

A VISION FOR THE
**FUTURE OF
UK WASTE**

Introduction

Since the early 1990s the waste sector has played a leading role in helping the UK become more sustainable. We recycle more, send far less waste to landfill and use unrecyclable waste to generate reliable homegrown energy that powers millions of homes. In doing so, we have reduced greenhouse gas emissions from the waste sector by more than 65%. It is a Great British success story.

And yet.

In recent years recycling rates have stalled. Carbon emission reductions have flatlined. We're exporting too much of our waste rather than dealing with it ourselves. Despite calls to consume less and reuse more, we've never produced more waste.

Is the success and efficiency of our waste system a reason for this? That out of sight really is out of mind? Does the concept of the circular economy and its promise of zero waste make consumption more acceptable? Perhaps.

The only logical long-term solution to more waste is to get better at using less. We need to make reuse easier. Then we need to recycle more. We need companies to be clearer with the public about the whole waste footprint of what they do. Radical transparency, forced or otherwise, almost always results in changed behaviour.

We also need to accept that zero waste is both technically and scientifically impossible. That which we do generate cannot be forever put in holes in the ground. Nor should we export our waste, making it a problem for someone else. Instead, we must put it to good use.

The waste sector is an essential utility. We protect the environment. We improve the UK's resource productivity. We turn unrecyclable waste into reliable, homegrown energy that powers millions of homes. We play a critical role in the journey to a Net Zero economy by providing high quality, well paid jobs.

Working with the UK Government and devolved governments, we can do even more, creating decarbonisation hubs to power a Net Zero economy.



Mike Maudsley
Chief Executive Officer

An alternative vision for the future of waste in the UK



The year is 2040. When it comes to waste the UK is one of the clear leaders in the developed world.

For the 14th year in a row the UK has produced less waste than in the preceding year, driven primarily by changes in consumer behaviour as a result of policy changes introduced in the mid-2020s.

From the introduction of the Extended Producer Responsibility initiative and Deposit Return Scheme, through to the steady expansion of the Emissions Trading Scheme, the circular economy is now business as usual for firms large and small. The first question of any new innovation being, "how will it be reused or recycled at end of life?".

Since the early 2030s recycling rates have not dropped below 80%, well above the 50% they were in the mid-2020s. The UK has not sent any combustible waste to landfill since a ban was introduced in 2028, and all other waste to landfill has recently ceased. Nor has it exported any waste since that time.

The UK now has all the capacity it needs to process the waste it produces, to supply industries in the UK and beyond with the higher value raw materials they need. For that which cannot be reused or recycled, energy is recovered from the material whilst at the same time removing carbon from the atmosphere.

The UK now has less than half the number of Energy from Waste (EfW) facilities that it had in 2024. They all continue to support the UK's energy security by producing reliable, homegrown power. All are fitted with carbon capture and storage (CCS) technology, which taken together capture more than 15 million tonnes of CO₂ per annum, whilst generating homegrown electricity, heat and electrolytic hydrogen. As a result, the UK's waste firms are now seen as leaders in the burgeoning carbon removals sector.

This isn't a fantasy. It's a future within our grasp.

We need a greater focus on reducing waste



Despite all the efforts of the past 30 years to reduce, reuse and recycle, as a society we have never produced more waste.

The primary reason for this is well known: as societies become richer, as their Gross Domestic Product (GDP) grows, so does the amount of waste they produce¹.

More circularity is part of the answer: we have to get better at reusing finite resources. But there is a problem. Researchers at the University of California-Irvine and Tsinghua University in Beijing, found that our ability to recycle can increase consumption, that it provides a **"...get out of jail free card..."** to continue our existing behaviour in the

belief that someone else will sort the problem we have created². They went on to say that **"...merely emphasizing the positive aspects of recycling and enhancing the availability of recycling options may not be sufficient to save natural resources"**.

Instead of telling, lets help people create their own agency - from a focus on the transfer of information and awareness of concern (which often leads to anxiety, apathy or denial) to one which creates opportunities for action³. From a **"...you must stop buying so much stuff..."** to **"...look how easy it is to reuse, to fix, to repurpose"**.

We need to shift the current repair and reuse culture from the fringe to the mainstream, partly with more stringent Right of Repair legislation, covering a far wider range of products, both for consumers and businesses, with a focus on end user cost savings and sustainability.

We need to empower consumers with more information, forcing firms to reveal the actual waste footprint of their products - not just in disposal but from point of extraction. And, instead of delaying the Extended Producer Responsibility scheme we need to strengthen it, alongside the implementation of a nationwide Deposit Return Scheme.

