

Call for Evidence: Review of the Role of Incineration in the Waste Hierarchy

Scottish Environment LINK response, February 2022

Summary

The amount of materials we extract, consume and dispose of is closely linked to our environmental impact. We need to fundamentally reduce our consumption of raw materials and move to a more circular economy where residual waste becomes a problem of the past.

Every effort must be made to reduce waste, prioritising action higher up the waste hierarchy, with a strong focus on design, and systems for repair, reuse and recycling. As such we would expect a diminishing residual waste stream as products last longer, more materials are recycled, chemical contamination is reduced and there is a shift from 'waste' to reusable 'by-products'.

Robust waste management systems are needed, albeit in a reducing capacity, and it is of utmost importance that they are designed to play their part in the transition to circularity. The analysis presented by The Review suggests that we should avoid constructing additional incinerators as these will not be needed. Unnecessary capacity can act as a disincentive to reducing the residual waste stream.

Waste management systems for the future need to be compatible with net-zero and biodiversity enhancement. As such we shouldn't landfill biodegradable materials (addressed by the upcoming ban) but we also shouldn't burn fossil materials. Plastic should be removed from waste going to incineration.

Our key recommendations and messages in this response are:

1. The review should extend the current moratorium on new and current incineration applications and set milestones for the reduction of existing incinerator capacity in line with minimum requirements.
2. The quickest, most effective way of reducing the climate change impacts of existing incinerators would be to ban the burning of plastic waste.
3. Additional pre-sorting should be required to remove all recyclable materials.
4. More transparent reporting of the carbon emissions of incineration is required.

Detailed response and recommendations

Q1. What is your name? Phoebe Cochrane

Q2. What is your email address? phoebe@scotlink.org

Q3. Which category in the following list best describes you? Environmental group

Q4. If you are replying on behalf of a business or representative organisation, please provide the name of the organisation/sector you represent, where your business is located, and an approximate size/number of staff (where applicable).

Scottish Environment LINK
Offices in Edinburgh and Perth, Scotland
Number of staff: 10

Q5. If you are an organisation, please be aware that your response may be published with your organisation's name. If you are responding as an individual, please indicate if you give permission for your response to be published, without your name or email address, as part of the review. If there are elements of your response which would wish to remain confidential, please make this absolutely clear within your answer. You can make this clear by writing 'confidential' at the start of your response. N/A

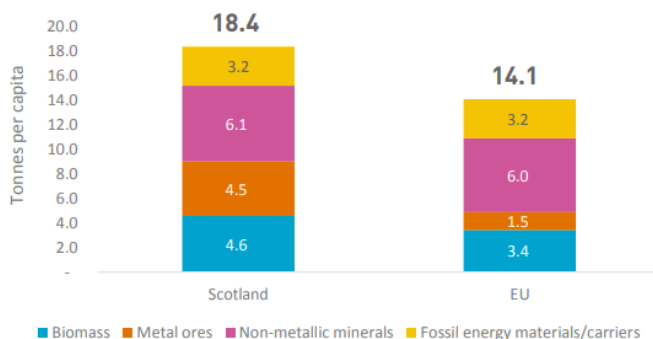
Q6. Does the Review Team have permission to contact you about your response? Yes

BACKGROUND

Scottish Environment LINK is the forum for Scotland's voluntary environment community, with 42 member bodies representing a broad spectrum of environmental interests with the common goal of contributing to a more environmentally sustainable society.

The vital role that moving to a more circular economy plays in meeting our climate goals¹ and biodiversity loss² is clearly set out - the UN has found³ that 'resource extraction and processing' causes 90 per cent of biodiversity loss and water stress around the world, as well as 50 per cent of global carbon emissions. In Scotland about 80% of our carbon footprint⁴ is from the goods and services we consume and use, and recently published Material Flow Accounts⁵ show that our material footprint per capita is 20% more than the EU average and over double what is considered sustainable (8 tonnes per person per year).

Scotland's Material Footprint (source: Zero Waste Scotland, 2021)



¹ UN (2021) [Shifting to a CE essential to achieving Paris Agreement goals](#)

WRI (2021) [How the CE can help nations achieve their climate goals](#)

EMF [How the CE tackles climate change](#)

² <https://ellenmacarthurfoundation.org/biodiversity-report>

<https://www.sitra.fi/en/articles/the-circular-economy-can-turn-the-tide-on-biodiversity-loss/>

³ <https://www.resourcepanel.org/reports/global-resources-outlook>

⁴ <https://www.gov.scot/news/scotlands-carbon-footprint-1998-2017/>

⁵ <https://www.zerowastescotland.org.uk/research-evaluation/material-flow-accounts-mfa>



The Scottish government⁶ was an early proponent of the circular economy which has been increasingly referenced and supported in recent policy⁷. However, we are far from circular and policy change is required across the economy.

