

Responses to the ExA's ExQ2

**UKWIN'S D6 RESPONSE TO
THE EXA'S EXQ2 ANNEX A
(PD-012)**

Proposed Development:

North Lincolnshire Green Energy Park

Proposed Location:

**Flixborough Wharf, Flixborough Industrial Estate,
North Lincolnshire**

Applicant:

North Lincolnshire Green Energy Park Limited

Planning Inspectorate Ref:

EN010116

Registration Identification Ref:

20031828

MARCH 2023



UKWIN'S D6 RESPONSE TO THE EXA'S EXQ2 ANNEX A (PD-012)

Year of likely first operation of the proposed development: **2027**

England

	2020	2021	2022	2023	2024	2025	2026	2030	2035	2040	Units
Waste as fuel available (Total minus waste not available for incineration)	19,725 (22,000 -2,275)	19,822 (22,097 -2,275)	19,911 (22,186 -2,275)	20,001 (22,276 -2,275)	18,773 (21,048 -2,275)	17,530 (19,805 -2,275)	16,147 (18,547 -2,400)	11,389 (16,389 -5,000)	9,834 (14,834 -5,000)	8,225 (13,225 -5,000)	ktpa
EfW capacity available	15,649	16,340	17,031	17,723	18,414	19,106	19,403	19,701	19,701	19,701	ktpa
Difference	4,077	3,482	2,880	2,278	359	-1,576	-3,256	-8,312	-9,867	-11,476	ktpa

Yorkshire and the Humber and East Midlands (Applicant's study area)

	2020	2021	2022	2023	2024	2025	2026	2030	2035	2040	Units
Waste as fuel available (Total minus waste not available for incineration)	3,919 (4,342 -423)	3,942 (4,365 -423)	3,964 (4,388 -423)	3,986 (4,410 -423)	3,690 (4,113 -423)	3,390 (3,813 -423)	3,059 (3,510 -451)	1,989 (3,051 -1,062)	1,718 (2,780 -1,062)	1,432 (2,494 -1,062)	ktpa
EfW capacity available	2,797	3,031	3,265	3,498	3,732	3,966	3,966	3,966	3,966	3,966	ktpa
Difference	1,122	911	699	488	-42	-576	-907	-1,977	-2,248	-2,534	ktpa

Yorkshire and the Humber

	2020	2021	2022	2023	2024	2025	2026	2030	2035	2040	Units
Waste as fuel available (Total minus waste not available for incineration)	1,959 (2,171 -212)	1,968 (2,179 -212)	1,975 (2,187 -212)	1,983 (2,194 -212)	1,856 (2,068 -212)	1,729 (1,941 -212)	1,601 (1,813 -212)	886 (1,597 -712)	737 (1,448 -712)	582 (1,294 -712)	ktpa
EfW capacity available	2,407	2,579	2,698	2,818	2,937	3,005	3,031	3,057	3,057	3,057	ktpa
Difference	-448	-611	-723	-835	-1,081	-1,276	-1,430	-2,171	-2,320	-2,475	ktpa

North Lincolnshire

	2020	2021	2022	2023	2024	2025	2026	2030	2035	2040	Units
Waste as fuel available (Total minus waste not available for incineration)	201 (207-6)	202 (208-6)	203 (208-6)	203 (209-6)	164 (170-6)	125 (131-6)	86 (92-6)	28 (49-21)	23 (44-21)	18 (39-21)	ktpa
EfW capacity available	56	56	56	56	56	56	56	56	56	56	ktpa
Difference	145	146	147	147	108	69	30	-28	-33	-38	ktpa

Situation in 2027

As 2027 is expected to be the first year of operation, and the year of the Government's Interim Target 3 to reduce municipal residual waste by 29% compared to 2019 levels, we have set out below the anticipated level of overcapacity in 2027:

	Total waste as fuel	Waste not available for incineration	Waste as fuel available	EfW capacity available	Overcapacity	Units
England	17,277	-3,250	14,027	19,701	5,674	ktpa
Yorkshire and the Humber and East Midlands (Applicant's study area)	3,204	-507	2,697	3,966	1,269	ktpa
Yorkshire and the Humber	1,472	-212	1,260	3,057	1,797	ktpa
North Lincolnshire	52	-6	47	56	9	ktpa

Commentary

- i. Even without the 760ktpa of incineration capacity proposed for North Lincolnshire, or any other incineration capacity entering construction, we can expect incineration overcapacity by 2027 at national, study area, regional, and local levels.
- ii. UKWIN used the same data sources and figures as the Applicant where appropriate (to minimise areas of dispute); UKWIN used Government data where possible and adopted approaches in line with meeting Government waste reduction targets.
- iii. 2019/20 baseline used to determine the 2027 and 2042 waste per capita figures took account of the RDF exported in 2020.

