.4-£0.8bn.

Such potential costs are significant for the EfW sector. According to the latest published data[10] average EfW gate fees were £93/t. Assuming that, in real terms, this is unchanged by 2026, total gate fee income charged for Residual Waste sent to EfWs would be just over £1.8bn. As Figure 2 shows **the total ETS carbon cost would be 23-43% of this total**.

Furthermore, assuming EfWs pass this cost fully through to their waste suppliers, including Local Authorities, Local Authorities in the UK would be potentially liable for additional costs of £0.3-£0.6bn.

The assessment in Figure 2 is based upon the projected capacity of operational EfW assets in 2026, the estimated current average CO_2 emissions and fossil content of waste supplied to operational EfWs (see Appendix 1) and carbon price assumptions based on those seen since the commencement of the UK ETS. The computations in Figure 2 assume no free allocations are attributed to the EfW sector.

ETS Carbon Cost Estimate	Source	Estimate
Projected Certain EfW Capacity in 2026	*Tolvik* [2]	19.4Mt
Local Authority Inputs to EfW in 2026	*Tolvik analysis*	14.0Mt
Average CO2 emitted	*2020 Pollution Inventory*[3]	0.992tCO_2/tonne waste input to EfW
% Fossil Content	*WRAP Composition* [4]	48%
Assumed Carbon price per t CO_2	*Market prices from May 21 to April 22*[5]	**£45 - £85**
Indicative cost of ETS to EfW Operators		**£416m - £785m**
Indicative Cost of pass through to Local Authorities		**£300m - £567m**

Figure 2: Projected 2026 Cost of ETS based upon recent carbon prices Source: Tolvik analysis

There is a potential further consequence of the application of ETS to EfW that will need to be considered. The Extended Producer Responsibility ("EPR") scheme being developed by DEFRA requires a Scheme Administrator to manage the costs of dealing with Packaging Waste from brand owners / retailers and compensate Local Authorities for their incurred costs.

A review of the National Waste Composition by WRAP[4] indicates that as much as 24% of Residual Waste is packaging derived waste which will largely be sent to EfW. As a result a significant portion of ETS carbon costs may well need to flow back to the EPR Scheme Administrator for them to compensate Local Authorities whose waste has been processed in an EfW.

2.3. ETS Carbon Costs – *making sure the (waste) producer pays?*

The call for evidence considers the implications of cost pass through of ETS carbon costs from an EfW asset or owner to its waste suppliers – the waste producers.

It is noted that developments already underway in the sector are rapidly advancing the ability to accurately measure CO_2 emissions from EfWs and fossil content thereof through analysis of waste supplied and combusted. This is potentially important in accurately assessing the future ETS carbon cost liability of an EfW.

However, in Tolvik's opinion, using empirical data calculated by more than 70 EfWs in the UK by the mid to late 2020's, with multiple waste suppliers, a variable cost of carbon and a variable fossil content of Residual Waste is likely to result in excessive complexity.

Waste is a heterogenous fuel, with significant seasonal and other variability. Most EfWs have multiple waste suppliers, each with their own complex waste supply chains. Waste from these different suppliers is mixed in the bunker before being combusted. In Tolvik's opinion, if such empirical data is used to calculate an EfW's liability under the ETS, it will be very challenging for an EfW operator to calculate and demonstrate

to each waste supplier, in an auditable manner, their individual liability for ETS carbon costs. Furthermore, as the industry has found, irrespective of protocols followed, Residual Waste sampling processes can yield significant variation in results between what should be similar samples.

As set out in Section 2.2, Local Authorities are currently and expected to remain the largest suppliers of waste to EfWs, are likely to carry the majority of the ETS carbon cost burden. Local Authorities need to be able, as far as is possible, to plan their financial commitments across competing demands for public services. With the expected variability arising from the use of empirical data to calculate ETS liabilities, this would be particularly challenging.

Tolvik therefore recommends the ETS Authority considers, at least for an introductory 5 year period;

- **Calculating the carbon price on which the ETS carbon cost for EfW is based using fixed, escalating carbon prices (rather than market prices).** This would be consistent with the plans in Germany for fixed carbon prices for an initial period of 5 years and moving to a market carbon price thereafter.

Tolvik also strongly recommends to the ETS Authority that

- **Emissions for each EfW on which the ETS carbon cost is based are calculated using the emission factors approach** (based upon nationally established emission factors and fossil content by European Waste Catalogue chapter in a similar way to those in the Netherlands used in assessing their EfW tax[6]). See 2.4 further details.