Before turning to waste management and incineration, it is important to note that circular economy policy must focus on reducing our overall consumption of raw materials and actions higher up the waste hierarchy are most effective⁸. Although the management of residual waste has less bearing on the life cycle environmental impact of a product, it still has an important role to play. There can be additional sorting stages to remove valuable materials prior to and after treatment and the treatment approach can be tailored to minimising environmental / social harm depending on the composition of the waste stream.

Incineration is fundamentally a linear⁹ technology. Once material is burnt, opportunities to return it to the economy are lost –perpetuating the consumption and extraction of raw materials. As such incineration is in general the least preferred option¹⁰ for managing waste and, in order to develop a circular economy, it is necessary (but not sufficient) to limit and reduce incineration as much as possible.

Q7. How much capacity do you think we need to build given the current waste produced, managed and disposed of in Scotland, as well as Scotland's waste and recycling targets? What evidence do you have to support this?

In general, Scotland should make every effort to meet its waste targets. The exception being the limit of 5% of all waste to landfill which is a questionable ambition in light of net-zero¹¹.

In terms of capacity requirements, we believe that the CXC study considered in the call for evidence clearly shows that, if we meet waste targets, we do not need additional incinerator capacity beyond currently operational plants (0.67 MT) from 2025, if the BMW ban is not extended. If the BMW ban is extended to Commercial and Industrial waste, the currently operational plants plus one (0.9 MT) would be needed from 2025.

We must make every effort to meet the relevant targets and plan accordingly. Upcoming EPR and DRS schemes will help and can be supported by additional measures which will reduce capacity requirements. There are strong arguments for removing plastic from waste going to incineration and, if this was phased in over the coming years, it would further reduce incinerator capacity requirements. We also recommend that a final sorting stage is mandatory so that all recyclable material is removed from the waste stream, further reducing the final volume of residual waste.

If there is a short-term capacity deficit, it should not be assumed that this needs to be filled with additional incineration capacity. Other, lower carbon options remain such as biostabilisation followed by landfill, or, as

⁶ Scottish Government (2016) [Making things last](#)

⁷ See the climate change plan update <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/> and the draft National Planning Framework 4 <https://www.transformingplanning.scot/national-planning-framework/draft-npf4/>

⁸ It is estimated that over 80% of all product-related environmental impacts are determined during the design phase of a product <https://ec.europa.eu/jrc/en/research-topic/sustainable-product-policy#:~:text=It%20is%20estimated%20that%20over,throughout%20their%20entire%20life%20cycle.>

⁹ 'linear' as opposed to 'circular' describes the predominant 'take, make, use, throw away' system

¹⁰ There are certain waste streams, such as contaminated waste, where incineration is probably the best approach

¹¹ <https://zerowasteurope.eu/library/rethinking-the-eu-landfill-target/>



a last resort stopgap measure - increasing export (to well managed plants in Europe with additional capacity). Such measures will allow Scotland's progress towards a circular economy to continue without creating unnecessary management capacity.

In the light of the above, we believe Scotland does not need additional incinerator capacity for the waste streams being considered.

Q8. It is suggested that the development of incineration capacity could lead to a 'lock-in' effect which will prevent waste from moving further up the hierarchy to be reused or recycled. What evidence do you have about these valid concerns? How do we prevent this lock-in effect, if it is a real risk?

Lock-in is an established concept in infrastructure understanding and practice. For example, Corvellec et al. (2013)¹² examines four different types of lock-in (institutional, technical, cultural and material) related to a waste incinerator in Sweden.

Incineration can harm progress towards a circular economy by creating lock in and reducing the incentive to shrink the residual waste stream. Evidence for this is clear in countries with high incineration rates, such as Denmark¹³ and Germany¹⁴. The 2020 Policy Connect report¹⁵ was criticised for recommending a move towards a Scandinavian style approach to residual waste by the Green Alliance¹⁶ and others, and Denmark is now planning to move away from incineration¹⁷.

SEPA's waste data publications¹⁸ show that landfill rates have fallen and incineration rates have risen since 2011, for all waste and household waste. Most of Scotland's incinerators are new plants, which began operating around 2018 meaning Scotland's existing incineration capacity will last for at least the next 20 years.

Lock-in can be limited by not building any more incineration plants in Scotland, this requires a strong new lead from policy makers. The temporary moratorium on new incinerators needs to be extended immediately and indefinitely. This approach has been applied to all but very small incinerators in Wales¹⁹.