APPENDIX A: INFORMATION SOURCES

Total waste as fuel available

1. 2020-2042 population:

- a) National population estimates use the Office of National Statistics (ONS) 2020-based population figures for England as agreed in the draft Statement of Common Ground (SoCG) [REP4-020].
- b) Regional and North Lincolnshire population estimates use the ONS 2018-based sub-national population person (SNPP) figures as per the Applicant's approach used in REP4-020, which they confirmed via an email to UKWIN dated 15th March 2023.

2. 2020 residual waste arisings (waste as fuel available):

- a) The 22Mtpa national (England) figure for 2020 is based on the Applicant's figure agreed at ISH3 which was derived by the Applicant based on filtered Defra Waste Data Interrogator data as set out in REP4-020.
- b) The 23.7Mtpa national figure (including RDF export) for 2020 is based on the 22Mtpa figure above plus the 1.7Mtpa figure provided by the Applicant on electronic page 6 of REP5-037 where the Applicant stated: "A result of this methodology is that waste exports are not included – in 2020 these amounted to around 1.7 million tonnes".
- c) The 2,171kt waste figure for Yorkshire and the Humber in 2020 was provided by the Applicant to UKWIN on 15th March 2023. This was doubled to produce the 'study area' figure of 4,342 based on the Applicant's separate statement of 4.3Mt for the study area and their general practice of halving study area figures to produce their Yorkshire and Humber figures.
- d) The North Lincolnshire figure of 207kt for 2020 was provided by the Applicant to UKWIN in an email on 15th March 2023.

3. 2027 and 2042 reductions in per capita arisings:

- a) Internal pages 145 and 148 of Defra's Environmental Improvement Plan (EIP) 2023 set out the interim target to reduce municipal residual waste by 29% compared to 2019 levels by 2027. Relevant excerpts of the EIP are provided, and this includes the explanation on internal page 148 that municipal waste in this context means "waste from households plus waste similar in composition to household waste, such as commercial waste".

- b) Internal pages 144 and 147 of Defra's EIP set out a target to reduce overall residual waste excluding major mineral wastes by 50% compared to 2019 levels by 2042, in line with the Environmental Targets (Residual Waste) (England) Regulations 2023. Relevant excerpts of the EIP and the Regulations are provided.

Waste not available as incinerator feedstock

4. MBT Removals:

- a) Applicant's national and regional MBT removal figures set out in REP3-041 paragraph 3.7.2.2 and REP4-020 electronic page 11.

5. Co-incineration:

- a) The 375ktpa figure is Tolvik's figure for SRF sent to cement kilns and lime kilns in 2021 set out on internal page 18 of Tolvik's UK Energy from Waste Statistics - 2021 published in May 2022. Figure used by Applicant in REP3-022 and REP4-020 electronic page 11.
- b) The 1Mtpa figure is Eunomia's estimate for waste going to cement kilns in 2030 set out in Eunomia's Residual Waste Infrastructure Review (12th Issue) as cited in REP2-111 page 6.

6. Waste-to-SAF:

- a) The capacity figure of 2.1Mtpa for the three Government funded SAF projects (500ktpa for Altalto, 600ktpa for Fulcrum and 1,000ktpa for Lighthouse Green Fuels figures) is based on Applicant figures provided to UKWIN by email on 15th March 2023 and are as set out at paragraph 2.13 on page 8 of REP5-037.
- b) The Altalto and Fulcrum figures are based on statements on the respective websites of Velocys and Fulcrum.
- c) The Lighthouse Green Fuels figure is as reported in 2022 in the news section of the Hydrocarbon Processing website for the article entitled "Worley wins contract for Alfanar's Lighthouse Green Fuels project in North East of England".
- d) The year when the SAF plants are expected to become operational reflects the Department for Transport's announcement of Advanced Fuel Fund competition winners published on 22nd December 2022 (REP4-047).

