NORTH LINCOLNSHIRE GREEN ENERGY PARK

Planning Act 2008

Infrastructure Planning (Applications Prescribed Forms and Procedure) Regulations 2009

North Lincolnshire Green Energy Park

Annex 2 - Waste Trends Summary Report

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Footprint Services

Sustainability for good

WASTE TRENDS SUMMARY REPORT WITHIN 100 MILES OF THE NORTH LINCOLNSHIRE GREEN ENERGY PARK

REPORT PREPARED FOR NORTH LINCOLNSHIRE GREEN ENERGY PARK LTD
JANUARY 2025 (v3.1)

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ABOUT FOOTPRINT SERVICES:

Footprint Services, an independent environmental consultancy based in Lincolnshire, was established in 2016. The company specialises in transforming, interpreting and presenting information regarding industrial waste and resources. Dedicated to unlocking the potential of environmental data, Footprint Services strives to convert this data into actionable insights that promote a more efficient and circular economy. The company is deeply committed to facilitating the transition to a sustainable circular economy. It has actively contributed to supporting Local Enterprise Partnerships, Local Authorities, industries and various organisations in developing policies and procedures aimed at fostering a future that is more resource-efficient.

GENERAL NOTES:

Waste volumes referred to in this report are taken from the national Waste Data Interrogator dataset, sourced from returns submitted by operators of permitted waste management sites to the Environment Agency. Figures refer to 2023 site activity unless otherwise stated.

SECTION 1 EXECUTIVE SUMMARY

1. The North Lincolnshire Green Energy Park (NLGEP) development submission addresses critical waste management challenges within a 100-mile radius (the Scope Area) of its location at the Flixborough Industrial Estate, near Scunthorpe. This study assesses waste trends, infrastructure gaps and opportunities for enhanced energy recovery, highlighting the strategic role of the proposed Energy from Waste (EfW) Combined Heat and Power (CHP) facility in transitioning toward a circular economy.

   i. **Potential for Further Waste Diversion:** Despite progress, there is potential to divert more waste from landfill. The report estimates that **1.5 million tonnes of combustible residual waste per annum** in the scope area could be managed more efficiently up the waste hierarchy, through processes such as energy recovery.

   ii. **Regional Waste Treatment Gaps:** Significant capacity gaps exist in the East Midlands and East of England for residual waste treatment. These regions rely heavily on landfill due to limited EfW infrastructure.

   iii. **Commercial and Industrial (C&I) Waste Potential:** C&I waste represents significant energy recovery potential, with 3.2 million tonnes of combustible residual waste landfilled annually in England. C&I waste is underrepresented in existing residual waste treatment infrastructure. Within the Scope Area, 1.6 million tonnes of C&I combustible residual waste was landfilled in 2023, nearly double the amount of LA-collected waste volume.

   iv. **Policy Challenges and Uncertainty:** The UK government's target to halve residual waste per capita by 2042 requires substantial shifts in recycling, waste reduction and infrastructure expansion. Policy consistency and clarity are vital to achieving environmental goals. The NLGEP development offers an efficient solution to bridge capacity gaps and support long-term waste management resilience to 2035 and beyond.

   v. **Refuse-Derived Fuel (RDF) Export Trends:** England exports over 1.8 million tonnes of RDF annually, with Immingham (26 miles away from the NLGEP development) serving as the largest RDF export hub. Total RDF export volumes has risen by +8% in the past year with consignments from Immingham having increased by +34% to 336,000 tonnes in 2024. Developing local treatment facilities could reduce export reliance and improve energy efficiency for the UK.

   vi. **Strategic Importance of NLGEP:** The proposed NLGEP is strategically located to address waste treatment gaps and enhance regional resilience. Importantly, its capabilities for energy recovery and carbon capture align with the UK's net-zero objectives.

   vii. **Conclusion:** The overall findings indicate that significant volumes of waste within the Scope Area remain landfilled or are exported for energy recovery overseas. Therefore, the report concludes that the NLGEP has a pivotal role in supporting the region's transition to a more sustainable waste management system, contributing to the UK's circular economy and environmental targets.

SECTION 2 AIMS AND METHODOLOGY

2.1 AIM OF THIS REPORT

2. The aim of this study is to present information and insight on relevant sources of waste within 100 miles[1] by road or rail of the North Lincolnshire Green Energy Park ('*NLGEP*') energy from waste combined heat and power (EfW CHP) facility which is to be built on the Flixborough Industrial Estate, near Scunthorpe, North Lincolnshire (*'the Development'*).

3. This study presents the trends within the regulatory data. It does not purport to be an exhaustive Feedstock Availability Assessment, given that 'feedstock availability' of waste is influenced by many factors such as the nature of pre-existing contracts, the commercial offering of the Development versus regional competitors, sudden shifts in the economy or transformative technological developments. It would be more appropriate to consider this study to be a "Feedstock Existence Summary".

2.2 APPROACH

4. **Data Sources:** The two main datasets used for the report are:

   i. Waste Data Interrogator (WDI) which contains data compiled from returns submitted by waste site operators to the Environment Agency.
   ii. Local Authority Collected Waste: Annual Results Tables (ENV18)[2]

5. **Trend Analysis:** Data from 2019 to 2023 is analysed to identify trends and patterns, with an emphasis on year-over-year changes in waste volumes by process (incineration, landfill, etc.), site classification and regional shifts in waste production and disposal. This multi-year perspective provides a robust basis for understanding fluctuations and helps mitigate the impact of single-year anomalies.

6. **Waste Classification and Codes:** The report focuses on the four European Waste Catalogue (EWC) codes most relevant to Energy from Waste (*'EfW'*) recovery: 20 03 01, 19 12 10, 19 12 12 and 20 03 07. These codes represent the bulk of materials suited for energy recovery and align with industry-standard waste classifications.

7. **Combustibility Assumptions:** A key aspect of this methodology is the treatment of EWC 19 12 12, a mixture of materials or trommel fines, for which combustibility varies significantly. Following expert analysis, this report assumes a 50% combustibility factor for 19 12 12 waste that is not explicitly destined for incineration, to ensure a realistic estimate of available fuel.

8. **Limitations and Assumptions:** This report acknowledges the potential risk of double counting when using the Waste Data Interrogator due to the inclusion of transfer stations and the possibility of the same waste batches passing over multiple weighbridges in a year. To manage this risk, waste volumes are typically reported at end-use destinations only, such as landfill or EfW sites, rather than attempting to provide an accurate total volume of waste across all regulated sites such as Material Recovery Facilities (*'MRFs'*), civic amenities, transfer stations etc.

2.3 DATA QUALITY

9. The Footprint Services model is fuelled by raw data that consists of regulatory information from organisations such as the Environment Agency (EA), Defra and others. This information is subject to thorough reliability checks by the respective regulatory bodies before it is published. Part of this data is released according to the scheduled programmes of these regulatory bodies, while other datasets are obtained through Freedom of Information requests. Each update is incorporated into the Footprint Services historical database, enhancing the repository with a comprehensive and deep datamining capacity.

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[1] *A 100-mile radius has been used in this study as the parameter of spatial analysis as an approximation of a catchment that lies within a two-hour drive of the Development, encompassing the East of England counties plus parts of Lincolnshire, Northamptonshire and Rutland waste planning authorities.*

[2] www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables

SECTION 3 MATERIALS SUITED TO ENERGY FROM WASTE (EFW) RECOVERY

3.1 WASTE CODES RECEIVED AT ENERGY FROM WASTE FACILITIES

10. Across the portfolio of EfW facilities in the UK, 99% of the received material is categorised with the following EWC Codes, as can be seen in Fig. 1:

    20 03 01: 59%
    19 12 10: 25%
    19 12 12: 12%
    20 03 07: 3%

    For this report, therefore, it will be assumed that waste of relevance will be restricted to these four codes only.

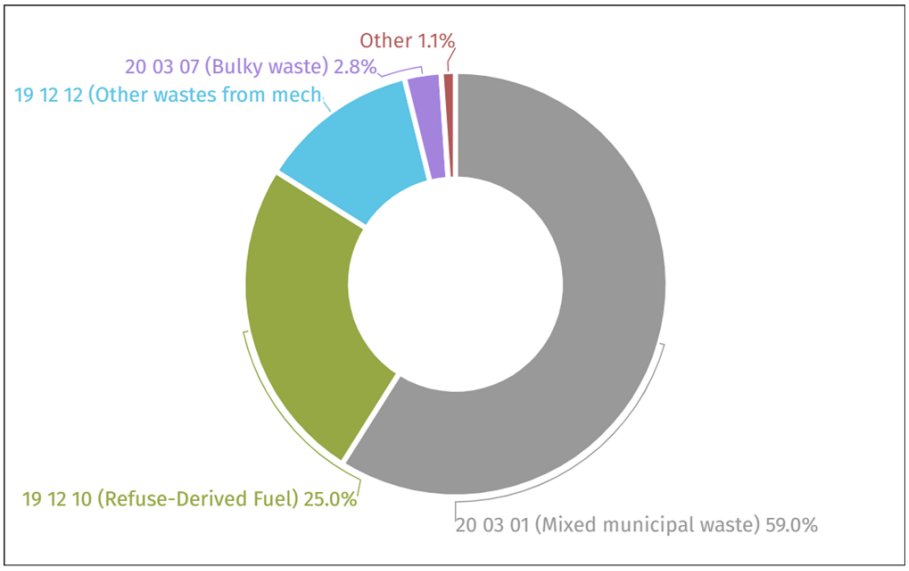

Fig. 1: Percentage of materials received at general waste EfW in 2023

3.2 EWC 191212 (MIXTURES OF MATERIALS / TROMMEL FINES)

11. It is necessary to record a cautionary note regarding EWC 191212 when considering it as a wholly available feedstock for EfW recovery. As noted in Fig. 1, EWC 191212 can be, and indeed is, received at EfW sites. In 2023, 1.9 million tonnes of material coded as 191212 were treated by incineration across the UK. Logically, all the 1.9 million tonnes can be considered 'combustible'; otherwise, there would be no purpose in sending it to an EfW plant. However, that reasoning does not apply to all arisings of EWC 191212.

12. Broadly-speaking, EWC 191212 can be classed as 'trommel[3] fines', or the fines from some other waste-sifting mechanical process. Such fines are the small particles of waste that are left over after larger materials have been sorted through a trommel screen or equivalent. The composition of the fines is therefore directly related to the nature of waste that the site in question processes. When an aggregate processor refers to trommel fines classified as EWC 191212, these are considered to be residues that may very well meet the 'Loss on Ignition' (*'LoI'*) test, making them eligible for inert waste landfill or land reclamation projects. They can also be blended with other materials, such as aggregates and binders, to create sub-base layers or fill materials for road infrastructure projects. Given that the LoI test criteria for inert landfill states that the difference in the mass of material being tested before and after the ignition process must be 10% or less to qualify, it is apparent that those volumes of EWC 191212 that meet such criteria are not suited for consideration as fuel for an EfW process. Aggregate processors, soil wash sites, processors of ash byproducts and scrap metal recyclers all produce EWC 191212; again, it is unlikely that

[3] *Trommel fines are the small, fine particles that pass through the rotating cylindrical screen known as a trommel. The trommel screen is used to separate larger materials from smaller ones during the waste sorting and recycling process. As the waste material is screened and sorted, the finer particles that fall through the mesh become trommel fines.*

such arisings will be of relevance as EfW feedstock. Nonetheless, large volumes of 191212 are produced within facilities handling general waste streams, such as skip companies and MRFs, and these are much more appropriate for consideration for thermal recovery.

Fig. 2: Trommel fines (image source: www.budget-waste.co.uk)

3.3 'BEYOND WASTE' PAPER

13. In August 2023, a paper, or technical note, was produced by Alan Potter of Beyond Waste and submitted initially to the Examination Authority of the DCO into the Medworth EfW CHP proposal. This same paper has subsequently been cited in relation to the NLGEP development. The author has extensive experience of conducting Waste Needs Assessments for various authorities and sits on the Defra waste steering group.

14. The primary conclusion of the 'Beyond Waste' paper was that "*an estimate of 50% of 191212 coded waste being combustible is far more realistic than the approach taken in the Medworth Fuel Availability Assessment.*[4]"

15. The 'Beyond Waste' paper references findings from Tolvik Consulting Ltd (*'Tolvik'*) that suggest a higher percentage of combustibility of EWC 191212 than the paper author is willing to concede: "*I note that Tolvik also considers 191212 waste to not all be combustible. They assume 70% is. The evidence above supports a position that a value of c40% may be most accurate, and would consider 50% to be a generous estimate.*"

16. The view expressed in the 'Beyond Waste' paper was that the Medworth Fuel Availability Assessment "*significantly overestimates the available fuel*". This same view was later directed at assessments made about the NLGEP waste fuel availability which had made no adjustment of 191212 volumes.

3.4 COMBUSTIBILITY ADJUSTMENTS

17. The author of the 'Beyond Waste' paper highlighted a valid point, namely, that not all 191212 material sent to landfill will be suitable as feedstock for an energy recovery process. Therefore, within this report, that point is duly incorporated within the methodology to avoid any charge of over-estimating the tonnage of waste. Given the Beyond Waste view that only 40% of landfilled EWC 191212 is combustible whereas Tolvik present a higher figure of 70%, the assumption is made by Footprint Services that 50% combustibility of landfilled EWC 191212 is a reasonable compromise rather than 'a generous estimate'.

18. Moreover, that assumption extends to <u>all</u> movements of EWC 191212 entering or leaving permitted waste sites with the exception of 191212 incoming to EfW facilities, or 191212 sent from permitted waste sites with a recorded fate of 'Incineration'. It is reasonable to assume that 100% of material received by EfW facilities is combustible, whereas all other recorded flows of EWC 191212 are reduced by 50%.

19. Adopting this approach results in a 12% decrease in the total volume of waste considered 'combustible' incoming to permitted sites (see Fig. 3) and a 21% decrease in waste considered 'combustible' outgoing

[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010110/EN010110-001764-David%20Kenyon%20-%20Other-%20MVV%20Volume%207.3%20Waste%20Fuel%20Availability%20Assessment%20Rev3%20(clean).pdf

from permitted waste sites (see Fig. 5) in the Scope Area compared to the unadjusted volumes. These totals include all permitted sites, such as MRFs, landfills, transfer stations and EfW sites, etc.