2.4. How much to pay – *some unknown knowns*

The compound effect of uncertainties in both the fossil content of waste and future carbon prices is, in Tolvik's opinion not just going to result in complexity, but, assuming that EfWs look to pass through ETS carbon cost to waste suppliers, it will almost certainly result, whether intended or not, **in the risk of EfWs over or under recovering ETS carbon costs**.

Figure 3 provides an analysis, on the basis of the data in Appendix 1, of the indicative liability per tonne of Residual Waste combusted for ETS carbon cost.

Based on Tolvik's experience of the sector the analysis assumes a range in the fossil content of Residual Waste of 30-60% and as for Figure 2, a range in carbon price of £45-£85. The net effect is a range in ETS carbon costs of per tonne of Residual Waste combusted of £13-£51/t.

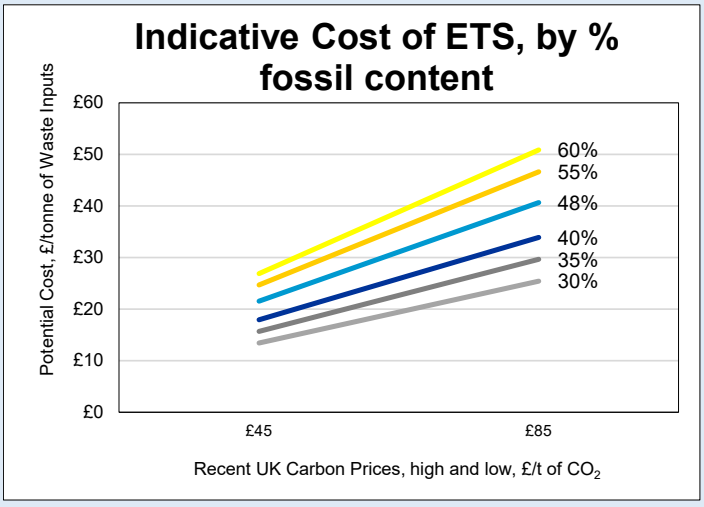


Figure 3: Indicative ETS Cost based upon recent carbon prices & variable % fossil Source: Tolvik analysis

Fossil Content of Residual Waste – Composition sampling of heterogenous Residual Waste feedstocks is challenging. The seasonal variations in Residual Waste composition, the physical constraints on sampling techniques (e.g. as basic as bulky wastes are not easily handled and do not fit into sampling buckets) and the need for enhanced health and safety practices all make composition sampling inherently uncertain. To this, given the potential sums involved, there is a very real risk that, irrespective of the protocols, there is "selective" sampling for optimum outcomes and competitive advantage (EfWs compete with each other for Residual Waste). It is not clear to Tolvik how, without using the emission factor approach, this risk could be effectively managed.

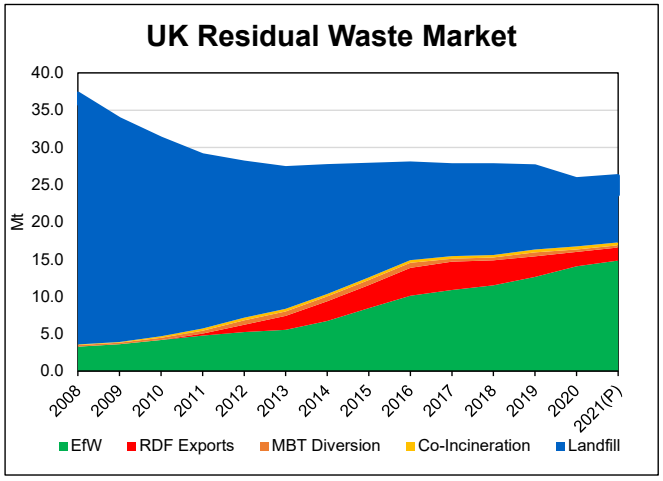
Tolvik notes that an emissions factor approach does not incentivise individual waste suppliers to reduce the fossil content of their Residual Waste and hence carbon emissions – rather it incentivises the market as a whole. This is clearly a potential weakness of the emissions factor approach, but in Tolvik's opinion, building up confidence in the ETS is, at least in the short to medium term, a greater priority.