Energy from waste capacity available

7. Facilities operational and/or under construction:

- a) Uses facilities and permitted capacity data from REP4-020 Updated Tables A6 and A7 and associated spreadsheet provided to UKWIN by the Applicant on 7th February 2023.
- b) Permitted capacity data is published by the Environment Agency and is summarised in Tolvik's UK Energy from Waste Statistics – 2021 published in May 2022. Protos capacity was subsequently increased to 500ktpa as per REP4-020 electronic page 10.
- c) Associated spreadsheet also included information on when whether facilities under construction were expected to be available in 2025, 2027 and/or 2030 which could be derived from Tables 1 and 2 of the Applicant's spreadsheet.

APPENDIX B: METHODOLOGY

Waste as fuel available

8. Waste as fuel available is calculated by starting with total waste fuel available and then subtracting the waste not available as incinerator feedstock, i.e. MBT removals, co-incineration and waste-to-SAF.
9. **Worked example:** As agreed at ISH3, the starting point for 2020 is 22,000ktpa of total waste available as fuel. From this, 2,275ktpa is subtracted – this is comprised of the Applicant's figures of 1,900ktpa of MBT removals and 375ktpa of co-incineration. No waste-to-SAF is subtracted as that capacity is not expected to become available until 2027/28.

Calculation: 22,000 ktpa – 2,275 ktpa = 19,725 ktpa

10. In line with the comments UKWIN made at ISH3 and elsewhere, the rationale for this approach is straightforward, which is that not all residual waste is suitable for incineration and not all of the waste which is suitable for incineration will be available for use as incinerator feedstock due to competing uses such as cement kilns and waste-to-SAF plants.
11. An item might not be combustible and there can be expected to be other constraints on the composition of feedstock such as calorific value, moisture content, and size.

Total waste as fuel available

12. In summary, the national (English), regional and North Lincolnshire figures all start with the Applicant's 22Mtpa figure or sub-national equivalent and then, while taking into account population growth, assumes that these waste per capita fractions will:
 - a) remain stable from 2021 through 2023;
 - b) fall linearly between 2024 and 2027 to 297.56kg per capita to account for waste (RDF) previously exported and for the UK Government's 29% municipal residual waste reduction target; and
 - c) fall linearly between 2028 and 2042 to 209.55kg per capita to account for waste (RDF) previously exported and to meet the UK Government's target to halve municipal waste by 2042.
13. The tonnages of total waste as fuel available are determined by multiplying the waste per capita figure by the ONS population estimates (except for the 2020 figures which are calculated in the opposite manner, with the waste per capita figures derived from the agreed total waste as fuel figures).

14. For each of the four tables above, the 2020 figure is based on the figure provided by the Applicant in an email dated the 15th of March 2023. This includes the 22Mtpa figure agreed at ISH3 and the Applicant's regional and local apportionments of that tonnage.
15. However, for the purposes of calculating later years we take into account the Applicant's position that around 1.7 million tonnes of RDF was exported in 2020 which means that this waste could become available for domestic treatment in future years.
16. We take this exported RDF into account by using the higher baseline figure for 2020 of 23.7Mtpa when calculating the fall in per-capita residual waste arisings for 2027 and 2042 which is then used to calculate intervening years (i.e. 2024-2026 and 2028-2041 inclusive).
17. The general approach taken was to create a projection of waste arisings that would be consistent with meeting the Government's targets for reducing municipal residual waste per capita by 29% by 2027 and by 50% by 2042 relative to a 2019 base year.
18. As set out by UKWIN in REP4-020 and elsewhere, the *municipal* residual waste reduction target for 2027 should be used for the basis of assuming falls in waste available as fuel as the majority of the intended incinerator feedstock meets the definition of municipal waste which includes household waste and commercial waste which is of a similar composition.
19. The Government has been explicit that their measures to reduce residual waste are intended to greatly reduce the amount of waste that is incinerated, and so the model assumes that waste available as fuel would reduce in line with this ambition to allow for the municipal residual waste reduction target to be met in line with Government statements such as the Defra statement that: "...the measures in the Resources and Waste Strategy and the Environment Bill will enable a paradigm shift, in relation to reducing, reusing and recycling our waste, that should limit the amount that ever has to go to incineration and landfill" as set out on REP2-110 page 22.
20. Because the agreed figure of 22Mt (or 23.7Mt including the RDF that was exported in 2020) was for a 2020 base year, for simplicity we have assumed that waste per capita in 2019 was the same as that for 2020.
21. Indeed, we assume that waste per capita will remain at the 2020 levels until 2024 when measures intended to help reach the waste reduction targets can be expected to begin to have an impact.
22. As such, for 2020 the relevant waste per capita figure is calculated from the Applicant's 22Mtpa and equivalent regional and local figures by dividing this total fuel figure by the 2020 population figures for the relevant geographic area.