Q9. Are you aware of any evidence or data that could be used to improve the capacity analysis? It would be particularly helpful if you could provide us with data on:

- ***HH and C&I waste composition.***
- ***C&I waste arisings, recycling and treatment.***
- ***The potential developments of future RDF export markets.***
- ***composition and biodegradability of sorting residues from HH, C&I and C&D waste.***

¹² Corvellec et al. (2013) [Infrastructures, lock-in, and sustainable urban development: the case of waste incineration in the Göteborg Metropolitan Area](#)

¹³ ZWE (2019) [A Danish Fiasco](#)

¹⁴ NABU (2020) [The future of waste incineration in a modern CE](#)

¹⁵ Policy Connect (2020) [No time to waste](#)

¹⁶ Green Alliance (2020) [Scandinavians call their waste incineration "crazy", so why copy them?](#)

¹⁷ For example, [Peter Høngaard Andersen, Director of Innovation Fund Denmark](#): "Denmark is very, very bad (regarding) reusable plastic, and that is because, for many years, we have burned our waste using incinerator plants".

¹⁸ SEPA (2021) [Waste data for Scotland](#)

¹⁹ Welsh Government (2021) [Wales takes action on CE with a moratorium on EfW](#)

Q10. What treatment options for residual waste should Scotland consider?

A ban on burning plastic would dramatically reduce greenhouse gas emissions from incinerators. Burning plastics releases fossil carbon into the atmosphere directly contributing to climate change. There are two immediate technical consequences of a ban: firstly, plastic would need to be separated from the remaining residual waste streams; and secondly, an alternative disposal mechanism is required in the short term.

Existing mechanical pre-treatment processes can separate plastic from other wastes but are not 100% effective, for example composite materials pose a problem. Therefore, a staged introduction of the plastic ban may be necessary, based on the technical limitations of today's sorting technologies and waste composition. A total ban should be implemented as soon as possible, which would incentivise alternatives to 'hard to sort' and 'hard to recycle' plastic products. Plastic that is unsuitable for recycling, can be landfilled, essentially storing the plastic, lowering greenhouse gas emissions.

As well as banning plastic, additional sorting should be compulsory. A compositional analysis of Scottish household waste found 59% is typically recyclable²⁰. This component should be removed at a final sorting stage.

The full potential of the role of biostabilisation in Scotland needs to be further explored²¹.

Q11. What emerging technologies are there for small scale residual waste treatment to support remote and island communities?

Q12. What data can you share with the Review on the costs of operating any options for managing residual waste in Scotland, especially costs based on real experience?

Q13. What data can you share with the Review on the wider costs associated with options for managing residual waste in Scotland, especially where those costs have materialised?

Q14. Do you have any evidence that the Review should consider in comparing the carbon impacts of options for residual waste treatment?

Studies have clearly shown that the most effective waste measures in terms of carbon come from preventing its existence in the first place²².

An in-depth and peer reviewed study by Zero Waste Scotland estimated the carbon impact of sending one tonne of municipal waste to incineration in Scotland in 2018 to be 246 kgCO₂e/t, which is 27% lower than the impact of sending the waste to landfill²³. However, this study assumed that all biogenic carbon in landfill biodegrades, whereas about half is stored as biogenic carbon. This approach conformed to international reporting guidelines, but is inappropriate for comparisons between technologies, used to aid policy decisions. When biogenic carbon is included the emissions from incineration are comparable, or greater than landfill²⁴.

²⁰ <https://www.zerowastescotland.org.uk/composition-household-waste-kerbside>

²¹ <https://zerowasteurope.eu/wp-content/uploads/2020/06/zero-waste-europe-policy-briefing-MRBT-en.pdf>

²² Green Alliance (2018) [Less in More out](#) and WRAP (2021) [Carbon waste and resources metric](#)

²³ ZWS (2021) [Climate change impacts of burning municipal waste in Scotland](#)

²⁴ UKWIN (2018) [Climate change impacts of incineration in the UK](#)



Q15. What other aspects should the Review consider when assessing the environmental impacts of residual waste treatment options?

Incineration contributes directly to climate change by releasing carbon into the atmosphere from burnt material. The emissions from incineration are included in the energy sector, rather than the waste sector in Scotland's emissions reporting²⁵. This gives policy makers the false impression that waste sector emissions are declining²⁶, when they are, in fact, being diverted to another sector. This carbon accounting loop-hole has allowed the emissions from incineration to increase unnoticed – their emissions masked by the relatively larger impacts of the rest of the energy sector.

The Scottish Government's climate change advisory body, the Climate Change Committee estimates that incinerators now emit more carbon than coal burning in the UK²⁷. Scotland must make the reporting of incineration emissions more transparent, and start attributing incineration emissions to the waste sector in its Climate Change Plan.