3.5 MATERIAL INCOMING TO THE WASTE SECTOR WITHIN SCOPE AREA

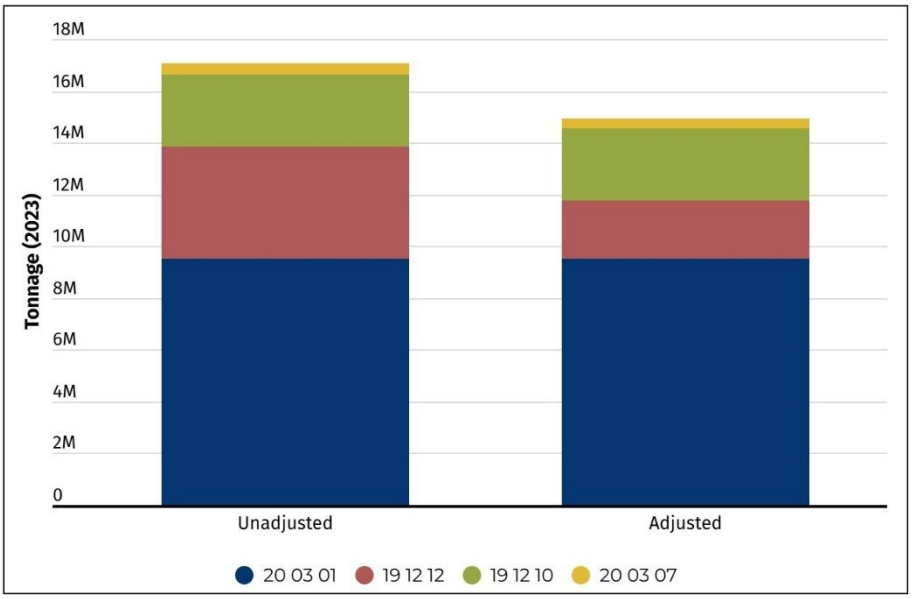

Fig. 3: Material incoming to permitted waste sites within Scope Area (2023 data)

EWC Code	Unadjusted	Adjusted	% +/-
20 03 01	9,502,427	9,502,427	***0.0%***
19 12 12	4,356,745	2,253,442	***-48.3%***
19 12 10	2,791,041	2,791,041	***0.0%***
20 03 07	399,497	399,497	***0.0%***
Sum:	***17,049,710***	***14,946,407***	***-12.3%***

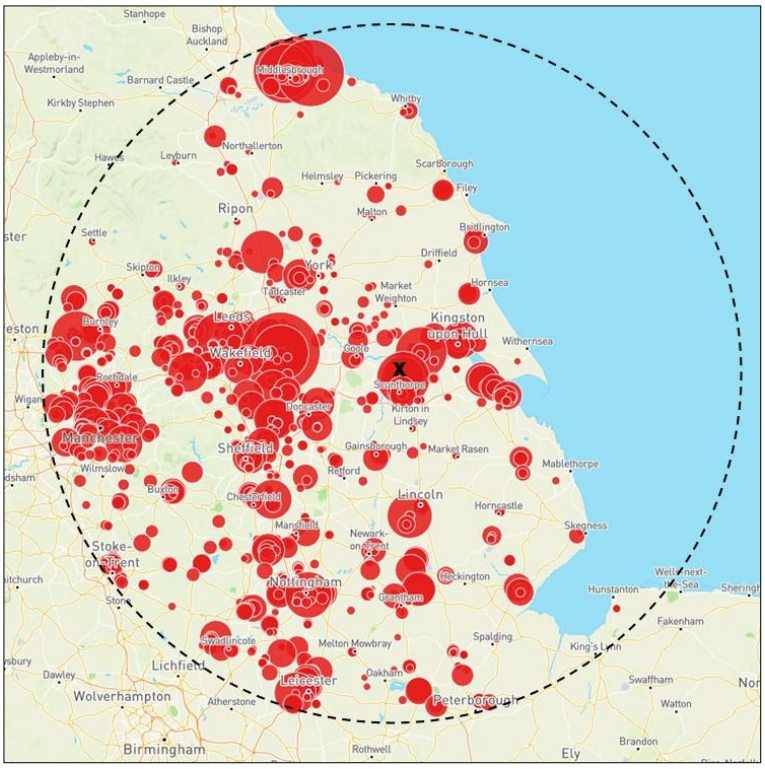

Fig. 4: Tonnage incoming to permitted waste sites within Scope Area

3.6 MATERIAL OUTGOING FROM THE WASTE SECTOR WITHIN SCOPE AREA

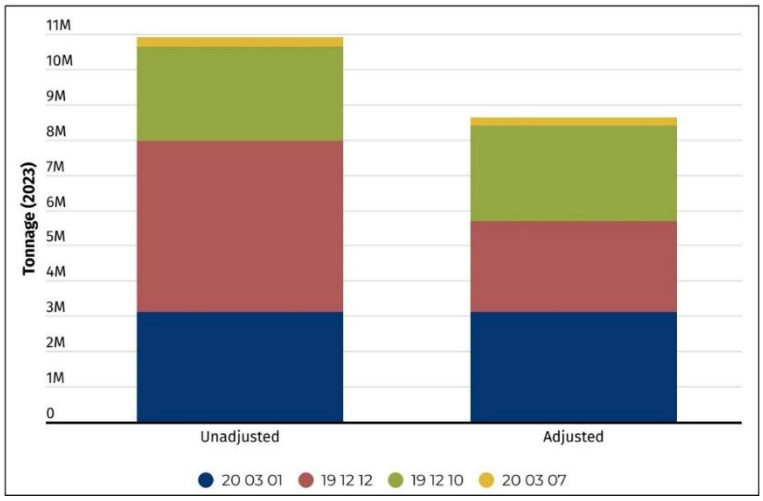

Fig. 5: Material outgoing from permitted waste sites within Scope Area (2023 data)

EWC Code	Unadjusted	Adjusted	% +/-
20 03 01	3,119,247	3,119,247	*0.0%*
19 12 12	4,830,762	2,573,608	*-46.7%*
19 12 10	2,693,366	2,693,366	*0.0%*
20 03 07	248,436	248,436	*0.0%*
Sum:	***10,891,811***	***8,634,657***	*-20.7%*

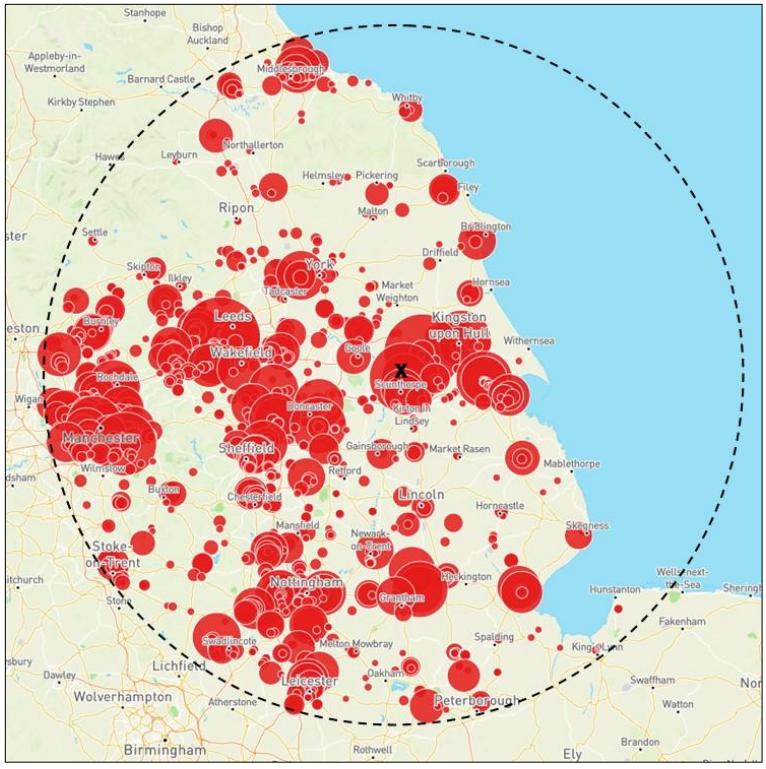

Fig. 6: Tonnage outgoing from permitted waste sites within scope area

20. Although these adjustments reduce the headline tonnages, the adoption of such an approach means that the findings and conclusions of this study will be more robust and less vulnerable to the suggestion of being inflated.

SECTION 4 ENVIRONMENTAL IMPROVEMENT PLAN (2023)

21. The Environmental Targets (Residual Waste) (England) Regulations 2023 commits the Government to halving the amount of residual waste produced in England to 287 kilograms per person by 2042 compared to the 574 kilograms per person measured in 2019. Residual waste is waste that is sent to landfill, put through incineration, used in energy recovery in the UK or sent overseas for energy recovery.

22. The 2023 Environmental Improvement Plan[5] includes interim targets to ensure that, by 31 January 2028:

    i. The total mass of residual waste (excluding major mineral wastes) does not exceed 437 kilograms per person (or 25.5 million tonnes in total).
    ii. Municipal residual waste should not exceed 333 kilograms per person (or 19.4m tonnes in total).

23. The core purpose of the strategy is to maximise the value of resources and minimise the environmental impact of waste, creating a mechanism to drive materials up the waste hierarchy to make the best and most productive use of them.

24. Major mineral wastes, such as concrete, bricks, sand and soil, are excluded from the target. Such materials are largely inert when treated as waste and are therefore excluded to focus attention on materials where the environmental impact per tonne of waste treatment is greatest, such as landfilling biodegradable materials or incinerating plastic.

25. Other interim targets specify total mass levels of food waste, plastic, paper and card, metals, and glass.

26. **Municipal residual waste:** Municipal waste includes both household waste and waste from other sources which is similar in nature and composition to household waste, including 'household-like' waste generated by businesses.

27. **Residual waste:** Waste that is not recycled or reused, including material that is too degraded or contaminated for these purposes, is termed residual waste. Residual waste, when collected from households or commercial businesses, is often termed 'black bag' or 'black bin' waste. It can originate from households and commercial businesses, but also from sectors such as construction and demolition, agriculture, forestry and fishing, mining and quarrying, and industry. It is typically treated by methods other than recycling or reuse.

28. The latest Defra statistics estimating the amount of 'Residual Waste' and 'Municipal Residual Waste' generated in England (released in April 2024)[6] suggest that these targets are challenging, as presented in figures 7 to 10 below. Furthermore, the Office for Environmental Protection concluded in January 2024 that "*Our assessment is that government is largely off track to meet its ambitions and its legal obligations.*"[7]

[5] www.gov.uk/government/publications/environmental-improvement-plan

[6] www.gov.uk/government/statistics/estimates-of-residual-waste-excluding-major-mineral-wastes-and-municipal-residual-waste-in-england

[7] www.theoep.org.uk/report/government-remains-largely-track-meet-its-environmental-ambitions-finds-oep-annual-progress

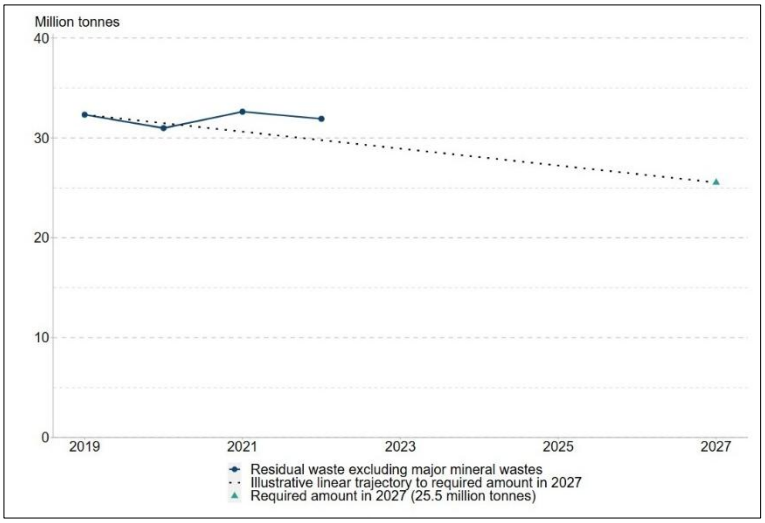

Fig. 7: Residual waste excluding major mineral wastes, million tonnes, England, 2019 to 2022

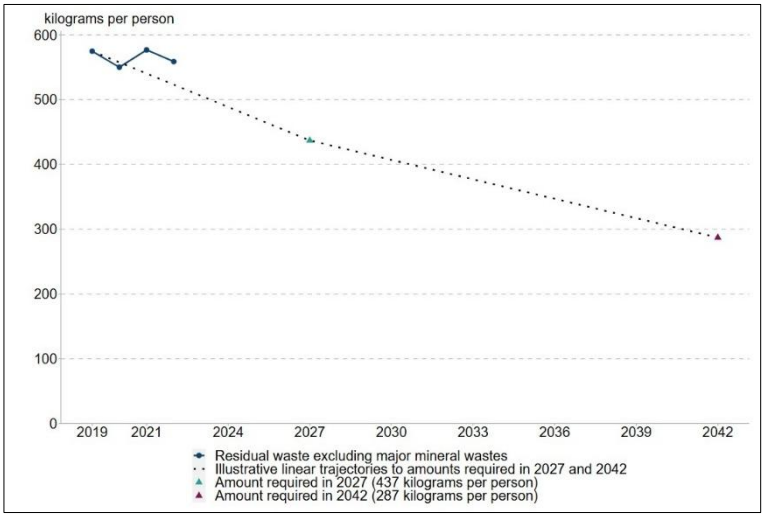

Fig. 8: Residual waste excluding major mineral wastes, kg per person, England, 2019 to 2022

