



From Waste
Hierarchy
to Carbon
Hierarchy:

Biffa's Blueprint for Waste Net Zero

The Reality Check 2022

Introduction

Over the past two decades, the UK's waste sector has transformed from an 'out of sight, out of mind', landfill-dependent model, to one where we have adopted the waste hierarchy, prioritising recycling and energy recovery over landfill disposal. UK household waste to landfill fell by almost 50% from 2010 to 2020¹ and CO₂e has reduced by 69% from 1990², making the UK's waste sector a stand-out contributor to carbon reduction.

No business symbolises that transition better than Biffa. We have transformed our business from a collection and landfill operation to one that has wholeheartedly embraced the waste hierarchy, providing leading services in waste prevention, closed loop recycling and energy recovery, all supported by the largest, most efficient business waste collection network in the UK. Today our team of more than 10,000 colleagues provide essential services to 96,000 business customers and 1.9 million households, handling eight millions tonnes of waste materials a year.

Whilst this transition is to be celebrated, the task is nowhere near complete. The UK still produces too much waste, and we don't recycle enough of it. Too many materials are not designed for recyclability, and collections systems are often inconsistent and unclear. As a result, recycling levels have stalled. And when we do recycle, we remain too dependent on export markets as an end destination for materials. We also have to acknowledge that our adoption of the waste hierarchy has had unintended consequences, meaning our sector's contribution to decarbonisation is now at risk of slowing too.

In this report we lay out our vision for what needs to happen next to decarbonise waste. We summarise the current state of play and the policy changes that are needed to help kick start the journey to Waste Net Zero. We argue that what might at first appear a big challenge is actually a big opportunity; an opportunity to unlock huge investment in the UK circular economy, creating high quality employment and securing much needed resources that will support sustainable manufacturing and consumption here in the UK.

At Biffa we have the skills, capital, and ambition to play a leading role in delivering this vision for a Net Zero, circular economy.



**Michael Topham,
Biffa, CEO**



¹ Defra: UK Statistics on Waste May 2022, Table 2 (Link: UK statistics on waste – GOV.UK (www.gov.uk)).

² Defra: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf

Executive Summary

The UK has a once in a generation opportunity to unlock circa £18bn in investment in the circular economy that will create more than 16,000 jobs and 43 million tonnes of circular raw materials annually, while contributing to a reduction of circa 7.1m million tonnes of co2.³

The good news is that this can be achieved using existing, proven technologies and processes, and that there is a vibrant, competitive, skilled sector with the access to the capital to make this happen.

The even better news is that society supports this drive and the UK's governments are committed to implementing policies to help make this happen. All that is needed now is for sensible policies that provide long-term certainty to be implemented without delay. This will create the right incentives and provide the certainty the sector needs to invest.

We have contributed extensively to the development of the emerging waste policy framework and are, for the most part, supportive of it. In this report we summarise the direction of travel and make some specific policy requests.

Biffa's business model is uniquely present across the entire waste hierarchy. Our efficient collections network supports capabilities in waste reduction, recycling, energy recovery and disposal to landfill. Our positioning aligns us with the ambitions of our customers, regulators and society at large. We work to move waste up the hierarchy, improving environmental outcomes while saving our customers money.

We believe this positioning across the hierarchy uniquely qualifies us to speak up on what is needed to help deliver Waste Net Zero.

³ Biffa research



Summary of policy requests

1. Embrace the move from Waste Hierarchy to Carbon Hierarchy

Waste policy needs to migrate from the outdated, tonnage-based waste hierarchy to a carbon-based hierarchy. This will mean the carbon cost of all activities (and in particular energy from waste) being recognised, alongside support for new recycling technologies and carbon capture, and intelligent reform of Landfill Tax.

2. Drive more adoption of recycled plastics

The introduction of the Plastics Packaging Tax is a good start; ambitious, progressive forward guidance is needed to ensure investment momentum is maintained. The roll out of Extended Producer Responsibility should be accelerated to incentivise reductions in packaging and increase use of recyclable material.