Carbon Prices – Since inception of the UK ETS carbon prices have ranged between £45-£85/t. It is also noted that current Government advice on carbon prices to be used for policy appraisal and evaluation[8] assume low and high ranges of carbon prices to 2030 of between £120/t and £420/t. Applying this range of carbon prices, again using the assumptions in Appendix 1 and without any free allocations, would indicate an ETS carbon cost from the EfW sector of between £1bn - £4bn annually.

These are further reasons why Tolvik's recommendations in Section 2.3 are for standard emissions factors and fixed carbon prices which seek to reduce these uncertainties and risks to provide a set of robust and deliverable outcomes.

2.5. Leakages – *some proper fixes are needed*

Figure 4 shows the evolution of the UK's Residual Waste market over the past decade.



Mt	2016	2017	2018	2019	2020	2021(P)
RDF Exports	3.73	3.78	3.38	2.77	1.93	*1.76*
EfW	10.10	10.88	11.49	12.63	14.06	14.81
Co-Incineration	0.35	0.35	0.34	0.39	0.40	0.40
MBT Diversion	0.70	0.41	0.37	0.52	0.33	*0.30*
Landfill	12.98	12.20	12.06	11.19	9.05	*8.91*
Total	**27.86**	**27.62**	**27.64**	**27.50**	**25.77**	***26.18***

Figure 4: UK Residual Waste Market – England – 2018 Source: Various, Tolvik analysis

The free allocation system is a policy instrument within the UK ETS that aims to mitigate carbon leakage and competitiveness risks associated with carbon leakage. Tolvik notes that Principle One of the proposed changes to the distribution of free allocations is *"….To ensure that the UK ETS appropriately mitigates carbon leakage risk caused by the carbon price it sets, ensuring a true reduction to global emissions. …"*

For the Residual Waste sector (and hence EfW) sector leakage can occur both across borders (exports of waste), leakage to lower environmental outcomes (landfill), but also possibly to emerging solutions of Waste to Fuel technologies.

Tolvik recommend the ETS Authority, along with other relevant government departments, assess suitable mechanisms to prevent the risk of leakage of Residual Waste by considering such measures as:

- Landfill - increasing the rate of landfill taxes, and/or landfill bans;
- Exports - applying equivalent carbon costs to exported Residual Waste, at point of export notification. In doing this the ETS Authority will need to remain aware of the relevant levels of EfW taxation in other (largely European) countries. It is possible, although unlikely, that the differential between the tax charge for EfW in a specific country and the ETS liability is such that the application of equivalent carbon costs to exported Residual Waste is insufficient to prevent leakage.
- Waste to Fuel/Chemical type technologies – incorporate facilities accepting Residual Waste within the ETS alongside EfW – recognising that carbon emissions per tonne of Residual Waste may be significantly lower and their ETS carbon cost should reflect this accordingly.

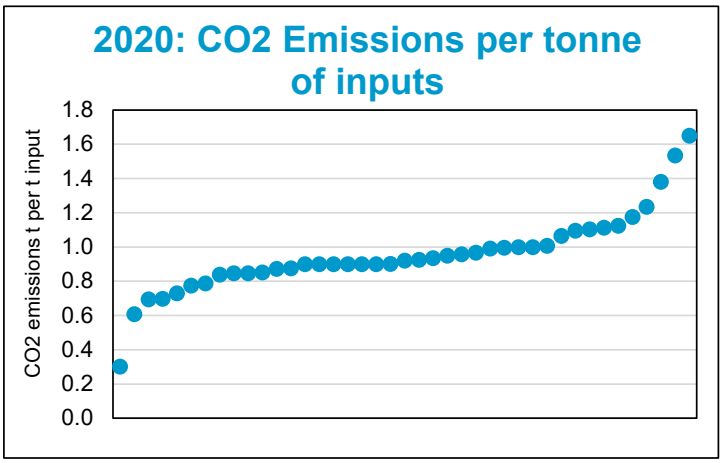
Appendix 1 Carbon Emissions of EfW [2]

It continues to be the case that, in the absence of a standard methodology, there is a significant element of subjectivity in estimating carbon intensity of EfW. This is further complicated by the wide variation in the operational performance of individual EfWs and the range of wastes accepted.

There is a general consensus that EfWs are not simply power stations and that it is incorrect to benchmark them solely against other sources of power generation. The general view is that any estimate of carbon intensity needs to also recognise their role in diverting Residual Waste from landfill and, depending on their operational configuration, generating heat and power and contributing to recycling.