The most effective way that we will reduce the amount of waste we produce is to reduce our overall consumption of goods, to decouple the link between GDP growth and waste.

¹ oecd-ilibrary.org/sites/2bf17284-en/index.html?itemId=/content/component/2bf17284-en

² sciedirect.com/science/article/abs/pii/S1057740812000381

³ iopscience.iop.org/article/10.1088/1748-9326/abcd5a

Some waste is here to stay

In a perfect world there would be no waste.

Materials would be easily and seamlessly transformed back into their constituent parts, ready to be made into something new, using as little energy as possible. Workers and machines would never make mistakes. Raw materials would be extracted and processed with nothing left over.

Despite the mobius rings liberally used by organisations of all sizes, true circularity is scientifically impossible.

The second law of thermodynamics states that energy (matter) cannot be continually recycled without reducing its density or quality⁴. The same piece of plastic can only be recycled about two to three times before its quality decreases to the point where it can no longer be used⁵, a sheet of printer paper can only be recycled about four to seven times⁶.

And, while recycling techniques are improving all the time there are amalgams of materials, such as ceramics, plastics and metals which are physically challenging to separate.

We don't live in a perfect world, and the simple truth is that, as the UK Government said, **"...there will always be some residual waste..."**⁷.

Should the priority be a more circular economy driven by more recycling? Yes, absolutely. We want to see dramatically less waste. In particular, it's critical that we eliminate plastics produced with fossil fuels by reducing their use or finding innovative ways to recycle them.

But, for that which we cannot avoid, we must deal with it in the safest and most efficient manner and make the most of the decarbonisation opportunity it offers.

Over 15 million tonnes per year

The UK Government's legally binding target for unrecyclable waste by 2042 - a 50% reduction on today's volumes.



⁴ "The Second Law of Thermodynamics states that in all energy exchanges, if no energy enters or leaves the system, the potential energy of the state will always be less than that of the initial state. This is also commonly referred to as entropy." (Cheremisinoff, 2016).

⁵ blog.nationalgeographic.org/2018/04/04/7-things-you-didnt-know-about-plastic-and-recycling/

⁶ [nytimes.com/2010/12/21/science/21qna.html](https://www.nytimes.com/2010/12/21/science/21qna.html); <https://www.afandpa.org/priorities/recycling/paper-recycling-process>

⁷ assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/667476/from-waste-to-resource-productivity-final-report.pdf

We need to end landfill, and end waste exports



Hiding our waste in big holes in the ground should no longer be an option; it should not become a problem for future generations. Nor should the answer be to ship it overseas; it should not be for someone else to fix.

The landfill tax has been a great success – we landfill 60% less than we did before the tax was introduced⁸. It gave the sector both long-term certainty and incentives to plan and invest in change.

We need to go further.

The Government has committed to stopping plastics exports to other wealthy countries and Parliament's Environment, Food and Rural Affairs Committee has gone further calling for a ban on all exports of UK plastic waste by the end of 2027⁹. Earlier this year the European Union (EU) parliament voted to ban the shipment of all waste destined for disposal outside of the EU¹⁰.

The Climate Change Committee has also expressed concerns on our direction of travel. First, calling for waste exports to end by 2030. Second, that long-term plans are announced for the eventual diversion of all wastes from landfill, but with a date conditional on sufficient action on reduction, re-use and recycling, and installation of CCS at energy-from-waste plants¹¹.

With the EfW sector joining the UK Emissions Trading Scheme in 2028, now is the time to go further and faster. We need to end combustible waste going to landfill by 2028 and a strategy to end all landfill by 2040. And we need to stop the practice of sending our waste abroad by ending waste exports.



We currently export more than 60% of our plastic waste¹², some

500,000 tonnes.

If processed in the UK it would create jobs and help us manage our waste at home.

Methane from landfill is also 80 times more damaging to the climate per tonne emitted than carbon dioxide.¹³

⁸ <https://www.businesswaste.co.uk/a-guide-to-the-uk-landfill-tax/>

⁹ <https://committees.parliament.uk/committee/52/environment-food-and-rural-affairs-committee/news/174191/mps-call-for-ban-on-all-plastic-waste-exports/>

¹⁰ <https://www.europarl.europa.eu/news/en/press-room/20230113IPR66627/waste-shipments-meps-push-for-tighter-eu-rules>

¹¹ <https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Waste.pdf>

¹² <https://news.sky.com/story/british-plastic-waste-still-being-illegally-dumped-and-burned-abroad-mps-told-12740671#:~:text=In%20a%20new%20report%2C%20the,dispose%20of%20the%20materials%20sustainably,>

¹³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf

Energy from waste facilities can become decarbonisation hubs

Turning unrecyclable waste into homegrown, reliable energy in a safe and environmentally conscious manner has been a good thing for society.