3. Consider a moratorium on more Energy Recovery Facilities

The development of the UK's network of energy recovery facilities is almost complete and we now need policies to be implemented and objectives delivered before deciding if we need any more.

4. More action to phase out waste export

An outright ban (including OECD) on the export of plastic waste is the first step; restrictions for other materials should be considered based on environmental risk if not recycled properly. This will stimulate investment and ensure vital recovered raw materials are available in the UK.

5. Accept that landfill will continue to play a role






Landfill is essential for certain types of waste which cannot be reused, recycled or recovered, as a disposal point of last resort. It needs to be addressed in national and local infrastructure plans. If we don't act now, we will have a landfill capacity crisis very soon.

6. Champion a zero-emissions, competitive collections market

Zero emissions zones in urban areas would accelerate the transition to low/zero carbon fuel but Local Government infrastructure funding will be needed. Legislation should support a dynamic and competitive collections market which responds to customers' needs.

Changing perspective... moving from the waste hierarchy to the carbon hierarchy

By looking at waste processing through the lens of carbon benefits we can better identify the pathway to Net Zero for the waste sector.

	Example carbon benefits	Policy asks and changes needed
Collect 	Switching the UK fleet of refuse vehicles to electric would save 290 Kt of CO ₂ each year. ⁴	<ul style="list-style-type: none"> Support a transition to low/zero carbon fuels for waste by introducing vehicle subsidies or/and ban fossil fuel vehicles from cities. Maintain competition to ensure a dynamic competitive market enabling businesses to maximise recycling.
Reduce 	1 tonne of surplus food redistributed rather than landfilled saves 0.989 tonnes CO ₂ e ⁵	<ul style="list-style-type: none"> Introduction of food waste reporting. Incentivise businesses to redistribute surplus produce. Introduce carbon pricing to reduce waste and ensure the carbon cost of incinerating material which cannot be recycled or reused is realised.
Recycle 	1 tonne recycled plastic saves 2.3 tonnes of CO _e compared to EFW ⁶	<ul style="list-style-type: none"> End plastic waste export and consider other materials based on the risk. Introduce a progressive plastics tax to stimulate further investment and adoption. Implement a consistent UK-wide deposit return scheme.
Recover 	Every tonne of residual household waste diverted from landfill avoids 0.452 tonnes of CO ₂ e emissions ⁵	<ul style="list-style-type: none"> Bring Energy from Waste (EFW) into Emissions Trading Scheme no earlier than 2028 to stimulate innovation and incentivise behaviour. Review EFW development to ensure lower carbon waste reduction and recycling is prioritised and ensure no over-capacity market distortion.
Dispose 	Average net carbon emission 0.34t CO ₂ e per tonne of input generating 584kWh Net Elec export ⁷	<ul style="list-style-type: none"> Ensure 2028 ban on biodegradable waste is workable. Reform landfill tax to ensure it doesn't work against Net Zero ambitions.

⁴ Eunomia: 2020, <https://www.eunomia.co.uk/electric-refuse-trucks-cut-carbon-costs/> ⁵ Zero Waste Scotland 2022 <https://www.zerowastescotland.org.uk/download/carbon-metric-factors-2011-2020>

⁶ WRAP – Market situation report 2021 – plastic packaging ⁷ UK Energy from Waste Statistics – 2021, Tolvik, (https://www.tolvik.com/wp-content/uploads/2022/05/Tolvik-UK-EfW-Statistics-2021_Published-May-2022.pdf)

Collect



Current situation

For the UK to achieve its target of a 65% municipal recycling rate by 2035 the way waste and recycling is collected will have to be improved. Current collections systems are inconsistent and in many cases don't support recycling. The most stark problem is the lack of provision of separate food waste collections for both households and businesses. Not only does this result in food waste going to landfill or energy recovery (when it could be processed by anaerobic digestion into biogas and soil enhancer), but often the food waste itself then contaminates materials that would otherwise be suitable for recycling. 'Dry' recycling collections provision is generally pretty good, albeit a bit inconsistent.