23. **Worked example:** A national total waste as fuel per capita figure of 389kg is derived by dividing the 22Mtpa waste figure by the population of 56.55m people.

$$22,000 \text{ kilotonnes} \div 56,550,138 \text{ people} = 389.04\text{kg per capita}$$

24. The 2020 waste as fuel per capita figure is used unchanged for 2021-2023, but because the population grows this results in an assumed increase in total waste as fuel. Nationally, this means the 22,000 ktpa figure increases to 22,276 ktpa by 2023.
25. The next key year is 2027, where the model assumes that the EIP interim municipal residual waste target for 2027 is achieved nationally, and that this will reflect a proportionate decrease in the waste available as fuel sub-nationally.
26. The 2027 figures are calculated by starting with a total waste as fuel per capita figure based on the 2020 23.7Mt figure divided by the 2020 population to provide an 'RDF-export-included' waste as fuel per capita figure of 419.10ktpa for 2019/20.
27. The 'RDF-export-included' waste as fuel per capita figure of 419.10ktpa for 2019/20 is then used to determine the waste per capita figure for 2027 assuming that waste as fuel per capita is 29% lower than 419.10ktpa.
28. **Worked example:** The national total waste as fuel available figure for 2027 is 17,277ktpa. This is derived by determining a waste per capita figure of 297.56kg for 2027, which is the aforementioned 419.10kg '2020-with-RDF' waste per capita figure reduced by 29% in line with the municipal residual waste target. This waste per capita figure for 2027 is then multiplied by the ONS 2018-based population forecast for 2027 of 58,061,002 people.

$$58,061,002 \text{ people} \times 297.56 \text{ kg per person} = 17,277 \text{ kilotonnes}$$

29. The inclusion of the historically exported RDF in the 2027 and 2042 target calculations addresses the Applicant's concern that applying the 50% reduction to the 22 Million tonne figure would omit "volumes which are currently exported should also be included in our view" set out on paragraph 2.5 of REP5-037.
30. The 2042 calculations follow the same methodology, but instead halve the 419.10 kg figure to produce a waste per capita of 209.55kg.
31. Our sub-national approach assumes that waste per capita will converge on the national trend by 2027 to account for Government's measures to increase consistency in waste collection across England in line with the Resources and Waste Strategy, the fact that many of the measures to achieve the target will affect the whole of England, and the necessity for all parts of the country to support the achievement of these EIP targets.

Waste not available as incinerator feedstock

32. In order to move from total waste available as fuel to the quantity of that waste that would be available for use as incinerator feedstock the following factors need to be taken into account: MBT removals, co-incineration, and waste-to-SAF.
33. Each of these three factors are considered separately, and then added together to provide a figure for waste not available for incineration, which is then subtracted from the figure for total waste available as fuel to derive waste as fuel available figures.
34. **MBT Removals:**
 - a) Figures for national MBT removals used in UKWIN's modelling are taken, unaltered, from the MBT removals figures supplied by the Applicant at REP3-041 paragraph 3.7.2.2 and REP4-020 electronic page 11.
 - b) We similarly use the Applicant's 'study area' figure for MBT removals for the combined Yorkshire and the Humber and East Midlands figure.
 - c) For the Yorkshire and the Humber figure, we divide the study area figure for MBT removals by 2 in line with the Applicant's approach to calculating the Total Waste as Fuel for 2020 (as set out in the email to UKWIN of 15th March 2023).
 - d) For North Lincolnshire MBT removals, we calculate this as 1.66% of the study area figure in line with the 2020 population proportion of North Lincolnshire residents living in the study area.
35. **Co-incineration:**
 - a) At a national level UKWIN uses Tolvik's 375ktpa figure for SRF sent to cement kilns and lime kilns in 2021 (as used by Applicant in REP3-022 and REP4-020 electronic page 11) for 2020 through to 2025.
 - b) We assume that, in line with Eunomia's 1Mtpa for waste going to cement kilns in 2030 (as cited in REP2-111 page 6) waste as fuel used for co-incineration grows to 500ktpa in 2026 and 750ktpa in 2027 before reaching 1,000ktpa from 2030 (which then remains constant through to 2042).
 - c) For the Applicant's study area and for the regions we use the Applicant's approach of assuming that the national value for co-incineration is divided equally between the nine English regions. This means that the study area figure is based on the national figure divided by 4.5 to accommodate the study area covering two regions (as set out in the email to UKWIN of 15th March 2023).