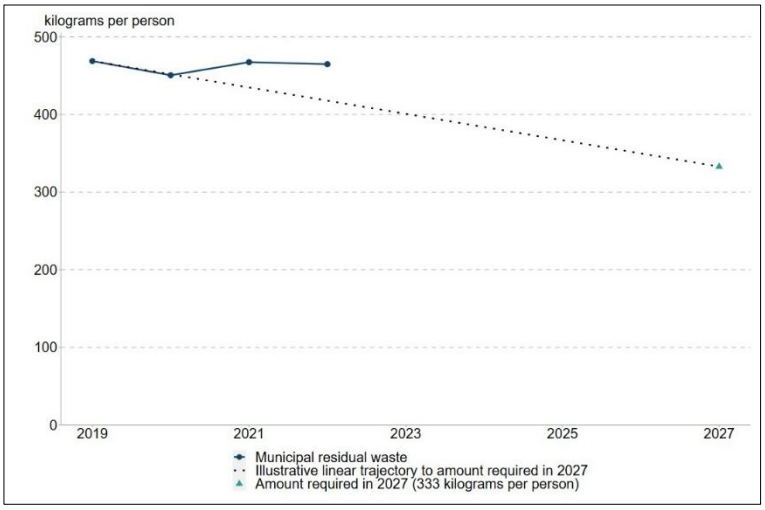

Fig. 9: Municipal residual waste, kg per person, England, 2019 to 2022

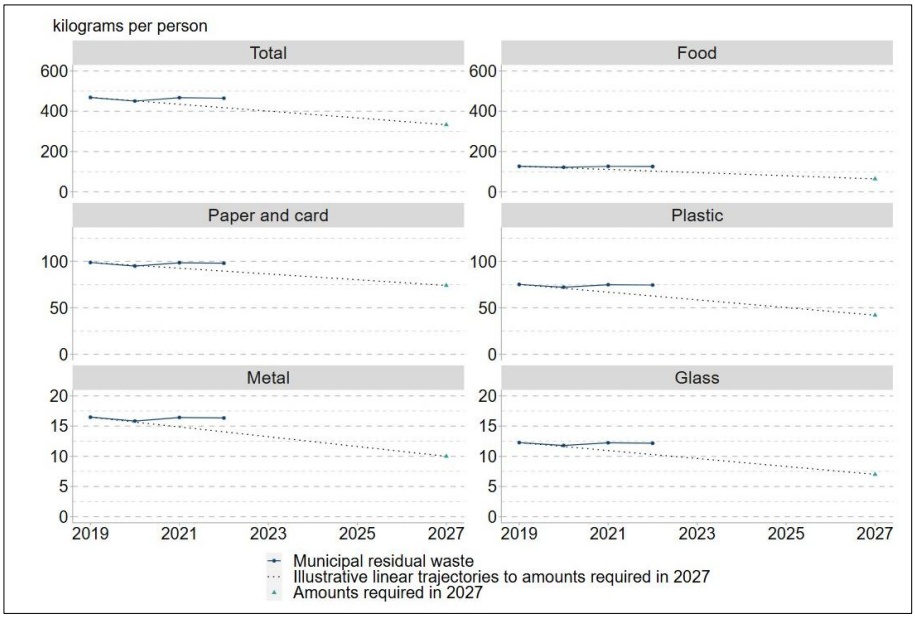

Fig. 10: Municipal residual waste by type, kg per person, England, 2019 to 2022

SECTION 5 RESIDUAL WASTE INFRASTRUCTURE CAPACITY NOTE

5.1 SUMMARY OF NOTE

29. In December 2024, Defra released a research and analysis paper entitled 'Residual Waste Infrastructure Capacity Note'[8]. This paper presented the evidence and analysis relating to municipal residual waste arisings and forecast infrastructure capacity in England from 2020 to 2035, accounting for the effect of Defra's packaging reforms. The paper was "*intended to support decision makers in planning for residual waste treatment to support the transition to a circular economy.*"

30. Given the statutory target to halve the weight of residual waste per person by 2042 compared to the 2019 benchmark, Defra have developed three major waste reforms intended to improve the way resources and waste are managed. These reforms are:

    i. An 'Extended Producer Responsibility' scheme for packaging ('*pEPR*')
    ii. 'Simpler Recycling' in England
    iii. A 'Deposit Return Scheme' ('DRS') for drinks containers.

31. This set of packaging reforms are expected to reduce residual waste through incentivising and improving recycling. The packaging reforms are estimated to reduce annual municipal waste arisings by 18% by 2035 relative to 2020 figures.

32. Other relevant policies are being implemented that will also impact the waste management sector and the treatment of residual waste. For example, the Plastic Packaging Tax, the expansion of the UK's Emissions Trading Scheme to include waste incineration and EfW, and the near elimination of biodegradable waste from landfill.

33. Key statements of relevance pertaining to the potential development of energy recovery in England include:

    i. "*In 2035, total energy recovery capacity is estimated to include 18.8 million tonnes in comparison to 19.4 million tonnes of residual municipal waste. Total residual waste treatment capacity is forecast to be approximately 24.9 million tonnes, including an allowance for capacity in landfills to manage 10% of all municipal solid wastes.*"

    ii. *The data in this note suggests that while we are approaching a point where national residual waste treatment capacity is sufficient to manage municipal residual wastes, there are regional variations.*"

    iii. "*There are … certain areas in England where alternative treatment options to landfill for municipal residual waste is required to further support our environmental objectives and obligations.*"

    iv. "*It is recognised … that additional energy recovery facilities may be required.*"

    v. "*For those energy recovery developments we do need, we will only support projects that offer the best efficiency and are future proofed towards supporting our net zero objectives. This means that further developments must be able to demonstrate that making use of the heat they produce is viable and that they can be built carbon capture ready.*"

    vi. "*A proposed plant must not compete with greater waste prevention, reuse or recycling, or result in an overcapacity of residual waste treatment.*"

    vii. "*We do not, however, support the development of overcapacity of energy recovery infrastructure in England*"

    viii. "*The government will also explore how to incentivise the decommissioning of facilities that are less efficient, cannot support our net zero objectives, or are no longer required.*"

34. The document primarily addresses the collection and treatment of household waste, municipal residual waste from households, and Local Authority collected ('*LA-collected*') waste streams. Nonetheless, it is

[8] *www.gov.uk/government/publications/residual-waste-infrastructure-capacity-note*

also necessary to manage and process commercial and industrial waste streams to achieve the 2042 target of 287kg per capita.

35. Key statements in the Defra Note recognise that the treatment of commercial and industrial residual waste is an important consideration. These include the following:

    i. *"The assessment undertaken does not consider treatment needs for non-municipal residual wastes."*

    ii. "*Non-municipal residual wastes not being treated at energy recovery facilities or exported as RDF are likely being managed through disposal at landfill."*

    iii. "*While some non-municipal residual wastes currently disposed of in landfill could be managed through existing energy recovery facilities as volumes of municipal residual waste reduce, creating 'headroom', it may be that alternative or additional facilities are required to divert these wastes, where they cannot be prevented or recycled, away from landfill."*

    iv. "*Evidence also suggests that alternatives are required to support the diversion of non-municipal wastes from landfill."*

    v. "*There is also likely a need for alternative treatment options to landfill for non-municipal residual wastes."*

36. Estimates of C&I residual waste volumes that are currently landfilled or incinerated are considered in Section 7.

5.2 COMMENTS AND RESPONSES

37. Using the Defra definitions, Municipal Residual Waste is that proportion of total Municipal Solid Waste (*'MSW'*) arisings that has a fate either in landfill or EfW. Therefore, achieving a target of 287 kilograms per person of Municipal Residual Waste will either require the reduction of the total MSW or a significant increase in recycling compared to current levels. A combination of both will be essential.

38. Defra notes that the recycling rate in England has remained unchanged in recent years (see Fig. 11). The suite of waste reforms, primarily focused on improving the recovery and recycling of packaging waste, aims to enhance recycling through simplification and incentives, and reduce total waste by implementing a 'producer pays' model. The extent to which these packaging waste reforms need to deliver is shown in the red line in Fig. 11 below.

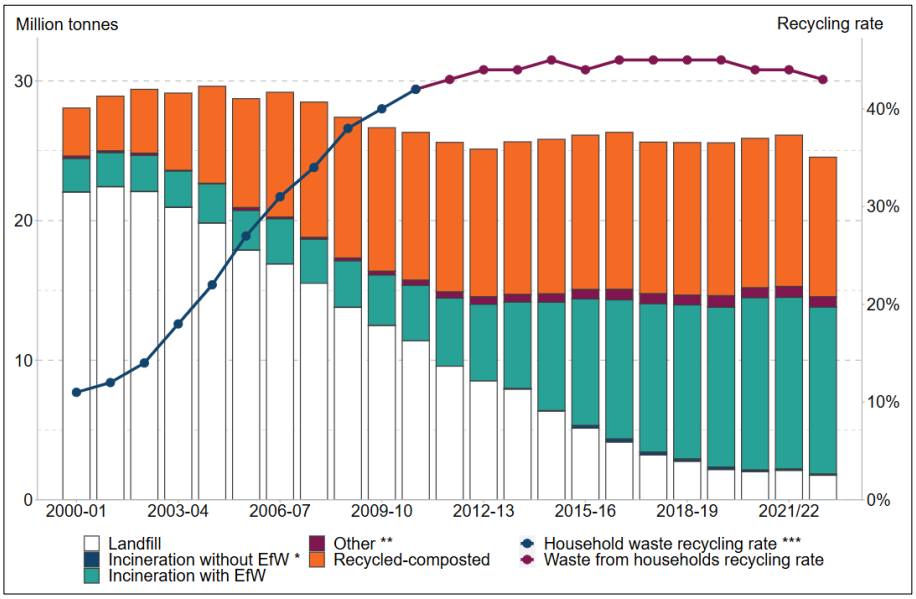

Fig. 11: Long-term trend of treatment of LA-collected municipal waste (England)

39. Material entering an EfW facility for incineration is, by Defra's definition, Municipal Residual Waste which is the measure that Defra is seeking to halve by 2042.

40. Municipal Residual Waste would not cease to exist if there were no landfills or EfW facilities. Potentially, there would be a dramatic increase in fly-tipping or waste crime, given that, in Defra's own definition of residual waste, it is considered "*too degraded or contaminated*" for recycling purposes. The solution, therefore, is a recognition that the sorting and recycling capacity and the commercial and regulatory incentives minimise the residual waste for both municipal and non-municipal waste streams.

41. The Defra Note acknowledges the uncertainty of the forecast beyond 2035 with the recycling rates having remained unchanged by previous initiatives and more regulatory reforms required:

    i. If the target of a 50% reduction in municipal residual waste by 2042 from 2019 levels is to be met, the 18% decrease by 2035 is helpful but insufficient on its own. This is acknowledged in the Defra Note: "*Detailed policies to achieve reductions beyond the packaging reforms and create the circular economy have not yet been developed.*"

    ii. The Defra Note acknowledges that the forecasted 18% reduction in Municipal Solid Waste will only be reached by 2035, and this outcome depends on the execution of the reform package.

    iii. There is inherent uncertainty regarding waste volumes and composition beyond 2035. This is inevitable and is acknowledged in the Defra note: "*Detailed analysis and forecasts of residual waste arisings post-2035 are not currently possible.*"

    iv. Furthermore, there are unknown unknowns: "*There will likely be additional factors that affect the future composition and tonnage of municipal residual waste that have not been considered within this note.*"

42. "*Based on forecasts of waste arisings and infrastructure capacity, headline results indicate that there will be sufficient residual waste infrastructure capacity (including an allowance of no more than 10% municipal waste to landfill) to treat forecast residual municipal waste arising from around 2026 until the end of the assessment period.*" This statement assumes that landfill operators can continue offering services at such a reduced level. There is a risk that this may not be commercially viable. Consideration should be given to the scenario where a major landfill operator, such as Biffa, decides to close their landfills rather than endure the slow decline and mounting losses from site maintenance, processes and staffing costs.

43. Moreover, if Defra and the UK government are truly committed to transitioning to a landfill-free circular economy where resources are not lost to landfill, then no environmental benefit is served by accepting a 'no more than 10% municipal waste to landfill' model. A 10% landfill "buffer" still means that around 5 million tonnes would be disposed of in landfill each year by 2035.

44. It is logical and entirely in line with the spirit and letter of the Residual Waste Infrastructure Capacity Note to focus on areas in England where additional residual waste treatment capacity would enhance the resilience of the waste management sector strategically. This includes planning beyond 2035, where uncertainty might result in more residual municipal waste due to factors like population growth, comprehensive closures of landfill sites, or unforeseen events such as the fire at the AVR EfW plant in the Netherlands in 2023. That one event affected residual waste treatment not only in the Netherlands but across Europe, as 1 million tonnes of residual waste needed alternative outlets.

45. The Defra Note outlines a future where sustainable management of residual waste is possible, acknowledging the need for a limited number of new facilities to ensure that 'rubbish' is managed in an environmentally responsible manner. These new facilities should be (a) located in appropriate areas of England where a capacity gap has been identified and (b) must meet the government's tightened planning controls. This ensures that new developments contribute to the UK's circular economy and support the Net Zero objectives.

5.3 AMBITION FOR POLICY

46. Defra's stated ambition to "*transition to a circular economy in the UK*" is endorsed and supported across the waste management sector, and the Government is right to set ambitious milestones. A fundamental obligation of the state is responsible waste management, which Defra recognises as a delicate balance between regulation and incentives.

47. Setting the correct pace of change is a challenge for any government, especially in advancing waste treatment up the hierarchy, particularly for residual waste. The transition to a circular economy must be

done in partnership with the waste and resource sector, as they have regulatory responsibility for the compliant collection, treatment, recovery or disposal of waste.

48. The Environment, Food and Rural Affairs Committee, in its third report of 2022-3, identified the potential risk of unintended consequences in the current design of the Plastics Packaging Tax (PPT). The tax could unintentionally discourage recycling beyond the 30% threshold, a concern cited by the waste industry[9].