But it's not just about materials: the collection vehicles also have an impact on carbon emissions and air quality, particularly in urban areas. Low emission zones are encouraging the transition to alternative fuels and electric vehicles but Local Authorities are not currently asking for zero emission vehicles in their tenders due to cost. This means progress will grind to a halt unless Government provides support by introducing zero emission zones to encourage the market and stimulate demand.

Collections consistency is a key part of the Government's 'Resources and Waste' strategy and we are supportive of the direction Defra is taking to step back from interfering with the existing vibrant competitive market. We need to ensure that all businesses' demands are met and keep the focus on increasing the collection of recyclable material.



Collect



Opportunity – from Low to Zero!

The transition to zero emissions has many challenges including supply chain of materials and parts, innovation in technology, infrastructure investment and the development of a viable cost-effective model of ownership. Zero emission zones could push this forward, creating an urgency for the transition to alternative fuels and electric vehicles to improve air quality and reduce noise.

We are actively considering biomethane and hydrogen to help fuel our fleet in the future which will also support the delivery of our sustainability strategy. Mandatory food waste collections, which will come into effect from 2024, offer an opportunity for a 'closed-loop' collections system, with vehicles powered by biomethane derived from the food waste collected.

Did you know?

In 2021 Biffa introduced the UK's largest electric refuse collection fleet in Manchester.



Policy asks

Put in place legislation which accelerates and encourages the transition to zero emission vehicles while maintaining a vibrant competitive market.

1. Introduce zero emissions zones

To speed up adoption of zero emission vehicles and stimulate innovation and investment in technology, improving air quality and reducing noise whilst speeding up the transition to Net Zero.

2. Collect food waste separately

Seeing that this will be implemented is good news – but it must be enforced. We need to work hard to get to the point that it is a social norm to properly separate waste at the point of disposal.

3. Maintain competition

To ensure the continuity of a dynamic competitive market enabling all businesses recycling needs to be met.

Reduce



Current situation

UK households produce around 30 million tonnes of waste a year (Defra, 2022)⁸. Reducing the amount of waste created in the first place is key and often overlooked. In truth we don't have a good measure of how much waste is or could be prevented, and while economics and doing the right thing should influence behaviours, the reality is too much produce capable of being redistributed, repaired or repurposed is going to waste.

Of particular concern is food. Food waste is a key contributor to UK waste carbon emissions, accounting for between 8-10% of total greenhouse gas emissions a year in the UK (WRAP).⁹ It's estimated that the UK produces 141,000 tonnes of surplus food and beverages alone (CSG, 2021)³ that are suitable for human consumption and could with the right intervention be redistributed and avoid becoming waste in the first place, while also providing much needed support for people on low incomes.

Biffa's role

In 2021 Biffa acquired Company Shop Group (CSG), the UK's largest redistributor of surplus food and household products. Through CSG we work at the heart of the supply chain to redistribute surplus stock from major retailers which would otherwise have gone to waste. We sell this produce at deeply discounted prices through a unique network of membership-based outlets. We use a business model which combines profit-with-purpose, comprising commercial redistribution via Company Shop (14 stores) and social redistribution via the award-winning Community Shop (8 stores).

Love Junk

In 2021 we made a seed investment in 'Love Junk' an online marketplace that connects upcyclers, refurbishers and reactive waste providers to people who need to dispose of waste or items they no longer need.

COMPANY SHOP GROUP

Part of the **Biffa** group



⁸ UK Statistics on Waste, 2022, <https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste>

⁹ Reducing household food waste and plastic packaging | WRAP

Reduce



The Opportunity

Introduce a set of minimum standards for product design to encourage resource efficiency through recycling, reuse or refurbishment such as laptops designed to be upgraded or recycled.

For food waste, enhanced reporting would enable an open dialogue and pave the way for producers to establish routes for product redistribution, realising the value of what once would be considered waste.

Did you know?

In 2021 we handled c. 98 million surplus items amounting to 35,000 tonnes diverted from becoming food waste. If this produce had been landfilled as household residual waste it would have generated 34,500tCO₂e (based on ZWS Carbon Metric Report 2022).

Policy asks

Incentivise reduction of waste and use full cost of carbon to stimulate innovation.