- d) For North Lincolnshire, although a portion of North Lincolnshire's waste is likely to contribute to the feedstock used for cement kilns elsewhere in the country (especially if the North Lincolnshire incinerator is not built), in the interests of minimising areas of disagreement with the Applicant the modelling attributes no North Lincolnshire waste to co-incineration.

36. Waste-to-SAF:

- a) This factor does not begin to influence the national figures until 2027, when 600ktpa of waste as fuel is used for SAF production at the Fulcrum plant (as per the Applicant's figures provided to UKWIN by email on 15th March 2023 and as set out on paragraph 2.13 on page 8 of REP5-037).
- b) By 2030 this figure is increased nationally to 2,100ktpa to include 500ktpa for the Altalto (Velocys) Immingham plant and 1,000ktpa for Lighthouse Green Fuels plant (also based on Applicant figures provided to UKWIN by email on 15th March 2023 and as set out on paragraph 2.13 on page 8 of REP5-037), both of which are expected to become operational by 2028 (as per REP4-047).
- c) Of the three waste-to-SAF projects that have been awarded funds under the Government's Advanced Fuel Fund, the 500ktpa Immingham plant is the only such plant to be located in Yorkshire and the Humber. As such, the whole of this capacity, and only this capacity, is included in the study area figures and the Yorkshire and the Humber figures, whilst all other waste-to-SAF capacity is excluded from all but the national figures.
- d) As the Immingham waste-to-SAF plant is located in Yorkshire and the Humber, for modelling purposes it is assumed that this plant will obtain waste from council areas across that region in proportion to the distribution of population within that region in 2020. This means around 16ktpa of the 500ktpa capacity at the Immingham waste-to-SAF plant is modelled to come from North Lincolnshire, which is 3.13% of the total 500ktpa figure for Yorkshire and the Humber.

Energy from waste capacity available

37. UKWIN's modelling uses the currently permitted capacity figures for all incinerators that are currently operational or under construction (as per REP4-020 Updated Tables A6 and A7 and associated spreadsheet provided to UKWIN by the Applicant on 7th February 2023).
38. UKWIN recognises that this approach is likely to overestimate processing capacity in earlier years (2020-2025) and to underestimate this capacity in later years (from around 2027 onwards) as waste composition changes.

39. Given the primary purpose of this exercise is to ascertain whether or not there is likely to be incineration overcapacity from 2027, when the North Lincolnshire plant is likely to become operational, we believe that our approach is more likely to underestimate the potential for overcapacity rather than overestimate it during the lifetime of the plant proposed for North Lincolnshire.
40. UKWIN has provided a significant body of evidence to support our decision to include in our modelling all incinerators that are currently operational or under construction and to use currently permitted capacity to model incineration treatment capacity.
41. UKWIN has provided further evidence on this topic in our other Deadline 6 submission (UKWIN's D6 comments on REP5-037 and REP5-032), as such there is no need to provide further detail within this response to the ExA's ExQ2.
42. For the avoidance of doubt, UKWIN uses the combined currently operating and under construction figures for all incinerators provided set out in REP4-020 (adjusted to include the increased Protos capacity), using information provided by the Applicant assuming plants become operational in line with the Applicant's totals for 2020, 2025, 2027, 2030, 2040 and 2042 (as provided by the Applicant to UKWIN) assuming a linear increase in capacity between these years.
43. For the study area, we use only the capacity located within the study area.
44. For regions, we use only the capacity that exists within that region.
45. For North Lincolnshire we only include the 56ktpa of permitted capacity of the Newlincs Grimsby incinerator on South Marsh Road, Stallingborough.
46. It should be noted that, although we are aware of projects that are expected to commence construction in the very near future, e.g. the Redcar incinerator, for the purposes of our modelling we have strictly limited inclusion of capacity that is under construction to the capacity that has already entered construction.
47. According to the figures provided by the Applicant in REP4-020 (and excluding the 500ktpa of 'Waste-to-Jet Fuel Facility' at Immingham to avoid double counting), consented capacity for projects which are considered to be still under development (as per REP4-020 electronic page 11) as follows:
 - a) National consented capacity under development is 8,597ktpa
 - b) Study area consented capacity under development is 2,962ktpa
 - c) Yorkshire and the Humber capacity under development is 2,037ktpa