The analysis of carbon intensity is very sensitive to the estimates given as to the total tonnage of CO_2 emitted by each EfW. Tolvik has based the analysis on data provided in Pollution Inventory returns.

There continues to be is a very significant variation in reported CO_2 emissions. Further work is needed to ensure consistent methodology and reporting.



Excluding any benefits from avoiding landfill, it is estimated that in 2021, on average across the UK EfW fleet, net carbon emissions were 0.340 tCO_2e per tonne of waste, up 2.1% on the recalculated 0.333 tCO_2e per tonne of waste seen in 2020.

	Per tonne of Input Waste	Unit	Data Source	2020	2021
	Average CO_2 emitted	*tCO_2*	*2020 Pollution Inventory[3]*	*0.992*	*0.992*
	% Fossil		*WRAP Composition – 2017[4]*	*47.9%*	*48.0%*
Emissions	Fossil CO_2 emitted	tCO_2		0.475	0.476
	Other GHG emitted	tCO_2e	*N_20 from Pollution Inventory[3]*	0.037	0.037
	Fuel import	tCO_2e	*APR and UK GHG Conversion Factor [9]*	0.007	0.007
	Total Fossil Emissions	**tCO_2e**		**0.519**	**0.520**
EfW Outputs	*Total Power Export*	*MWh*	*Figure 10 [2]*	*0.553*	*0.591*
	Imported Power	*MWh*	*APR [2]*	*(0.007)*	*(0.006)*
	Net Power Export	*MWh*		*0.546*	*0.584*
	Heat Export	*MWh*	*Figure 15 [2]*	*0.117*	*0.125*
	Recycling Benefit	*t*	*Figure 17[2]*	*0.019*	*0.017*
Substitution Benefits	Net Power Export	tCO_2e	*Converted using UK Government GHG Conversion Factors for company reporting for the applicable year[9]*	(0.127)	(0.124)
	Heat Export	tCO_2e		(0.020)	(0.021)
	Recycling Benefit	tCO_2e		(0.039)	(0.034)
	Total Benefits	**tCO_2e**		**(0.186)**	**(0.180)**
	Impact (Net Emissions)	**tCO_2e**		**0.333**	**0.340**

Figure A1: Estimated Carbon Emissions per tonne of waste input

SOURCES

(1) Guidance Document No. 5 on the harmonised free allocation methodology for the EU ETS post 2020 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873780/Guidance_on_Monitoring_and_Reporting_in_relation_to_the_free_allocation_rules__GD5_.pdf

(2) Tolvik's EfW Statistics 2021 https://www.tolvik.com/published-reports/view/uk-energy-from-waste-statistics-2021/

(3) 2020 Pollution Inventory Dataset , Environment Agency https://environment.data.gov.uk/portalstg/home/item.html?id=9fd350cf2d264cf2967f28cb6bd5895c

(4) WRAP: National Municipal Waste Composition, England 2017 https://wrap.org.uk/content/quantifying-composition-municipal-waste

(5) Carbon Prices https://ember-climate.org/data/data-tools/carbon-price-viewer/

(6) Dutch Emissions Agency https://www.emissieautoriteit.nl/documenten/hulpdocument/2021/05/25/berekeningsfactoren-afvalstoffen

(7) Germany- carbon prices for BEHG https://www.dihk.de/resource/blob/19512/8a03955209ed045fb4870917da6a225c/dihk-merkblatt-brennstoffemissionshandelsgesetz-data.pdf

(8) BEIS - Valuation of greenhouse gas emissions: for policy appraisal and evaluation https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

(9) UK Govt. Greenhouse gas reporting: conversion factors 2020 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

(10) WRAP Gate Fee Report 2020 https://wrap.org.uk/resources/report/gate-fees-report-2020

GLOSSARY

ACT	Advanced Conversion Technologies
ATT	Advanced Thermal Treatment
CCUS	Carbon Capture Utilisation and Storage
CEMS	Continuous Emissions Monitoring Systems
C&I Waste	Commercial and Industrial Waste
EfW	Energy from Waste, also including waste incineration facilities
EWC	European Waste Catalogue
GDP	Gross Domestic Product
HWRC	Household Waste Recycling Centre
LACW	Local Authority Collected Waste
Mt	Million tonnes
MRV	Monitoring, Reporting and Verification
RDF	Refuse Derived Fuel
SIC	Standard Industry Classification
SRF	Solid Recovered Fuel
TFS	Transfrontier Shipments of Waste