1. Include full carbon pricing within EPR environment impact assessment.

Producer pays the full carbon cost (manufacturing and disposal) for material which cannot be reused or recycled.

2. Enhanced food waste reporting.

Introduce reporting to give a clear view of the potential market and hold producers to account.

3. Introduce resource efficiency design standards.

Including a minimum standard for product recycling, reuse or refurbishment.

4. Promote reuse within supply chains.

Reward suppliers who innovate to reuse or reduce waste.

Recycle



Current situation

After nearly two decades of success, recycling levels in the UK have stalled at around 44%¹⁰ (Defra, 2022). The UK Government's target to recycle 65% of household waste by 2035 equates to around 10 million additional tonnes per annum of recyclable material and presents a big challenge.

EPR and the introduction of mandatory recyclability labelling from 2026 will help to support clearer consumer choice and enable impactful recycling behaviour change campaigns. The reform of packaging recovery notes (PRN) for packaging waste recycling should tighten compliance and ensure a smooth interface with the introduction of a Deposit Return Scheme (DRS).

The Government has committed to stop plastic exports outside the OECD and we welcome the recent Environment, Food and Rural Affairs Committee report calling for a “ban on all exports of UK plastic waste by the end of 2027”.¹¹

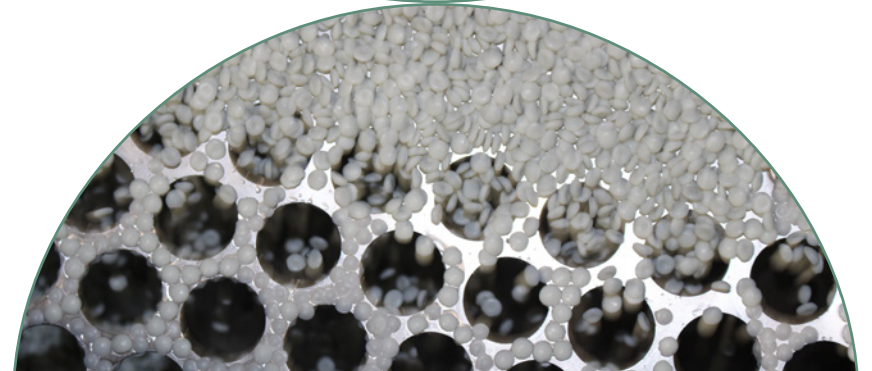
Biffa is a pioneer in closed loop plastic recycling, turning waste plastic into food grade raw materials that can be used as a substitute for virgin materials. Since 2016, Biffa has invested over £50million in plastics recycling infrastructure and now recycles over 150,000 tonnes of plastic each year, with plans to increase this to 240,000 tonnes by 2030.

Did you know?

We've worked closely with the dairy industry over the last decade to produce closed-loop High-density Polyethylene ('HDPE') plastic milk bottles and now over 85% of milk bottles in the UK contain Biffa material. Altogether we recycle billions of plastic bottles and tubs here in the UK.

¹⁰<https://www.gov.uk/government/publications/progress-report-on-recycling-and-recovery-targets-for-england-2020/progress-report-on-recycling-and-recovery-targets-for-england-2020>

¹¹ EFRA committee report on plastic waste – REA (r-e-a.net)



Recycle



The Opportunity

Handling an extra 10m tonnes of recycling a year is a big task, and we simply must not revert to export as the solution. To handle this material fully in the UK represents around £1.2 billion of investment in circa 30 MRFs. This will create about 13,000 permanent jobs and will save up to 6.3 million tonnes of carbon a year.³

On plastic alone an end to the export of plastic packaging would mean the UK needs 12 more polymer plants the size of Biffa's Seaham plant to recycle the 0.7mtpa of plastic packaging waste a year currently exported. We have all seen what can happen when plastic waste is exported and ends up in the wrong hands.

It is within our gift to end the 'race to the bottom' that plastic export has become.

Policy asks

Aim for UK based recycling while taking into consideration global demand, environmental risk, and lower carbon waste processes.