48. As UKWIN noted on electronic page 9 of REP4-042, the overcapacity figure would be higher still if it were assumed that some of the consented capacity currently in the pipeline entered construction, with Afry noting on electronic page 134 of REP3-022 that: "Analysis of historic planning data suggest that approximately 50% of consented capacity is realised". A footnote to that statement attributed the planning data to BEIS's Renewable Energy Planning Database (REPD).

APPENDIX C: SUPPORTING TABLES

Overcapacity calculations for England (ktpa)

Year	Total waste as fuel available	MBT Removal	Co-incineration	Waste-to-SAF	Waste available as incinerator feedstock	Incineration capacity available	Remaining waste minus incineration capacity	Level of overcapacity if North Lincs is built
2020	22,000	-1,900	-375		19,725	15,649	4,077	Pre-dates likely first year of operation for North Lincs plant
2021	22,097	-1,900	-375		19,822	16,340	3,482	
2022	22,186	-1,900	-375		19,911	17,031	2,880	
2023	22,276	-1,900	-375		20,001	17,723	2,278	
2024	21,048	-1,900	-375		18,773	18,414	359	
2025	19,805	-1,900	-375		17,530	19,106	-1,576	
2026	18,547	-1,900	-500		16,147	19,403	-3,256	
2027	17,277	-1,900	-750	-600	14,027	19,701	-5,674	6,434
2030	16,389	-1,900	-1,000	-2,100	11,389	19,701	-8,312	9,072
2035	14,834	-1,900	-1,000	-2,100	9,834	19,701	-9,867	10,627
2040	13,225	-1,900	-1,000	-2,100	8,225	19,701	-11,476	12,236
2042	12,572	-1,900	-1,000	-2,100	7,572	19,701	-12,129	12,889

Overcapacity calculations for Yorkshire and the Humber and the East Midlands, i.e. the Applicant's Study Area (ktpa)

Year	Total waste as fuel available	MBT Removal	Co-incineration	Waste-to-SAF	Waste available as incinerator feedstock	Incineration capacity available	Remaining waste minus incineration capacity	Level of overcapacity if North Lincs is built
2020	4,342	-340	-83		3,919	2,797	1,122	Pre-dates likely first year of operation for North Lincs plant
2021	4,365	-340	-83		3,942	3,031	911	
2022	4,388	-340	-83		3,964	3,265	699	
2023	4,410	-340	-83		3,986	3,498	488	
2024	4,113	-340	-83		3,690	3,732	-42	
2025	3,813	-340	-83		3,390	3,966	-576	
2026	3,510	-340	-111		3,059	3,966	-907	
2027	3,204	-340	-167		2,697	3,966	-1,269	2,029
2030	3,051	-340	-222	-500	1,989	3,966	-1,977	2,737
2035	2,780	-340	-222	-500	1,718	3,966	-2,248	3,008
2040	2,494	-340	-222	-500	1,432	3,966	-2,534	3,294
2042	2,377	-340	-222	-500	1,315	3,966	-2,651	3,411

Overcapacity calculations for Yorkshire and the Humber (ktpa)

Year	Total waste as fuel available	MBT Removal	Co-incineration	Waste-to-SAF	Waste available as incinerator feedstock	Incineration capacity available	Remaining waste minus incineration capacity	Level of overcapacity if North Lincs is built
2020	2,171	-170	-42		1,959	2,407	-448	Pre-dates likely first year of operation for North Lincs plant
2021	2,179	-170	-42		1,968	2,579	-611	
2022	2,187	-170	-42		1,975	2,698	-723	
2023	2,194	-170	-42		1,983	2,818	-835	
2024	2,068	-170	-42		1,856	2,937	-1,081	
2025	1,941	-170	-42		1,729	3,005	-1,276	
2026	1,813	-170	-42		1,601	3,031	-1,430	
2027	1,684	-170	-42		1,472	3,057	-1,585	2,345
2030	1,597	-170	-42	-500	886	3,057	-2,171	2,931
2035	1,448	-170	-42	-500	737	3,057	-2,320	3,080
2040	1,294	-170	-42	-500	582	3,057	-2,475	3,235
2042	1,231	-170	-42	-500	520	3,057	-2,537	3,297