From the destructors¹⁴ of the Victorian era through to the barely better post war incinerators, today's EfW facilities are now state-of-the-art pieces of urban engineering and part of the UK's nationally strategic infrastructure.

But they need to evolve further.

Today there are 57 operational EfW facilities in the UK with a further 14 under construction¹⁵. They divert 15 million tonnes of unrecyclable waste from landfill and provide well-paying jobs across the country. They also generate reliable homegrown energy to meet over 1% of national power demand.

However, in a future where we have at least 50% less unrecyclable waste, it's clear we will need less EfW plants than we have today. We need to transform the most modern EfW facilities into 'decarbonisation hubs' capable of capturing and removing millions of tonnes of carbon from the atmosphere. Or generate heat or electrolytic hydrogen. All of which will help local

businesses near our facilities in their decarbonisation journeys.

Analysis by the Energy Systems Catapult¹⁶ has shown that fitting carbon capture technology to EfW plants could lead to a 20% overall increase in the amount of CO₂ captured in the UK by 2050, with EfW plants contributing 20% of the total CO₂ captured.

The opportunity to become carbon negative

By using CCS technology to capture our biogenic CO₂, our EfW plants could take CO₂ out of the atmosphere and become carbon negative.

The Climate Change Committee estimates that by 2050, the UK could need as much as 60 million tonnes of carbon dioxide removed from the atmosphere every year. This would mitigate emissions in hard-to-decarbonise sectors like agriculture and aviation.

Installing CCS technology on EfW plants also creates a unique opportunity to create carbon negative power. This would support ambitions to decarbonise the British power sector in the 2030s.



¹⁴ <https://www.minerallandwasteplanning.co.uk/future-proofing-energy-recovery/energy-from-waste/article/1587428>

¹⁵ Tolvik Consulting, UK energy from waste statistics - 2022

¹⁶ <https://es.catapult.org.uk/report/energy-from-waste-plants-uk-with-carbon-capture/#:~:text=On%20a%20lowest%20system%20transition,without%20EfW%2DCCUS%20being%20available.>

What enfinium promises to deliver

We know that reductions in waste and improvements in recycling are needed.

However, we also need to continue to invest in innovative new decarbonisation technologies to reduce the waste sector's emissions.

It is not an 'either/or' - to achieve a Net Zero economy that creates green jobs and safeguards our energy security, we need to do both. enfinium is committed to playing a leadership role in the UK's journey to a cleaner, prosperous zero carbon future.



1

To help UK communities manage their unrecyclable waste in the most efficient manner.

Since 2015, we have invested over £2 billion in building state-of-the-art EfW facilities in the UK. By 2025, we will be preventing 3 million tonnes of waste per year going to climate-damaging landfill. We will also work with our communities to promote the reuse and repair of the things they have.

2

To produce reliable, homegrown energy, supporting the UK's energy security.

We will have the capacity to generate over 300 MW of electricity - enough to power nearly 800,000 homes. In harnessing a homegrown energy source our output is always constant and reliable.

3

To take emissions out of the atmosphere by continuing to invest in our CCS plans.

Some industries, such as aviation and agriculture, will take decades to decarbonise. To offset this we need to manage these emissions now. We will advance our plans to install carbon capture technology across our facilities, allowing us to remove millions of tonnes of carbon from the atmosphere every year.

4

To supply low carbon heat to communities near our facilities.

We are a reliable source of low carbon heat and located near large areas of industrial activity and housing. We will work with local councils and private sector partners to develop heat networks that will decarbonise the heat our communities require.

5

To provide electrolytic hydrogen to those looking to decarbonise.

By using commercially available electrolyser technology, we will look to generate low carbon hydrogen at our facilities and kick-start regional hydrogen economies. Hydrogen that could power the delivery vehicles coming to our site, or coaches and buses operating in our communities.

6

To deliver green economic growth where we operate.

We need highly skilled people to run our facilities, jobs that pay well in the areas we operate. We will invest in training and apprenticeships to develop a diverse, skilled workforce. We will always prioritise local suppliers, adding to the more than 600 we already work with.