1. End plastic waste export (including OECD).

Government should give a timetable for the end of plastic waste export to stimulate investment and create jobs while mitigating high environmental risks and carbon emissions from allowing this material to be processed outside the UK.

2. Make the Plastic Packaging Tax Progressive.

The PPT is the right start but what is needed now is longer term guidance on increases in both the rate of the tax and the minimum recycled content to ensure that investment momentum stimulated by the introduction of taxation is not lost.

3. For those materials that can be safely exported, put export on a sound legal footing.

For many materials (such as paper and cardboard), export is an environmentally safe and cost-effective solution, taking recovered raw materials back to where they are in demand. But as it stands, exporting is beset by uncertainty thanks to unclear standards. Regulators and policy makers need to decide; either phase out their export, or work with the industry to set proper standards (such as 'end of waste' protocols) that will promote high standards and provide certainty for the industry to invest.

Recover



Current situation

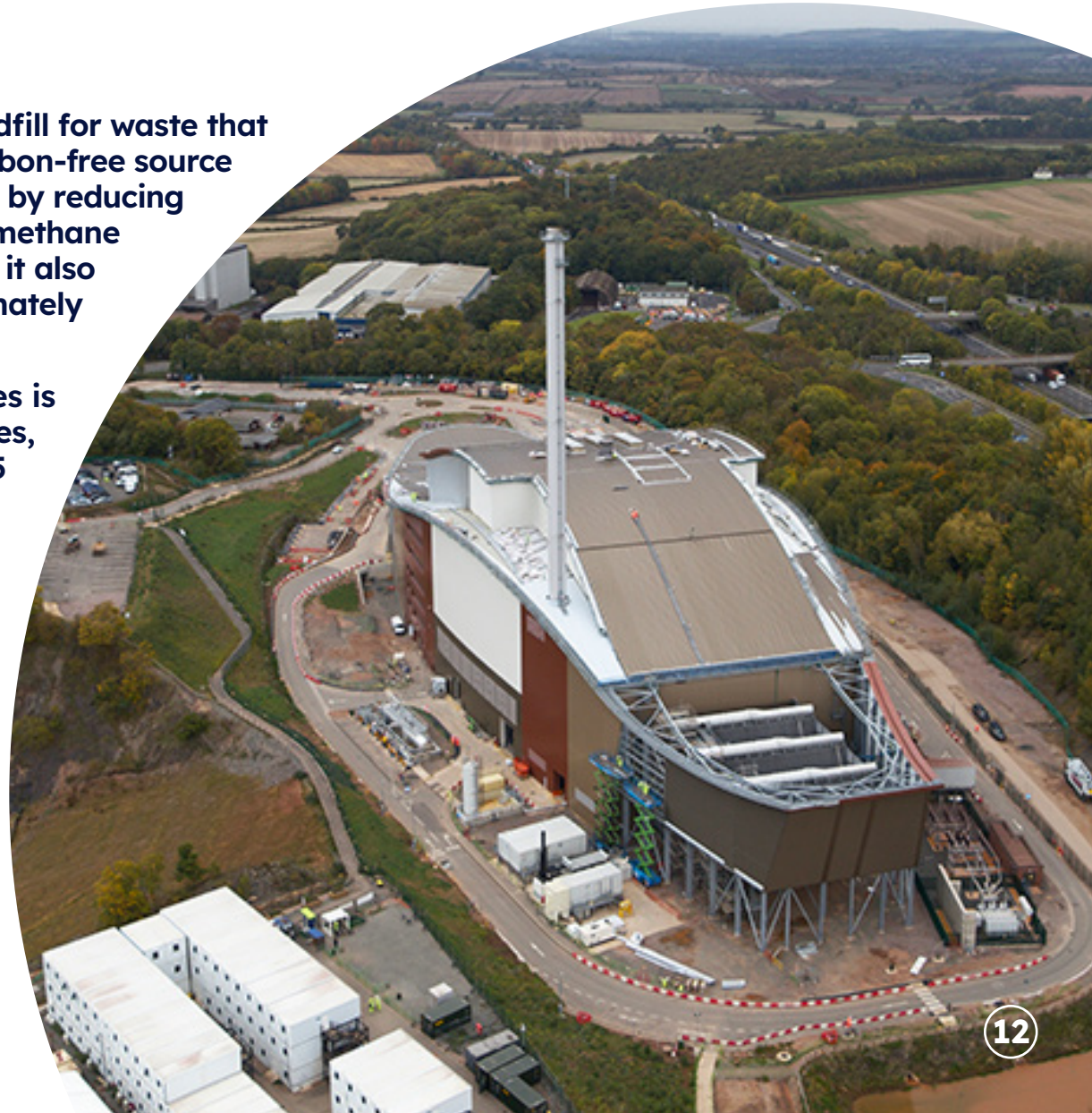
Energy recovery is a lower carbon alternative to landfill for waste that can't be reduced or recycled. And whilst it isn't a carbon-free source of energy, it contributes to the transition to Net Zero by reducing dependence on fossil fuels and eliminating harmful methane emissions from landfill. As a non-intermittent source it also helps provide energy security, contributing approximately 2.9% of total net UK generation in 2021.⁷