Q16. Do you have any evidence that the Review should consider in comparing the other (non-climate) environmental risks of options for residual waste treatment in Scotland?

Incineration has non-climate environmental risks. Some of these, such as air pollution, dioxins and hazardous ash are well understood and documented²⁸. Emissions include dioxins, NOx and ultrafine particulate matter that can be harmful to both human health and the natural environment.

Importantly, the societal risks of CCS are rarely discussed. Piping CO₂ poses risks similar to those associated with fossil fuel pipelines, from land disturbance and water contamination to the danger of explosions and other accidents²⁹. The IPCC recognizes that "carbon dioxide leaking from a pipeline forms a potential physiological hazard for humans and animals"³⁰.

Q17. Do you have evidence or experience of the community impacts (positive and negative) of different residual waste treatment options, e.g. landfilling compared to incineration, that you could share?

Q18. Do you have evidence (reports, studies, data) that could help to inform consideration of the public health implications of different treatment options?

The recent and numerous reports³¹ on the health impacts on incineration, even within EU limits, should be considered seriously. The moratorium on new applications should not be lifted until full consideration of the

²⁵ <https://www.gov.scot/publications/scottish-greenhouse-gas-statistics-1990-2019/>, CCC (2021) [Progress Report Scotland](#) p131

²⁶ The Scottish Government's Climate Change Plan states: "In 2018, waste and resources sector emissions were over 70% lower than in 1998." This does not include for emissions from incineration of waste, which have increased over this period as waste was diverted from landfill to incineration.

²⁷ <https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf> (page 129)

²⁸ <https://appga.files.wordpress.com/2021/12/211208-waste-incineration-and-public-health-appg-air-pollution-report.pdf>

²⁹ Ceil (2021) [Why Carbon Capture is not a climate solution](https://www.ciel.org/wp-content/uploads/2021/07/Confronting-the-Myth-of-Carbon-Free-Fossil-Fuels.pdf) <https://www.ciel.org/wp-content/uploads/2021/07/Confronting-the-Myth-of-Carbon-Free-Fossil-Fuels.pdf>

³⁰ IPCC Special Report on Carbon Dioxide Capture and Storage Chapter 4, supra note 61, at 188

³¹ For example APPGAir Pollution (2021) [Pollution from waste incineration](#) which recommended a moratorium on incineration in England and the [ELAPSE study](#), published in the BMJ (2021) which concluded "Long term exposure to outdoor air pollution was positively associated with Mortality: even at levels well below the EU limit values, US Environmental Protection Agency national ambient air quality standards, and WHO air quality guidelines for fine particles and nitrogen dioxide".



health impacts of incineration are reviewed fully. It is important to take into consideration, that when any waste plastics containing PVC are burned they will produce particularly toxic and long lived combustion by-products, including carcinogens, such as dioxins and dibenzofurans³². Such by products are associated with incinerator flue emissions.

Q19. What are the main considerations in deciding where capacity should be located, and in what form?

Q20. Do you have evidence to support consideration of options to decarbonise the current residual waste treatment infrastructure in Scotland?

Removing plastic from the waste stream would reduce GHG emissions from incineration plants³³. Such plastic could be recycled or, where this is not possible, landfilled.

Q21. Do you have evidence of the main barriers and drivers of decarbonisation of this infrastructure?

Carbon Capture and Storage is often cited as a means of reducing emissions from existing infrastructure. However, CCS is not a realistic option for managing waste emissions from incineration in Scotland. The UK CCC caution against the Scottish Government relying on CCS to meet GHG targets³⁴. CCS would exacerbate lock-in to an unsustainable waste management system.

³² <https://www.sciencedirect.com/science/article/pii/S187802961630158X>

³³ <https://www.circularonline.co.uk/news/study-remove-plastic-from-waste-sent-to-incinerators-to-meet-net-zero-goals/>

³⁴ <https://www.theccc.org.uk/publication/progress-reducing-emissions-in-scotland-2021-report-to-parliament/>



This response is supported by the following LINK members:

Association for the Protection of Rural Scotland (APRS)

Fidra

Friends of the Earth Scotland

Froglife

Marine Conservation Society

Nature Foundation

North East Mountain Trust

Scottish Countryside Rangers Association

Scottish Wild Land Group

Scottish Wildlife Trust

For further information contact:

Phoebe Cochrane, Sustainable Economics Officer

phoebe@scotlink.org



Scottish Environment LINK the voice for Scotland's environment



Registered office: 5 Atholl Place, Perth, PH1 5NE. A Scottish Charity No. SC000296

Scottish Environment LINK is a Scottish Company Limited by Guarantee and without a share capital under Company no. SC250899