Our asks of Government

We cannot achieve our ambition on our own; we will work closely with our partners, suppliers and communities. But alongside this the sector needs the right incentives and signals to provide the certainty required to invest over the long term. We have five areas of focus:

1. Reducing the waste the UK produces

- Legislate for companies to reveal the actual waste footprint of their products - not just in disposal but from point of extraction.
- Broadening out the Right of Repair legislation, including a wider range of products covered, both consumer and business, with a focus on consumer savings and sustainability.
- Timely roll-out of Extended Producer Responsibility and the Deposit Return Scheme.

2. Dealing with our waste at source, sustainably

- End combustible waste going to climate damaging landfill by 2028.
- End the export of waste overseas by 2028.
- Consult on a long-term strategy to end all wastes to landfill by 2040.

3. Creating the EfW fleet of the future

- Introduce regional caps for EfW capacity to ensure new projects are only built where needed.

- No new EfW plants permitted from 2025 unless CCS ready or an alternative decarbonisation solution.
- Continued tightening of emissions controls to manage older EfW facilities off the waste system.

4. Deliver carbon removals at scale

- Carbon removals included in the UK Emissions Trading Scheme from 2030.
- Accelerate the deployment of EfW CCS projects through the Government's CCS cluster sequencing process.
- Develop a strategy for dispersed emitters to help them connect to supporting CO₂ transport infrastructure.
- Diversion of organics to EfW in regions where EfW plants with CCS can transform the material into carbon removals.

5. Support regional decarbonisation

- Accelerate the roll-out of heat networks from EfW facilities through free ETS allowances for heat offtakes.
- Use the Net Zero Hydrogen Fund to support EfW projects that use electrolyser technology to produce low carbon hydrogen.

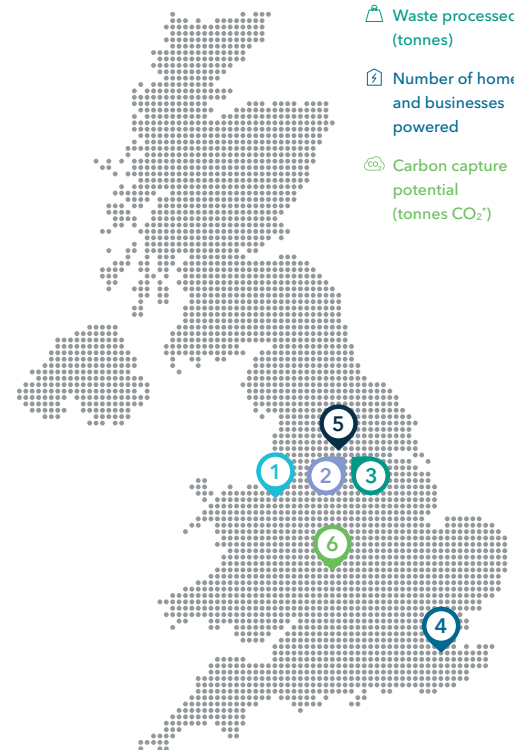
About enfinium

As one of the UK's leading energy from waste operators, enfinium is supporting our country's journey to a Net Zero economy.

We do this by operating and developing five decarbonisation hubs around the UK, where we use waste that would otherwise go to landfill to generate homegrown energy.

And we're going further by developing plans to use pioneering carbon capture and storage technology across our facilities to take carbon emissions out of the atmosphere.

We will do this by working with the local communities where we operate - in Yorkshire, Wales, Kent, and the Midlands - to provide jobs and support their journey to net zero using locally generated heat and electricity.



- 🗑️ Waste processed (tonnes)
- 🏠 Number of homes and businesses powered
- 🌱 Carbon capture potential (tonnes CO₂*)

OPERATIONAL

1	Parc Adfer	🗑️ 200,000	🏠 170,000	🌱 219,000
2	Ferrybridge 1	🗑️ 725,000	🏠 170,000	🌱 713,000
3	Ferrybridge 2	🗑️ 725,000	🏠 170,000	🌱 720,000
4	Kemsley	🗑️ 657,000	🏠 160,000	🌱 608,000

UNDER CONSTRUCTION

5	Skelton Grange	🗑️ 410,000	🏠 100,000	🌱 413,000
6	Kelvin	🗑️ 395,000	🏠 95,000	🌱 404,000

*Carbon capture potential assumes a 95% capture rate for emissions.



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