But the need for additional energy recovery facilities is slowing down. When predicting future waste volumes, the growth in household recycling levels to the 2035 recycling target of 65% and a reduction in the export of residual waste as refuse derived fuel, we estimate the current capacity gap will all but disappear.

Did you know?

Biffa is a net exporter of energy. In 2021 we exported 363Gwh of electricity into the Grid from the anaerobic digestion of food waste and landfill gas. We use 102 Gwh.

Current research estimates that, on average across the UK, net carbon emissions from energy recovery facilities were 0.34 tCO₂e per tonne of waste⁷, lower than the alternative of landfill (0.452 tCO₂e per tonne of waste) (ZWS 2022).⁵



Recover



The Opportunity

Energy recovery will have a vital role to play for many years as we transition to a more circular economy. But it is essential that it is a support for, rather than a competitor to, efforts to reduce and recycle waste. It should account for the fossil-based carbon emitted through a carbon pricing framework which will make energy from waste more expensive, thereby creating the incentives to drive up recycling and deploy carbon capture, usage and storage (CCUS) technologies.

As policies to stimulate waste reduction and recycling take effect, the need for further new UK Energy Recovery Facilities (ERF) becomes questionable. It's likely that future projects will primarily be to replace ageing, less efficient plants, and that in the long-term, we will see a gradual decline in the UK's energy recovery capacity. Developers of new facilities should carefully consider where the waste for their proposed plants will come from and whether there is a clear demand for them.

Policy asks

Create a market linked carbon pricing framework to incentivise emissions reduction.

1. Include energy recovery in the Emissions Trading Scheme (ETS).

As per the current BEIS consultation proposal, include ERF in ETS no earlier than 2028 to stimulate low carbon innovations, incentivise behaviour and enable economically viable CCUS.

2. Consider a moratorium on further ERF consents.

There are more than enough consented facilities and it is likely many will never be built. Policy makers should think carefully about the capacity needed for energy recovery while the push to increase recycling target takes hold.

3. Link ERF inclusion in ETS with a reform of Landfill Tax.

Legislative changes need to be connected to drive carbon-based decisions on waste destination. Policy makers may even consider whether landfill for non-recyclable plastic waste is a better outcome than energy recovery until such time as packaging redesign and novel recycling technologies have their impact.

4. Support the delivery of Carbon Capture Utilisation and Storage.

CCUS will need significant Government support, and careful consideration will need to be given to maintain a level playing field across the country. The last thing we want is 'waste tourism', with waste travelling long distances (with all the adverse side effects that brings) in order to access remote CCUS-equipped facilities.

Dispose



Current situation

Let's be clear – no waste which can be reused, recycled, or recovered should go to landfill. However, landfill has a continuing role to play, and the UK will have an ongoing need for landfill void for complex but inactive waste.

There are many areas, including the South East of England where existing landfill capacity is almost fully used and analysis by Biffa and Tolvik (Tolvik/Biffa, 2017)¹² shows that even if the Government recycling rate targets are reached there is an ongoing capacity requirement of around 21mtpa, and replacement sites will be needed in the UK within the next 3-5 years.