49. Achieving the targeted 18% reduction in residual waste volumes could be hampered by high costs, complexity and delay (acknowledging that the DRS is delayed until 2027). Ensuring adequate capacity for the responsible and environmentally sensitive management of non-recyclable residual waste will be essential to avoid unintended consequences

5.4 AUTHORITY AREAS WHERE ADDITIONAL RESIDUAL WASTE TREATMENT CAPACITY IS NEEDED

50. The Defra Note highlighted that areas in England still require more alternative treatment options to landfill. Specifically, the report identifies the East Midlands and East of England as regions with high landfill use, linking this to low operational EfW capacity: "*Analysis of the Local Authority Collected Waste Statistics shows that 7 local authorities reported sending more than 40% of their residual waste to landfill in 2022 to 2023. These results broadly align with the English regions where the areas with the lowest operational energy recovery facilities (East of England and East Midlands) include 4 of the 7 local authorities who sent more than 40% of their residual waste to landfill.*"

51. The seven local authorities referenced in the Residual Waste Capacity Note are:

i.	Essex County Council	95% landfilled[10]
ii.	Cambridgeshire County Council	87% landfilled
iii.	Southend-on-Sea Borough Council	74% landfilled
iv.	Darlington Borough Council	61% landfilled
v.	Lancashire County Council	59% landfilled
vi.	Leicester City Council	57% landfilled
vii.	Newcastle-upon-Tyne City Council	56% landfilled

52. The NLGEP development at Flixborough is within two hours' drive (considered, for the purpose of this report, to equate to 100 miles) by road or rail of four of these seven council areas (Cambridgeshire, Darlington, Lancashire and Leicester), placing it at a prime location to address alternative treatment capacity gaps across a wide area of England.

53. The following seventeen regulatory subregions (approximating for the most part to counties) are within two hours of the NLGEP development:

[9] www.letsrecycle.com/news/opinion-waste-sector-needs-a-sensible-stable-policy-environment/

[10] *The 'landfilled' figures refer to local authority collected waste only. This measure refers to the tonnage landfilled as a percentage of ('landfilled' plus 'incinerated')*

Regulatory Sub-Region	% Residual Waste Landfilled	Landfilled Residual Waste Tonnage (LA-collected)
Cambridgeshire	66%	135,034
Lancashire	51%	215,337
Leicestershire	43%	118,368
Derbyshire	26%	70,953
Tees Valley Unitary Authorities	16%	38,275
County Durham	16%	24,144
Northamptonshire	15%	28,886
Norfolk	13%	31,309
Nottinghamshire	10%	33,529
West Yorkshire	6%	37,821
North Yorkshire	6%	14,394
Lincolnshire	5%	10,906
Cheshire	3%	6,640
Greater Manchester	2%	14,767
South Yorkshire	1%	4,858
Staffordshire	1%	4,129
Former Humberside[11]	1%	2,003
	Sum:	***791,393***

54. The consideration of a two-hour drive or by rail is entirely consistent with the message of the Defra Note, which states: "*While regard must be given to the proximity principle, which encourages residual waste to be recovered in one of the nearest appropriate facilities, this must not be over-interpreted. It does not require using the absolute closest facility to the exclusion of all other considerations. Accepting waste from, or sending waste to, another council, city, or region in many cases may be the best economic and environmental solution and be the only outcome achievable at a given time that is the most consistent with the proximity principle. The ability to source waste from a range of locations and organisations helps ensure existing capacity is used effectively and efficiently.*"

[11] *Comprising North Lincolnshire, North East Lincolnshire, East Riding and Hull*

55. The Defra Note identifies the need for additional treatment capacity in the East Midlands as an alternative to landfill. Furthermore, the note recognises the pragmatic reality that any new capacity need not actually be sited within the East Midlands, so long as it is within reasonable reach of the East Midlands.

56. The NLGEP development, being situated at the upper edge of the East Midlands and within the Greater Lincolnshire devolved authority area, is therefore ideally situated to receive and recover residual wastes from both the East Midlands and the Yorks & Humber region, with good rail, river and road links extending throughout both regions.

57. Exploring the local authority waste data trends for these two key regions, using the Local Authority Collected Waste Management data[12], additional insights can be gleaned which add context to the conclusions of the Defra Note.

58. Fig. 12 affirms that the East Midlands presently has less EfW capacity than Yorks & Humber:

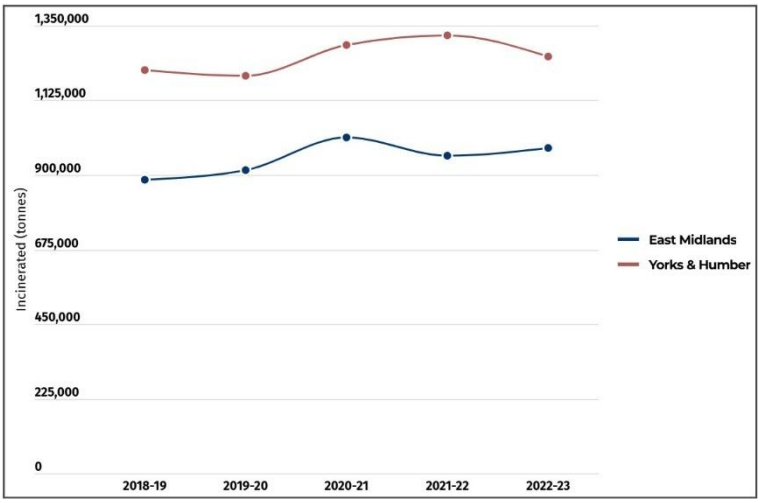

Fig. 12: LA-collected waste incinerated

59. Fig. 13 indicates that, as a result of insufficient EfW capacity, the non-recyclable residual municipal waste from the East Midlands is being sent to landfill in the absence of other viable alternatives.

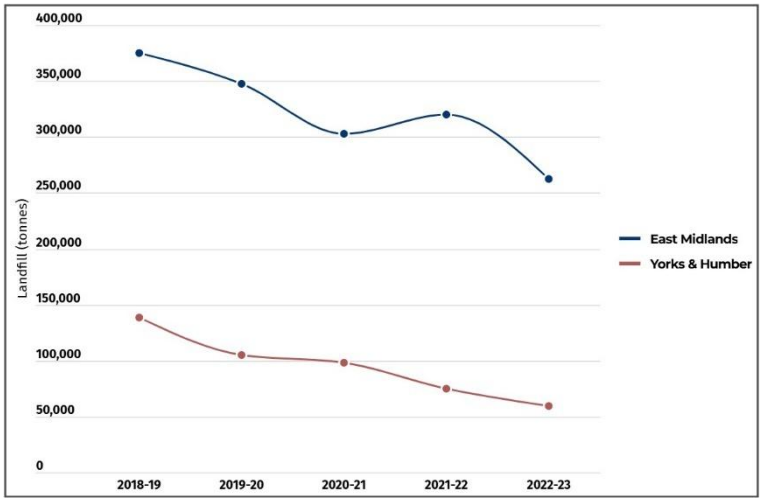

Fig. 13: LA-collected waste landfilled

60. In Yorks & Humber, only 4% of LA-collected residual waste is landfilled (59,000 tonnes), compared to 21% for East Midlands authorities (263,000 tonnes). The disparity in residual waste treatment between the two regions is clearly seen in Fig. 14:

[12] *www.gov.uk/government/statistics/local-authority-collected-waste-management-annual-results/local-authority-collected-waste-management-annual-results-202223*

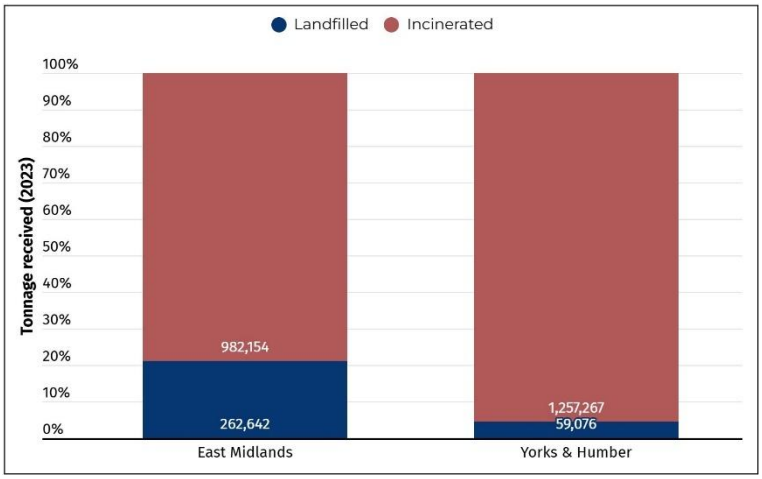

Fig. 14: LA-collected waste landfilled as % of total

61. Breaking these landfill trends down into sub-regions, it becomes apparent that Leicestershire and Derbyshire are the two areas of greatest concern, both areas sending more than 10% of their LA-collected waste to landfill (see Fig. 15).

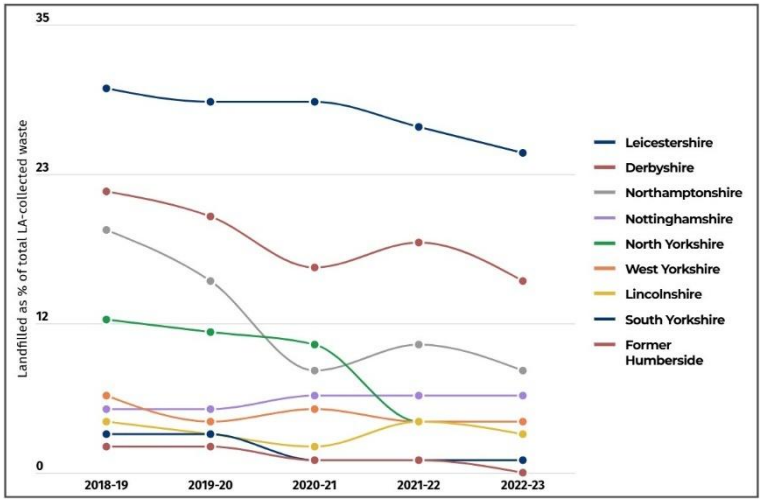

Fig. 15: LA-collected waste landfilled as % of total by subregion

62. When these trends are presented as landfill tonnage as a percentage of the non-recyclable residual waste fraction in Fig. 16, the difference between the 'best' and the 'worst' becomes even more stark. Leicestershire landfills 43% of its residual waste compared to less than 1% in the Former Humberside subregion:

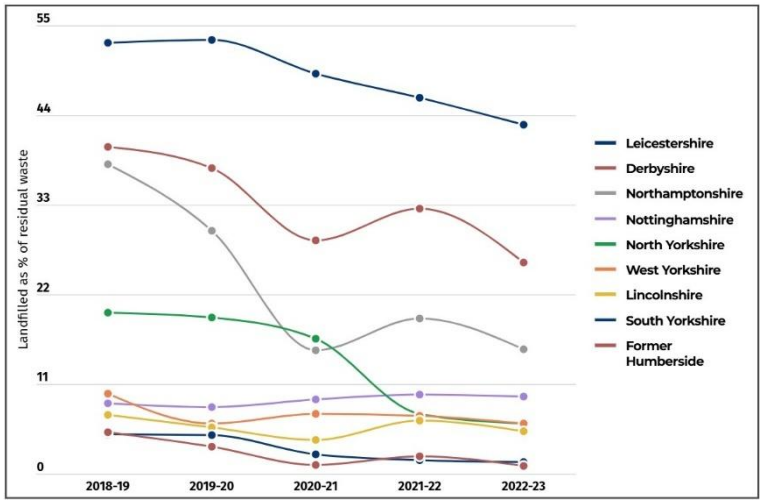

Fig. 16: LA-collected waste landfilled as % of residual waste by Subregion

63. Reflecting these trends by local authority, the top 5 councils within reach of the NLGEP development who are sending the highest proportion of their municipal solid waste to landfill are:

i. Leicester City Council (57% of residual waste landfilled)
ii. Leicestershire County Council (39%)
iii. Derby City Council (30%)
iv. Derbyshire County Council (25%)
v. Wakefield City MDC (18%)

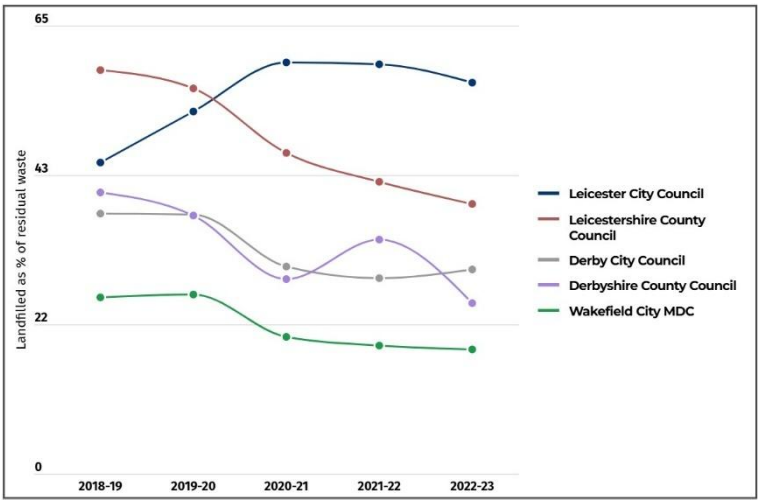

Fig. 17: LA-collected waste landfilled as % of residual waste by Authority (Top 5 by %)

64. Collectively, these five authorities alone sent nearly 206,000 tonnes of residual waste to landfill in 2022-23 (see Fig. 18).

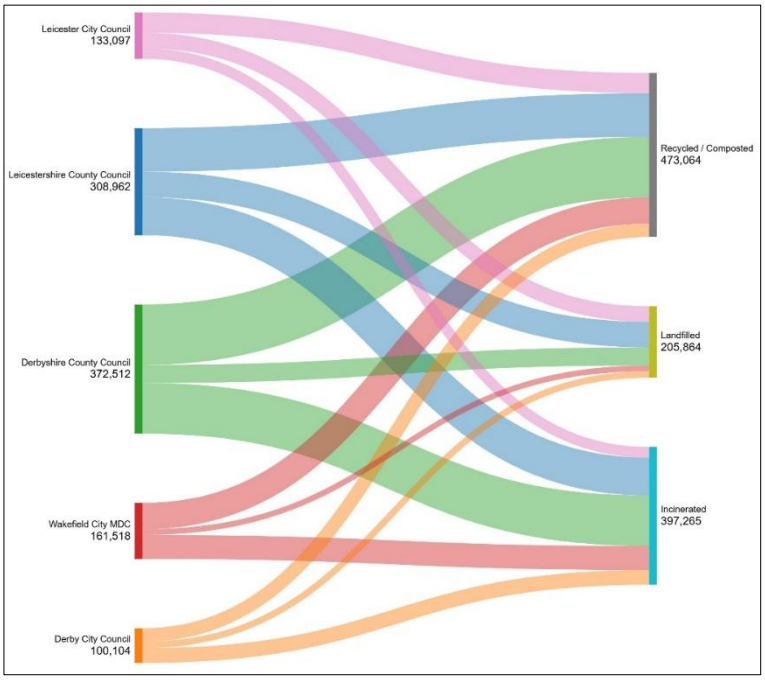

Fig. 18: Waste treatment profile of 5 councils in East Midlands / Yorks & Humber with highest landfill output

SECTION 7 REGULATORY WASTE SITE DATA

7.1 C&I WASTE IN YORKS & HUMBER AND EAST MIDLANDS

65. The clear message of Defra's Note is that additional treatment capacity is likely to be needed to support the diversion of non-recyclable residual waste away from landfill, particularly in certain areas of the country. This conclusion was formed largely on the basis of LA-collected waste. However, as has been noted, the report also states: "*There is also likely a need for alternative treatment options to landfill for non-municipal residual wastes.*"

66. According to the most recent UK waste statistics[13], "*It is estimated that the UK generated 40.4 million tonnes of C&I waste in 2022, of which 33.7 million tonnes (83%) was generated in England.*"

67. Defra C&I estimates are typically presented at the UK total or England level and are not broken down by region. However, in 2009, Defra conducted a survey of C&I waste arisings, presenting the results by region. The findings reported 47.9 million tonnes of C&I waste in England, with 6.9 million tonnes in Yorks & Humber and 6.3 million tonnes in the East Midlands (14.4% and 13.2%, respectively).

68. While the total tonnages reported in the 2009 survey are outdated, the relative percentages remain useful in the absence of a more recent survey. Using the latest Defra C&I estimate of 33.7 million tonnes for England and applying these regional percentages, we conclude:
    i. **Yorks & Humber:** 14.4% of 33.7 million tonnes equals 4.8 million tonnes of C&I waste.
    ii. **East Midlands:** 13.2% of 33.7 million tonnes equals 4.4 million tonnes of C&I waste.

    The combined assumed arisings therefore amount to 9.2 million tonnes of C&I waste in East Midlands and Yorks & Humber.

7.2 C&I RESIDUAL WASTE LANDFILLED WITHIN REACH OF NLGEP DEVELOPMENT

69. Given that (A) the landfilled residual waste tonnage collected by local authorities is known, and (B) the total residual waste of the four EWC codes received at landfill sites is identifiable from the Waste Data Interrogator, it is possible to deduce the volume of C&I waste sent to landfill, which is (B) minus (A).

70. The table below reflects (A) and (B), as described above, for the authority subregions within a 100-mile radius (either wholly or partly) of the NLGEP development. This represents a high estimate since, for subregions like Cambridgeshire, much of the area lies beyond the 100-mile perimeter. Nonetheless, this method helps determine the volume of residual C&I waste compared to LA-collected residual waste.

Regulatory Sub-Region	(A) Landfilled Residual Waste Tonnage (LA-collected)	(B) Total Residual Waste Received At Landfills[14]
Cambridgeshire	135,034	416,469
Lancashire	215,337	302,283
Leicestershire	118,368	77,928
Derbyshire	70,953	295,210
Tees Valley Unitary Authorities	38,275	110,709
County Durham	24,144	16,062
Northamptonshire	28,886	47,095
Norfolk	31,309	50,435
Nottinghamshire	33,529	2,539
West Yorkshire	37,821	95,977
North Yorkshire	14,394	4,513
Lincolnshire	10,906	183,978
Cheshire	6,640	0
Greater Manchester	14,767	256,070
South Yorkshire	4,858	62,537
Staffordshire	4,129	337,191
Former Humberside[15]	2,003	124,099
Sum:	***791,393***	***2,383,090***

[13] www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste

[14] *EWC 191212 adjusted to account for combustibility*

[15] *Comprising North Lincolnshire, North East Lincolnshire, East Riding and Hull*

71. In the regulatory sub-regions within 100 miles of the NLGEP development, the total receipts of residual waste (as any of the four key EWC codes[16]) amounted to 2.4 million tonnes. In those same sub-regions, the LA-collected waste totalled 791 thousand tonnes. Therefore, it is logical to deduce that the total volume of C&I residual waste landfilled in the 100-mile radius amounted to 1.6 million tonnes – approximately twice the volume of landfilled LA-collected waste.

72. Even within a 50-mile radius of the NLGEP development, there are several landfill sites receiving material suited to EfW recovery. The top eight such sites received a total of 720,000 tonnes in 2023 (see Fig. 19 and key).

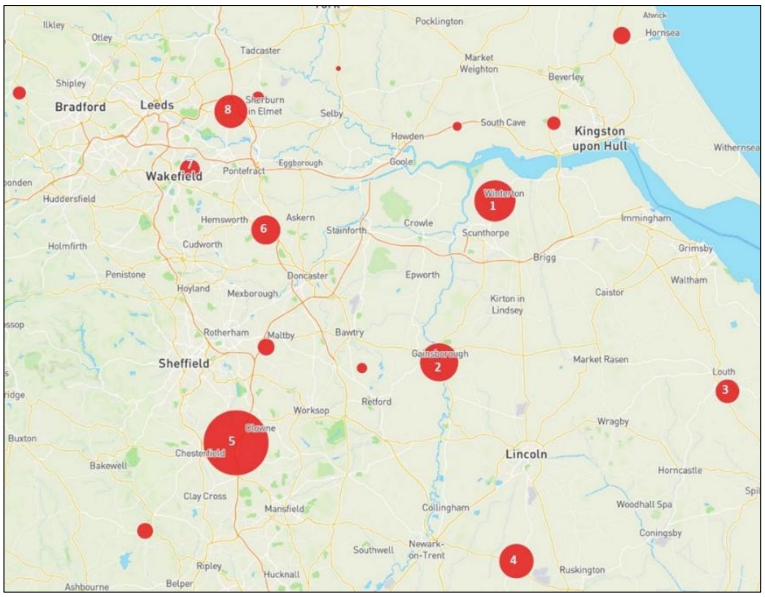

Fig. 19: Landfill sites within vicinity of proposed development

Key:
1: Biffa Waste Services Ltd (DN15 0BD) *(105,000 tonnes of combustible residual waste received in 2023)*
2: Lincwaste Ltd (DN21 1AF) *(87,000 tonnes)*
3: Lincwaste Ltd (LN11 9QP) *(28,000 tonnes)*
4: Lincwaste Ltd (LN5 0QF) *(69,000 tonnes)*
5: Viridor Waste Management Ltd (S44 5HS) *(286,000 tonnes)*
6: Catplant Quarry Ltd (DN6 7EX) *(51,000 tonnes)*
7: Welbeck Waste Management Ltd (WF6 2JA) *(29,000 tonnes)*
8: Caird Peckfield Ltd (LS25 4DW) *(62,000 tonnes)*

73. The majority of wastes arriving at these landfill sites in 2023 was categorised as EWC 191212, meaning that a degree of mechanical separation and sorting had taken place prior to disposal. Over recent years, the proportion of 191212 relative to other codes has increased because of greater use of mechanical sorting in the waste sector. This is evident in Fig. 20 which reflects landfill receipts by waste code across England. (The 191212 volumes have, in this instance, not been adjusted to account for assumed combustibility.)

[16] *EWC codes 191210, 191212, 200301 and 200307. 191212 figures have been adjusted to account for combustibility of mechanical fines.*

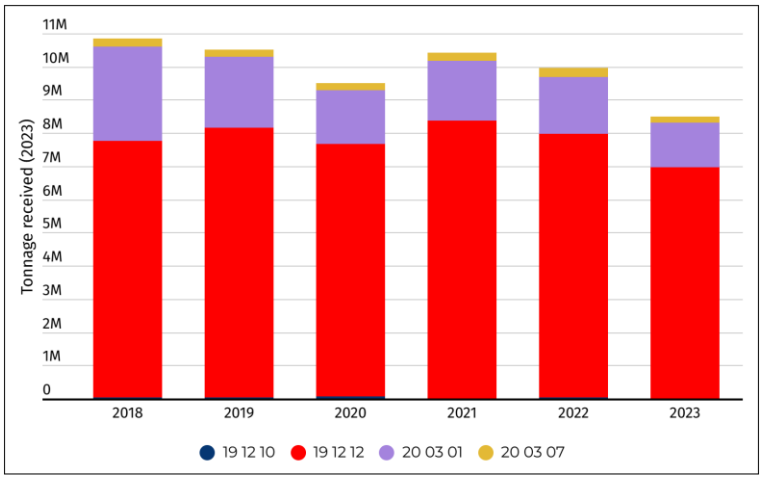

Fig. 20: Residual waste receipts at landfill sites (England-wide)

7.3 C&I RESIDUAL WASTE INCINERATED WITHIN 100 MILES OF NLGEP DEVELOPMENT

74. The same logic that was applied to landfill tonnages can be applied to incinerated residual waste: the LA-collected tonnage is known, as is the total residual waste received at incinerators. Therefore, assuming that what was not LA-collected is likely to be commercial or industrial waste, it is possible to determine the volume of residual C&I waste incinerated within reach of the NLGEP development.

Regulatory Sub-Region	(A) Incinerated Residual Waste Tonnage (LA-collected)	(B) Total Residual Waste Received At Incinerators
Cambridgeshire	66,607	75,473
Lancashire	175,484	51,703
Leicestershire	149,233	392,543
Derbyshire	188,506	202,034
Tees Valley Unitary Authorities	182,225	1,121,634
County Durham	125,982	0
Northamptonshire	143,988	0
Norfolk	201,059	0
Nottinghamshire	304,961	189,972
West Yorkshire	566,038	1,626,728
North Yorkshire	211,675	303,815
Lincolnshire	195,466	186,706
Cheshire	195,860	1
Greater Manchester	618,923	0
South Yorkshire	264,551	226,204
Staffordshire	288,334	370,024
Former Humberside[17]	215,003	116,992
Sum:	***4,073,446***	***4,863,827***

75. The difference between A and B in this case is 790,381 tonnes, which is the assumed figure for C&I waste incinerated in the zone of interest. This suggests that the incineration capacity in the listed subregions is primarily dominated by LA-collected municipal waste.

[17] *Comprising North Lincolnshire, North East Lincolnshire, East Riding and Hull*

7.4 C&I RESIDUAL WASTE LANDFILLED (ENGLAND-WIDE)

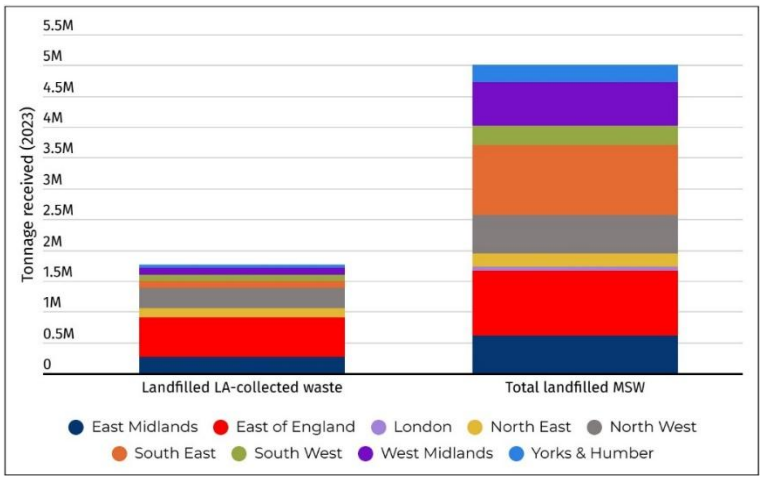

Fig. 21: England-wide landfill volumes (residual waste, LA-collected vs Total)

76. Fig. 21 presents the landfilled residual waste tonnages from the Local Authority statistics compared to the declared receipts from the regulatory data interrogator. The 'Total Landfilled MSW' bar includes the four key EWC codes, with the 191212 figures adjusted to account for the combustibility of mechanical fines.

77. 'Total landfilled MSW' (5.0 million tonnes) minus 'Landfilled LA-collected waste' (1.8 million tonnes) equals 3.2 million tonnes, this being an estimate of the volume of residual C&I waste disposed of in landfill in 2023. Again, given that the EWC 191212 tonnages have been adjusted, this represents a residual resource that is likely to be suitable for EfW recovery. As with the findings in Section 7, the amount of C&I residual waste sent to landfill is significantly higher than the landfilled municipal LA-collection tonnage. This suggests that the conclusions of the Residual Waste Infrastructure Capacity Note are an understatement of the actual challenge if Defra aspires to move waste out of landfill.