Managing and restoring landfill sites:

Once landfill sites are full, they are capped and restored and have many uses including biodiversity and nature conservation, solar energy installation, woodland, public amenity, agriculture, or a combination of all these. Whilst landfill disposal now has a much-reduced role, at each stage of the waste hierarchy from reduction through to disposal, residual waste management has a vital role to play, it still provides an essential support function for waste which cannot be reused, recycled, or recovered as energy.



¹² <https://www.biffa.co.uk/media-centre/publications>

Dispose



The Opportunity

To address the ongoing need for landfill void for inactive waste, there are two areas which should be included in national infrastructure assessments. Firstly, the need for landfill void itself needs to be clearly recognised as a national requirement to ensure that planning authorities grant permissions where needed. Secondly planned landfill void should be linked by rail as the preferred option. Moving waste by rail will save carbon, reduce local emissions, and avoid traffic congestion.

We are supportive of a ban on biogenic material to landfill by 2028, however it needs to be linked to moving ERF into the Emissions Trading Scheme, to encourage a shift to biogenic fuel and a reduction in the use of fossil-based material into ERFs. Alongside this an intelligent reform of landfill tax should take both these changes into consideration to ensure all mechanisms pull towards the Net Zero target.

Policy asks

Ensure there is adequate planning provision for safe disposal of inactive material which cannot be reused or recycled.

1. Commitment to include rail linked landfill void in National Infrastructure planning

Clear direction from Government in the National Infrastructure Commission assessment for planners to accommodate the need for new void, preferably linked by rail.

2. Reform landfill tax to ensure it doesn't work against Net Zero ambitions

Alongside ERF being include in ETS and the forthcoming ban on biodegradable waste to landfill by 2028. Use the Net Zero target to stimulate innovation in the lowest carbon method of processing the material. This could mean material such as low-grade plastic material is sequestered in landfill until better recycling solutions are developed.

3. Ensure the future landfill tax regime is clear, stable and workable

Government departments should work together to ensure landfill tax reform incentivises the right behaviour, tackles waste crime and supports investor confidence in a currently indispensable sector.

Summary of potential investment, jobs and carbon reduction benefits across waste streams and processes

Ambition	Waste stream	Policy ambition	Gap tonnage	Investment / Jobs required	Carbon benefits (tonnes CO ₂ e)
Increased recycling	MSW (household waste and similar waste from businesses)	65% MSW recycling by 2035 (currently c45%)	7-9mtpa additional recycling tonnage needed	£1.2bn 30 large MRFs 12,000 jobs	4.9m-6.3m
Recycling on shore (reprocessing to avoid ongoing exports)	Waste plastic packaging	UK reliance on substantial export	0.7mtpa exported in a typical year	£0.5bn 12 Polymer plants 1,200 jobs	58,000 (transport emissions only)
	Wastepaper and cardboard	UK reliance on substantial export	4.5mtpa exported typical year	£0.9bn 15 pulping plants 3,000 jobs	112,000 (transport emissions only)
Residual waste treatment energy recovery	Combustible element for energy from waste	Minimum 90% landfill diversion (RWS and EU target)	9mtpa current capacity gap	£0.8bn equity/£2.5bn gross uncommitted £7.5bn incl committed 20-25 EFW plants (17 already in build or committed) 2,500 jobs	630,000
Landfill disposal for remaining inactive waste	Landfill of non-combustible element for safe disposal	Safe disposal for all non-recyclable, non-combustible waste within UK (export not allowed)	Replacement capacity needed within the next 3-5 years 20mtpa on-going disposal capacity requirement	£1.0bn upfront/£7.5bn whole life capex 2,500 jobs	
					5.7-7.1m tonnes of avoided CO ₂ e per year

We're proud to be working with our customers and partners on this vision.

Biffa

wilko



cocado



"Dunelm recognises climate change as society's biggest threat and as such have set Science-based carbon reduction targets across our value chain to reduce this threat. We support Biffa's carbon reduction ambitions for themselves and their industry, as they are a key part of our value chain and valued partner."