7.5 C&I RESIDUAL WASTE INCINERATED (ENGLAND-WIDE)

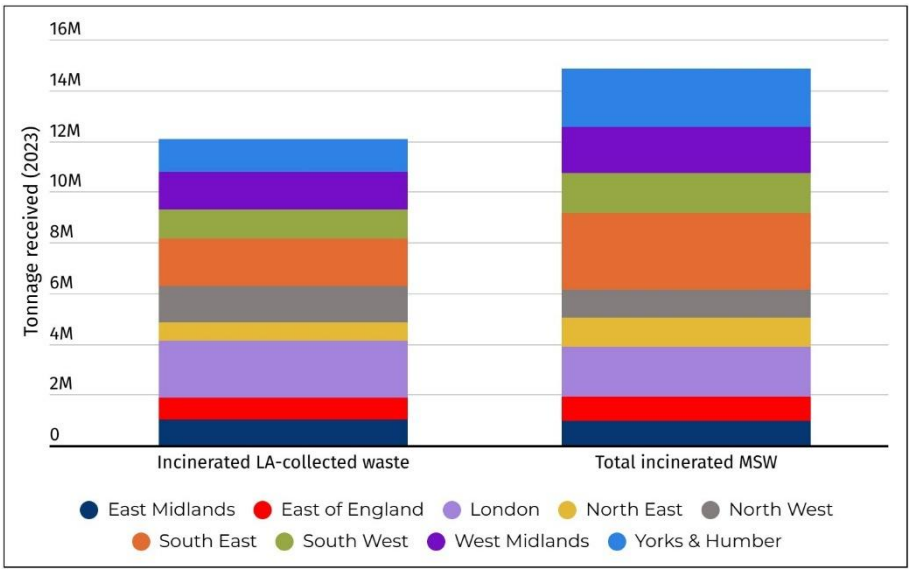

Fig. 22: England-wide incineration volumes (residual waste, LA-collected vs Total)

78. Fig. 22 reveals that the difference between 'Total Incinerated MSW' (14.8 million tonnes) and 'Incinerated LA-collected waste' (12 million tonnes) across England amounted to 2.8 million tonnes in 2023. Environment Agency data for England shows that the headline collective capacity of the operational EfW sites in 2023 was 15.8 million tonnes.

79. The logic applied in Sections 7.4 and 7.5 reveals a very significant finding, namely that the EfW capacity of England is primarily configured to serve the needs of local authorities (given that many were commissioned and constructed through public sector contracts for the processing of domestic residual

waste), meaning that the C&I residual waste is more likely to end up in landfill. The disparity between these two sides of the residual waste divide is illustrated in Fig. 23.

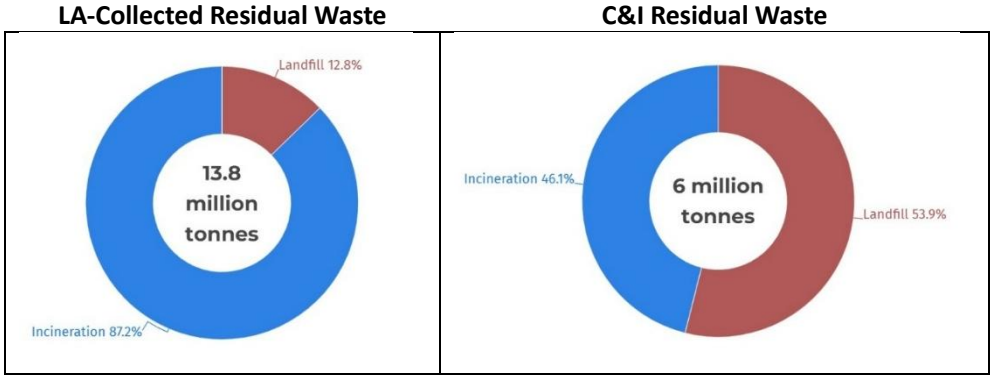

Fig. 23: England-wide residual waste treatment (LA-collected compared to C&I)

7.6 RESIDUAL WASTE OUTGOING FROM EAST MIDLANDS FACILITIES

80. **Residual waste going to landfill from East Midlands facilities:**

i. Almost one million tonnes (968,585 tonnes) of residual waste (of the four relevant codes) were sent from permitted waste sites in the East of England to landfill in 2023. Only 65% of that landfill was located within the East Midlands region (see Fig. 24). The remainder was sent to facilities primarily in the West Midlands, Yorks & Humber, and East of England.

ii. The greater proportion (79%) of this landfill-destined residual waste was categorised as EWC 191212, which means that it had passed through some mechanical sorting / screening process prior to being sent for disposal. If the combustibility adjustment is applied to this 191212 material, this suggests that around 384,000 tonnes of potential fuel is being lost to landfill as a result.

iii. In addition to the 191212 waste, 189,000 tonnes of 'Municipal Solid Waste' (EWC 200301) was sent to landfill from East Midlands facilities.

iv. The combination of these two waste streams totals 573,000 tonnes of material presently lost to landfill which would be suited for EfW recovery.

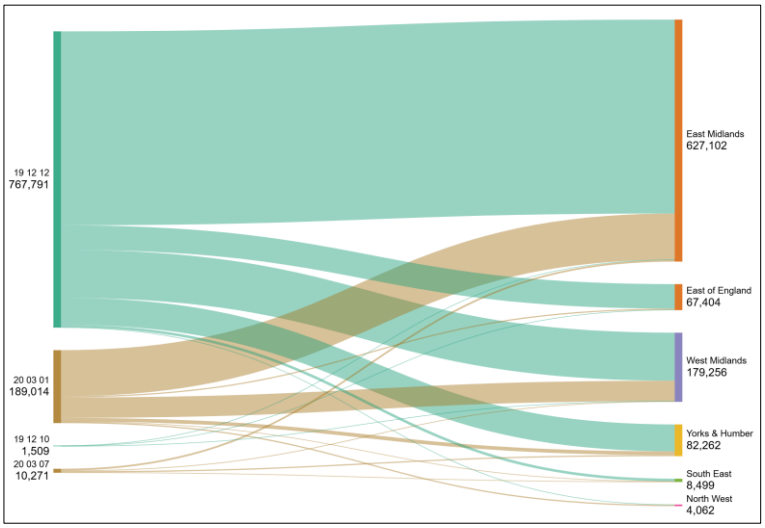

Fig. 24: East Midlands Outgoing Waste - fate region (landfill)

81. **Residual waste going to incineration from East Midlands facilities:**

i. 1.1 million tonnes of residual waste was sent for incineration by permitted facilities in the East Midlands in 2023, split roughly-evenly between RDF (EWC 191210) and MSW (EWC 200301), with minor volumes of EWC 191212 and 200307.

ii. Only 326,000 tonnes of this total was recovered by incineration in the East Midlands region, amounting to 29%. Other recipient areas in the UK included Yorks & Humber, West Midlands and East of England (see Fig. 25).

iii. Just over half a million tonnes (538,021) left permitted facilities in the East Midlands as processed RDF (EWC 191210). Of this, 172,000 tonnes were sent overseas, which equates to 32% of the processed RDF output.

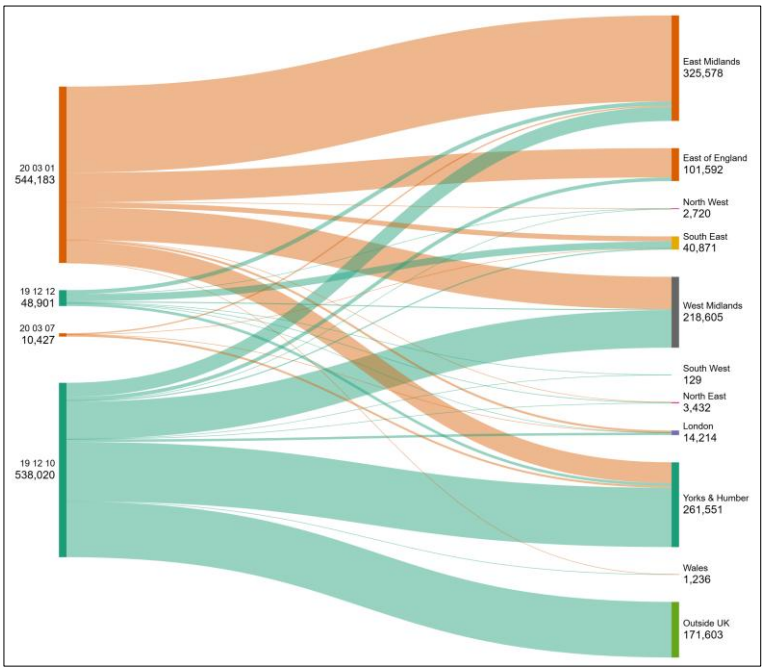

Fig. 25: East Midlands Outgoing Waste - fate region (incineration)

82. **Residual waste opportunity from East Midlands region:**

i. The combination of the 573,000 tonnes of combustible residual waste presently going to landfill plus the 172,000 tonnes sent overseas as RDF totals 745,000 tonnes.

ii. This constitutes residual waste that has been screened and sorted in material recovery facilities in the East Midlands, deemed to be non-recyclable. Therefore, the utilisation of this feedstock by thermal recovery will have no detrimental impact on recycling and recovery streams.

7.7 RESIDUAL WASTE OUTGOING FROM YORKS & HUMBER FACILITIES

83. **Residual waste going to landfill from Yorks & Humber facilities:**

i. Residual waste sent to landfill from Yorks & Humber permitted waste facilities in 2023 amounted to 430,000 tonnes, less than half of what was sent to landfill by facilities in the East Midlands. 77% of that landfill capacity was within the Yorks & Humber region.

ii. 86% of this landfill-destined residual waste was categorised as EWC 191212. Applying the combustibility adjustment to this particular stream, this suggests that around 185,000 tonnes of potential fuel is being lost to landfill.

iii. In addition to the 191212 waste, 53,000 tonnes of 'Municipal Solid Waste' (EWC 200301) were sent to landfill from Yorks & Humber facilities.

iv. The combination of these two waste streams totals 237,000 tonnes of material presently lost to landfill from facilities in Yorks & Humber which would be suited for EfW recovery.

v. Existing EfW facilities in the Yorks & Humber region may not be able to accommodate this combustible waste, particularly those facilities that are bound to local authority contracts such as Veolia Sheffield (which takes 77% of its input from LA-collected material), Suez Kirklees (83% from LA-collected material) or Veolia Leeds (89% from LA-collected material). Conversely, the key 'merchant facility' in the region (Ferrybridge) receives only 52% of its feedstock from LA-collected material. The issue is as much about an EfW site's ability to receive waste-derived fuel from non-municipal sources as it is about headline capacity.

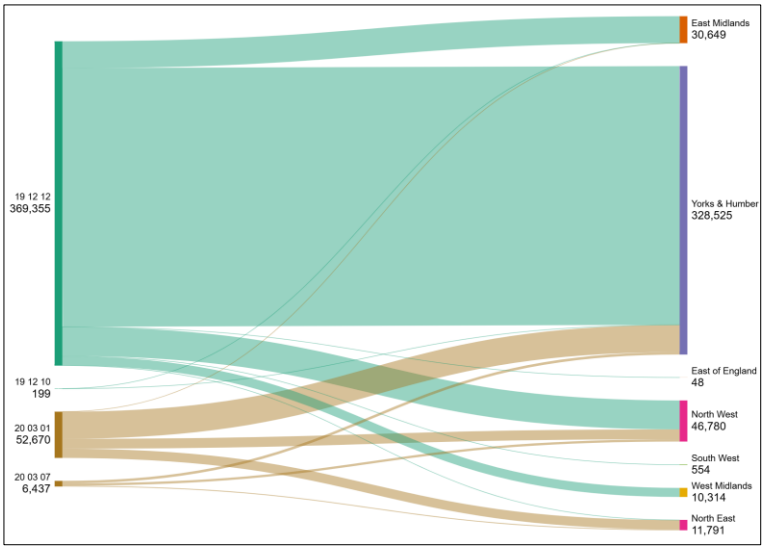

Fig. 26: Yorks & Humber Outgoing Waste - fate region (landfill)

84. **Residual waste going to incineration from Yorks & Humber facilities:**

i. 1 million tonnes of residual waste was sent for incineration by permitted facilities in Yorks & Humber in 2023, predominantly categorised as RDF (EWC 191210).

ii. 71% of this material was recovered by incineration in the Yorks & Humber region, which contrasts with the low level of residual waste from the East Midlands that was recovered by incineration within East Midlands. This reinforces one of the conclusions from the Residual Waste Infrastructure Capacity Note, that there is a shortage in energy from waste capacity in the East Midlands.

iii. 259,000 tonnes of RDF from Yorks & Humber waste sites were sent overseas in 2023.

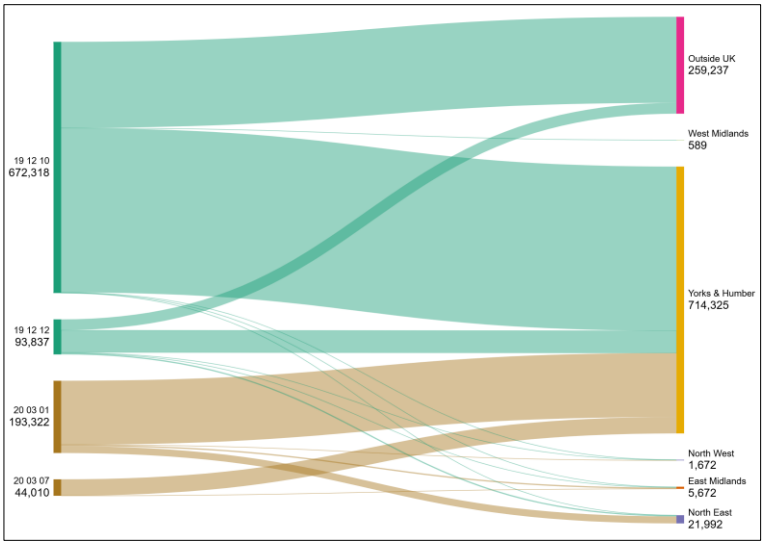

Fig. 27: Yorks & Humber Outgoing Waste - fate region (incineration)

85. **Residual waste opportunity from Yorks & Humber region:**

i. The combination of the 237,000 tonnes of combustible residual waste presently going to landfill plus the 259,000 tonnes sent overseas as RDF totals 496,000 tonnes.

ii. As with the East Midlands, this consists of residual waste that has been screened and sorted in material recovery facilities and deemed non-recyclable. This represents a potential resource that could be better utilised compared to landfill or used more locally instead of exporting overseas.

86. Between the two regions of the East Midlands and Yorks & Humber, the conclusion of this analysis is that there exists a feedstock pool of approximately 1.2 million tonnes of combustible waste that is currently either being sent to landfill or exported. This total increases to 1.5 million tonnes if the 100-mile radius is used instead of simply East Midlands and Yorks & Humber, given that 100 miles incorporates sites at the edges of other regions.

SECTION 8 WASTE VOLUME TRENDS

87. The charts in this section illustrate tonnage trends within a 100-mile radius by road or rail of the NLGEP development. Each chart represents waste either entering or leaving the licensed waste facilities in this area and is further categorised by specific classifications:

    i. Site Process
    ii. EWC Code
    iii. Source Region (*for incoming wastes only*)
    iv. Destination Region (*for outgoing wastes only*)
    v. Fate (*for outgoing wastes only*)

8.1 WASTE VOLUMES BY SITE PROCESS (INCOMING)

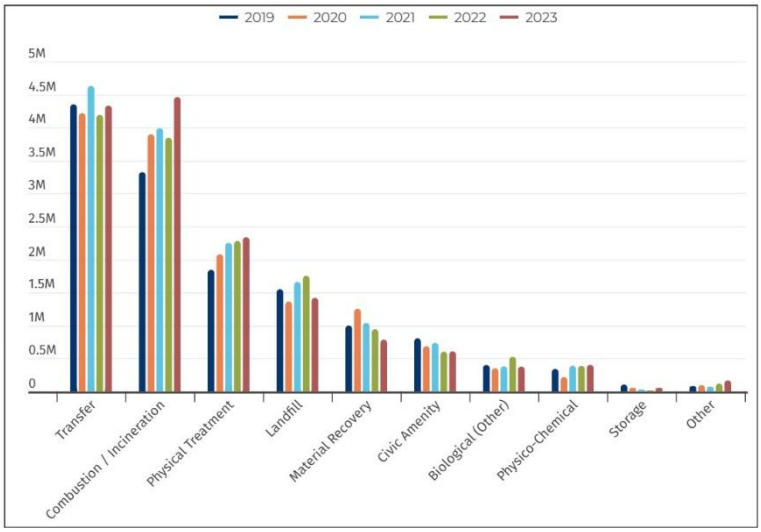

Fig. 28: Materials incoming to waste sites, sliced by Site Process

Process	2019	2020	2021	2022	2023	% +/-
Transfer	4,351,040	4,217,342	4,629,412	4,192,424	4,330,519	*3.3%*
Combustion / Incineration	3,324,935	3,898,250	3,988,853	3,846,369	4,463,039	*16.0%*
Physical Treatment	1,845,828	2,077,892	2,252,742	2,281,180	2,336,059	*2.4%*
Landfill	1,550,876	1,364,439	1,658,891	1,754,848	1,417,810	*-19.2%*
Material Recovery	998,993	1,253,438	1,039,338	943,815	785,116	*-16.8%*
Civic Amenity	807,172	684,823	737,146	603,647	608,488	*0.8%*
Biological (Other)	401,714	351,789	380,046	526,729	376,831	*-28.5%*
Physico-Chemical	341,334	218,471	389,336	388,915	403,630	*3.8%*
Storage	106,707	56,190	27,169	10,656	55,639	*422.1%*
Other	81,879	97,494	71,998	120,425	169,275	*40.6%*
Sum:	***13,810,478***	***14,220,128***	***15,174,931***	***14,669,008***	***14,946,406***	*1.9%*

88. The increase in Combustion/Incineration volumes in the most recent year is attributed to the Newhurst Quarry EfW (LE12 9BU), which became operational in 2023.

89. Transfer stations have been included in the search criteria, though caution is needed when interpreting the figures due to the significant risk of double counting. Waste volumes entering a transfer station have likely already passed over the weighbridge of a permitted site before being received, or materials leaving a transfer station will be recorded as entering a different waste site afterward. Discernment is needed here. The total figure of 14,946,406 tonnes for 2023 is inevitably inflated because some waste streams will have passed over more than one weighbridge during the year. However, the value of 4,463,039 tonnes received at combustion/incineration sites in 2023, or the 1,417,810 tonnes received at landfills, are more robust, as once waste enters such a site, it will not leave and go elsewhere.

90. Sites registered as 'Physical Treatment' have increased the level of recorded output between 2019 and 2023. Technically, such classification implies some form of physical transformative process taking place within such sites. For instance, aggregate recyclers are often included within 'Physical Treatment', for they produce specific grades of aggregate products through stages of crushing and screening. When it comes

to general waste recovery, however, there is a degree of overlap between those sites with advanced sorting technologies (which might describe themselves as 'Physical Treatment') and those without (which are more likely to be categorised as 'Material Recovery' sites). The site designation can therefore be somewhat subjective and ambiguous. The general upward trend of the 'Physical Treatment' tonnage, and the slight drift downwards of tonnage to 'Material Recovery' sites, implies a sustained level of investment in processing equipment in the waste sector to the extent that more sites consider that they offer a degree of transformation, rather than mere sorting. One relevant example of such transformation could be the production of RDF, for example.

8.2 WASTE VOLUMES BY SITE PROCESS (OUTGOING)

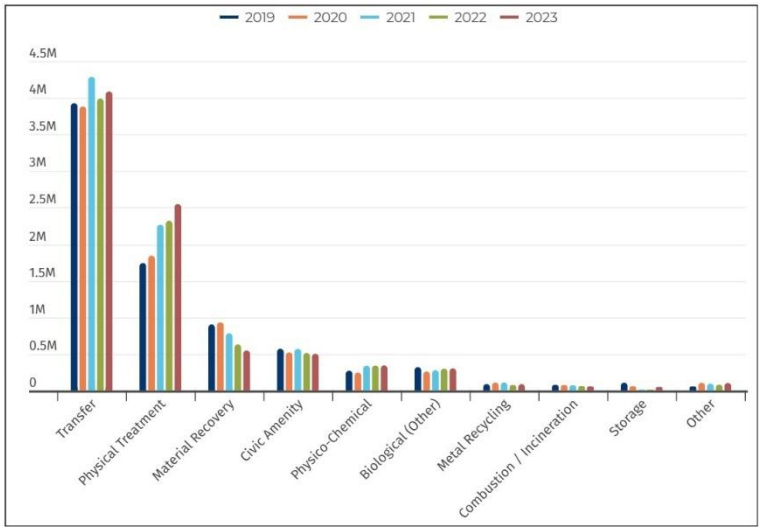

Fig. 29: Materials outgoing from waste sites, sliced by Site Process

Process	2019	2020	2021	2022	2023	% +/-
Transfer	3,928,722	3,883,316	4,289,067	3,991,044	4,087,464	*2.4%*
Physical Treatment	1,742,749	1,844,355	2,268,636	2,323,422	2,551,170	*9.8%*
Material Recovery	903,630	932,086	782,388	630,966	547,062	*-13.3%*
Civic Amenity	572,102	522,696	569,322	514,207	502,061	*-2.4%*
Physico-Chemical	270,677	246,826	340,776	342,509	344,957	*0.7%*
Biological (Other)	319,435	260,212	279,878	300,043	303,010	*1.0%*
Metal Recycling	88,586	109,469	111,267	74,578	87,092	*16.8%*
Combustion / Incineration	77,007	74,341	70,047	61,040	57,925	*-5.1%*
Storage	107,668	60,184	511	556	50,209	*8930.4%*
Other	57,103	107,624	94,670	79,349	103,708	*30.7%*
Sum:	***8,067,679***	***8,041,109***	***8,806,562***	***8,317,714***	***8,634,658***	*3.8%*

91. The increase in Combustion/Incineration volumes in the most recent year is attributed to the Newhurst Quarry EfW (LE12 9BU), which became operational in 2023.

8.3 WASTE VOLUMES BY EWC CODE (INCOMING)

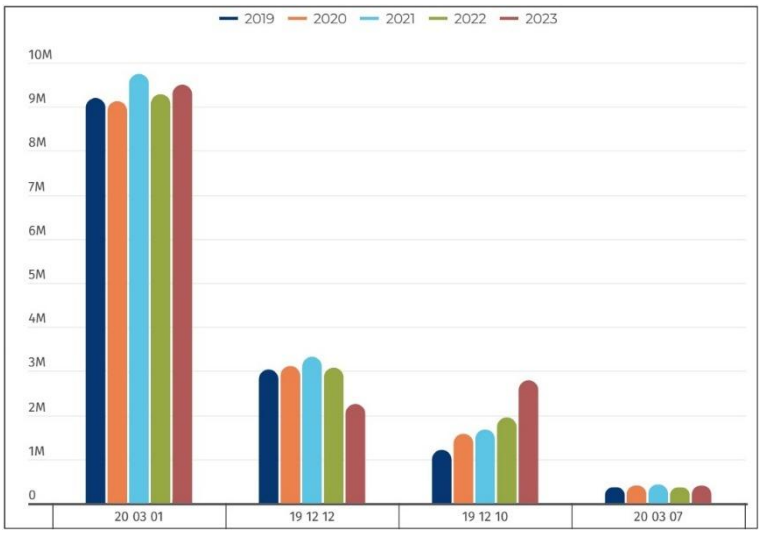

Fig. 30: Materials incoming to waste sites, sliced by EWC Code

EWC Code	2019	2020	2021	2022	2023	% +/-
20 03 01	9,201,210	9,127,492	9,747,149	9,286,018	9,502,427	*2.3%*
19 12 12	3,036,657	3,115,328	3,325,393	3,076,549	2,253,442	*-26.8%*
19 12 10	1,211,069	1,576,683	1,675,631	1,947,748	2,791,041	*43.3%*
20 03 07	361,543	400,624	426,756	358,693	399,497	*11.4%*
Sum:	***13,810,478***	***14,220,128***	***15,174,931***	***14,669,008***	***14,946,406***	*1.9%*

92. The indications from Fig. 30 are that receipts of RDF has increased within the region (and the opening of Newhurst Quarry EfW), possibly because of improvements to the efficiency of mechanical recovery, thereby reducing the level of EWC 191212.

8.4 WASTE VOLUMES BY EWC CODE (OUTGOING)

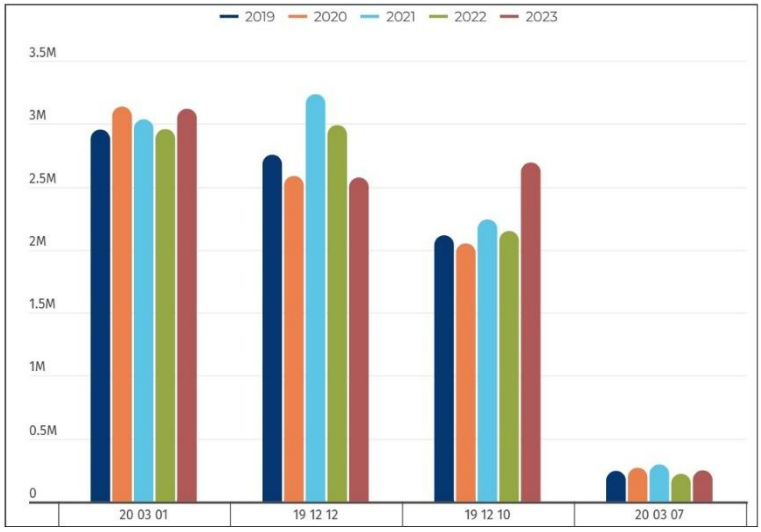

Fig. 31: Materials outgoing from waste sites, sliced by EWC Code

EWC Code	2019	2020	2021	2022	2023	% +/-
20 03 01	2,954,385	3,136,636	3,035,509	2,958,230	3,119,247	*5.4%*
19 12 12	2,755,060	2,585,996	3,235,139	2,990,055	2,573,608	*-13.9%*
19 12 10	2,114,394	2,050,262	2,240,970	2,148,765	2,693,366	*25.3%*
20 03 07	243,839	268,218	294,942	220,666	248,436	*12.6%*
Sum:	***8,067,679***	***8,041,109***	***8,806,562***	***8,317,714***	***8,634,658***	*3.8%*

8.5 WASTE VOLUMES BY SOURCE REGION (INCOMING)

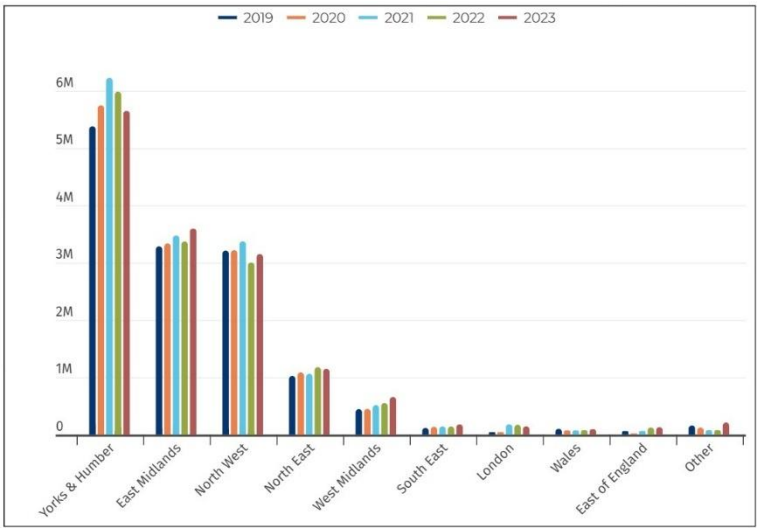

Fig. 32: Materials incoming to waste sites, sliced by Source Region

Source Region	2019	2020	2021	2022	2023	% +/-
Yorks & Humber	5,374,432	5,739,025	6,220,195	5,977,791	5,644,346	-5.6%
East Midlands	3,281,255	3,334,199	3,470,900	3,368,134	3,593,409	6.7%
North West	3,207,327	3,215,840	3,370,247	2,999,819	3,146,985	4.9%
North East	1,024,250	1,083,931	1,061,461	1,176,665	1,146,773	-2.5%
West Midlands	444,212	448,319	514,157	552,092	656,308	18.9%
South East	116,096	137,551	141,710	141,960	179,302	26.3%
London	42,010	41,879	179,838	171,941	143,774	-16.4%
Wales	100,779	74,045	74,410	77,794	93,772	20.5%
East of England	62,442	21,031	64,098	124,528	130,152	4.5%
Other	157,675	124,309	77,913	78,283	211,586	170.3%
Sum:	**13,810,478**	**14,220,128**	**15,174,931**	**14,669,008**	**14,946,406**	1.9%

8.6 WASTE VOLUMES BY DESTINATION REGION (OUTGOING)

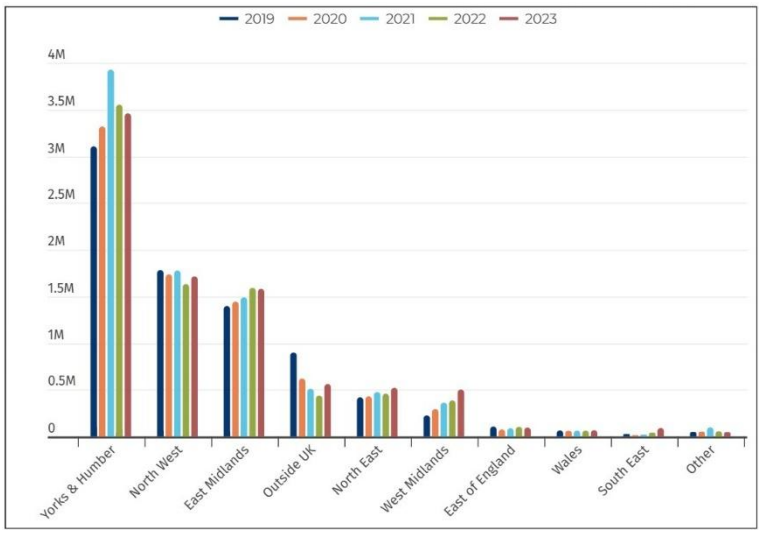

Fig. 33: Materials outgoing from waste sites, sliced by Destination Region

Destination Region	2019	2020	2021	2022	2023	% +/-
Yorks & Humber	3,105,561	3,317,944	3,928,086	3,552,455	3,459,405	-2.6%
North West	1,781,729	1,736,090	1,776,320	1,632,710	1,713,594	5.0%
East Midlands	1,395,806	1,443,368	1,489,504	1,590,506	1,580,745	-0.6%
Outside UK	897,739	620,290	510,906	438,057	560,834	28.0%
North East	418,078	429,121	475,553	458,698	520,963	13.6%
West Midlands	225,433	293,796	361,320	385,345	501,741	30.2%
East of England	106,998	75,447	88,012	102,483	95,013	-7.3%
Wales	63,347	60,109	61,759	61,439	66,229	7.8%
South East	25,164	13,775	18,232	41,251	90,006	118.2%
Other	47,822	51,172	96,869	54,771	46,126	-15.8%
Sum:	***8,067,679***	***8,041,109***	***8,806,562***	***8,317,714***	***8,634,658***	3.8%

8.8 WASTE VOLUMES BY FATE (OUTGOING)

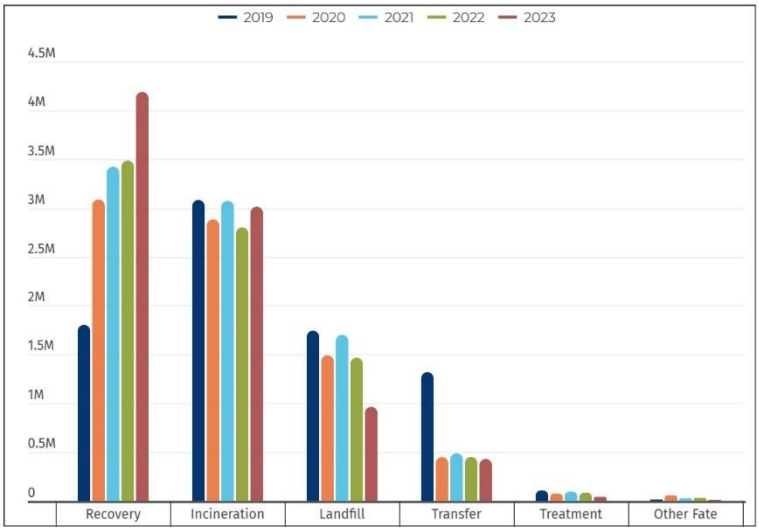

Fig. 34: Materials outgoing from waste sites, sliced by Fate

Fate	2019	2020	2021	2022	2023	% +/-
Recovery	1,802,810	3,084,953	3,421,900	3,484,380	4,186,807	20.2%
Incineration	3,080,997	2,882,180	3,072,139	2,800,408	3,011,757	7.5%
Landfill	1,742,829	1,491,838	1,699,643	1,466,197	963,536	-34.3%
Transfer	1,318,418	449,485	490,379	450,986	429,332	-4.8%
Treatment	108,138	75,856	95,216	83,170	42,609	-48.8%
Other Fate	14,488	56,798	27,283	32,575	616	-98.1%
Sum:	***8,067,679***	***8,041,109***	***8,806,562***	***8,317,714***	***8,634,658***	3.8%

SECTION 9 REFUSE-DERIVED FUEL SHIPMENT TRENDS

9.1 RDF EXPORTS: NATIONAL PICTURE

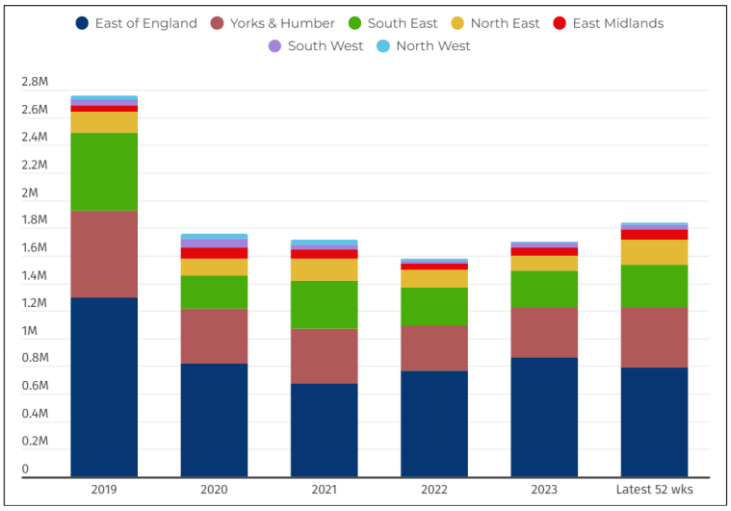

Fig. 35: Shipments of RDF from England 2019-2024

Exit Port Region	2019	2020	2021	2022	2023	Latest 52 wks
East of England	1,296,340	819,505	672,256	767,395	858,478	786,912
Yorks & Humber	628,904	396,593	398,201	322,706	362,209	438,304
South East	565,282	241,682	346,412	275,329	266,285	310,707
North East	149,615	119,767	159,763	135,156	114,089	181,556
East Midlands	43,559	76,959	66,780	43,858	57,550	70,958
South West	41,932	66,814	33,353	18,660	35,335	31,726
North West	32,622	37,774	36,838	17,431	3,752	18,511
Sum:	***2,758,254***	***1,759,093***	***1,713,602***	***1,580,536***	***1,697,697***	***1,838,674***

93. RDF exports from England rose from zero in 2010 to just over three million tonnes in 2018. Volumes slipped thereafter because of political turbulence in the UK following the Brexit referendum, then, subsequently, the Covid pandemic and then the energy crisis caused by the Russia-Ukraine war. Since 2022, however, export tonnages have steadily increased once more. Leading operators in the sector predict that the RDF export market will stabilise at its current level of just over 1.8 million tonnes.

94. The East of England ports collectively handle the greatest volume of RDF export activity, more than Yorks & Humber and the South East combined.

95. Immingham, in the Yorks & Humber region, is presently the port handling the largest volume of RDF (336,000 tonnes in the latest year). Felixstowe is in second place with 228,000 tonnes shipped in the past year.

9.2 RDF EXPORTS: IMMINGHAM

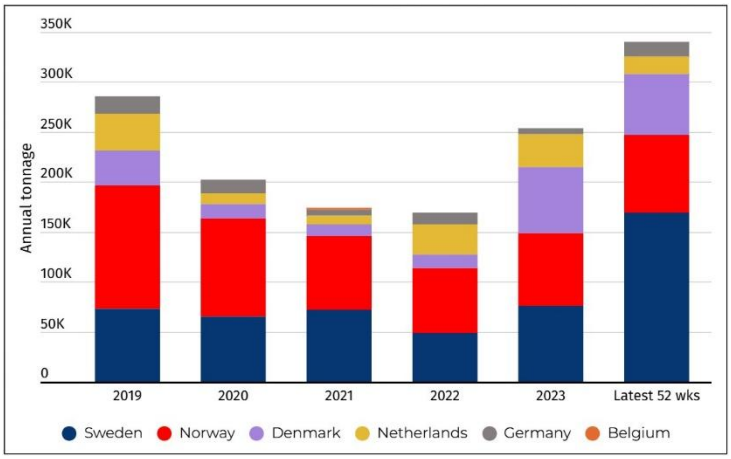

Fig. 36: Shipments of RDF from port of Immingham, 2019-2024

Destination	2019	2020	2021	2022	2023	Latest 52 wks	% +/-
Sweden	73,298	65,121	72,075	48,166	76,025	169,174	*122.5%*
Norway	122,611	98,025	73,309	65,859	72,250	77,898	*7.8%*
Denmark	35,401	14,714	11,931	13,235	66,256	61,484	*-7.2%*
Netherlands	36,875	10,568	8,983	29,895	33,384	16,791	*-49.7%*
Germany	17,411	13,377	5,714	11,661	5,401	14,848	*174.9%*
Belgium	170	460	1,758	364	0	0	*n/a*
Sum:	***285,766***	***202,265***	***173,771***	***169,180***	***253,316***	***340,195***	*34.3%*

96. The top five RDF exporters using the port of Immingham are:

i. **Geminor:** 228,000 tonnes (+18% year-on-year)
ii. **Andusia Recovered Fuels:** 47,000 tonnes (+93% year-on-year)
iii. **Totus Environmental:** 24,000 tonnes (+2,096% year-on-year[18])
iv. **Associated Waste Management:** 18,000 tonnes (-6% year-on-year)

[18] *From a very low base in 2023*

SECTION 7 – CONCLUSIONS

Conclusion 1: Waste Treatment Capacity Gap

i. The UK is nearing sufficient national waste treatment capacity, but regional variations remain a challenge.
ii. The East Midlands and East of England face significant capacity gaps for treating residual waste, a fact explicitly acknowledged in Defra's Note.
iii. These regions rely heavily on landfilling due to limited Energy from Waste (EfW) infrastructure.

Conclusion 2: Significant Residual Waste Volumes

i. There exists a combined pool of 1.2 million tonnes of combustible waste in East Midlands and Yorks & Humber that is either landfilled or exported. This figure rises to 1.5 million tonnes when including areas within a 100-mile radius by road or rail of the proposed facility.
ii. These volumes represent an opportunity for improved waste recovery and energy generation.
iii. Defra acknowledges that landfill use must be reduced but stops short of advocating for complete elimination, leaving 5 million tonnes of residual waste that would still be disposed of in landfills per year by 2035.

Conclusion 3: Commercial and Industrial Waste Potential

i. Commercial and industrial (C&I) waste contributes significantly to landfilled waste, with an estimated 3.2 million tonnes of combustible residual waste disposed of annually in England.
ii. This material represents untapped potential for energy recovery, confirming the need for infrastructure enhancements.
iii. C&I waste is underrepresented in existing residual waste treatment infrastructure. Within a 100-mile radius by road or rail of the NLGEP development, around 1.6 million tonnes of C&I combustible residual waste was landfilled, nearly double the amount of LA-collected waste.
iv. Defra acknowledges that there is likely a need for alternative treatment options to landfill for C&I wastes.

Conclusion 4: Export Dependency for RDF

i. England exports over 1.8 million tonnes of RDF annually, with Immingham (26 miles away from the NLGEP development) serving as the largest RDF export hub. Total RDF export volumes has risen by +8% in the past year. Consignments from Immingham have increased by +34%. Developing local treatment facilities could reduce export reliance and improve energy efficiency.
ii. The combined total of RDF exported by waste companies in the East Midlands and Yorks & Humber was 431,000 tonnes in 2023, indicating inefficiencies in utilising local EfW capacity.

Conclusion 5: Policy Challenges and Uncertainty

i. England's recycling rate has remained flat in recent years, creating challenges for waste reduction solely through current reforms.
ii. If the Defra interventions fall short or face delays, there may be insufficient capacity to manage non-recyclable waste responsibly, potentially increasing waste crime and fly-tipping.
iii. Delays in government initiatives such as the Deposit Return Scheme (DRS) have created uncertainty in the sector.
iv. Predictions beyond 2035 are uncertain due to potential changes in waste composition, population growth and unforeseen events.

Conclusion 6: Disparity Between Regions in Waste Treatment

i. Yorks & Humber processes significantly more waste via EfW compared to the East Midlands, leading to less reliance on landfilling in Yorks & Humber.
ii. Addressing regional disparities can enhance the resilience of the waste management system against systemic shocks.

Conclusion 7: Strategic Importance of the North Lincolnshire Green Energy Park (NLGEP)

i. The NLGEP is strategically located within the Greater Lincolnshire region to address capacity shortfalls in surrounding areas. Its proximity to regions, particularly via rail transport, with high landfill reliance positions it as a key player in reducing waste disposal inefficiencies.
ii. The planned NLGEP facility, once operational, would rely on diverting residual waste from landfill and RDF exports. Furthermore, the site plans align with national Net-Zero targets, providing a sustainable solution for waste management through energy recovery, an 11km district heat network and carbon capture. It will also offer resilience and flexibility with the plastic recycling capacity to facilitate the increased recycling targets and provide a capacity buffer against systemic shocks and unforeseen disruptions in the waste management sector.