Overcapacity calculations for North Lincolnshire (ktpa)

Year	Total waste as fuel available	MBT Removal	Co-incineration	Waste-to-SAF	Waste available as incinerator feedstock	Incineration capacity available	Remaining waste minus incineration capacity	Level of overcapacity if North Lincs is built
2020	207	-6			201	56	145	Pre-dates likely first year of operation for North Lincs plant
2021	208	-6			202	56	146	
2022	208	-6			203	56	147	
2023	209	-6			203	56	147	
2024	170	-6			164	56	108	
2025	131	-6			125	56	69	
2026	92	-6			86	56	30	
2027	52	-6			47	56	-9	769
2030	49	-6		-16	28	56	-28	788
2035	44	-6		-16	23	56	-33	793
2040	39	-6		-16	18	56	-38	798
2042	37	-6		-16	16	56	-40	800

Arisings calculations for England

Year	People in England (2020-based ONS)	Waste as Fuel per capita (kg)	Waste as fuel (kt)	Comments
<i>RDF 2020</i>		419.10	23,700	<i>Includes 1,700kt of RDF exported (as per Applicant)</i>
2020	56,550,138	389.04	22,000	Was per capita is calculated from agreed 22Mt starting point. For all subsequent calculations the waste as fuel figure is derived by multiplying the waste per capita figure by the ONS forecast population for England to account for anticipated population growth.
2021	56,799,599	389.04	22,097	Waste per capita assumed stable in 2021-2023.
2022	57,029,195	389.04	22,186	
2023	57,260,338	389.04	22,276	
2024	57,481,554	366.17	21,048	Linear decrease in waste per capita 2024-2026 to reach 2027 target.
2025	57,689,926	343.30	19,805	
2026	57,883,265	320.43	18,547	
2027	58,061,002	297.56	17,277	
2028	58,229,629	291.69	16,985	Calculated based on meeting interim target reductions in Environmental Improvement Plan 2023 (i.e. 419.10kg per capita reduced by 29%). Uses 419.10 rather than 489.04 to incorporate waste exported as RDF in 2020. Linear decrease to reach 2042 target.
2029	58,389,396	285.82	16,689	
2030	58,540,552	279.96	16,389	
2031	58,683,551	274.09	16,085	
2032	58,819,282	268.22	15,777	
2033	58,948,275	262.35	15,465	
2034	59,071,237	256.49	15,151	
2035	59,189,214	250.62	14,834	
2036	59,304,260	244.75	14,515	
2037	59,418,521	238.89	14,194	
2038	59,532,838	233.02	13,872	
2039	59,647,785	227.15	13,549	
2040	59,763,744	221.28	13,225	
2041	59,880,442	215.42	12,899	
2042	59,997,119	209.55	12,572	Reduction based on 2042 Environmental Act target to halve residual waste per person by 2042 (i.e. 419.10 kg per capita reduced by 50%). Uses 419.10 rather than 489.04 to incorporate waste exported as RDF in 2020.

Arisings calculations for Yorkshire and the Humber and East Midlands (Applicant's study area)

Year	People in England (2020-based ONS)	Waste as Fuel per capita (kg)	Waste as fuel (kt)	Comments
2020	10,410,335	417.09	4,342	Waste per capita is calculated as double the Applicant's 2,171kte figure for Yorkshire and Humber provided in email from Applicant to UKWIN 15 th March 2022 based on Applicant's general approach of halving the study figure to determine the regional figure's value is in line with the Applicant's rounded figure of 4.3Mt for the study area.
2021	10,466,652	417.09	4,365	Waste per capita assumed stable in 2021-2023.
2022	10,520,221	417.09	4,388	
2023	10,572,233	417.09	4,410	
2024	10,622,810	387.20	4,113	Linear decrease in waste per capita 2024-2026 to reach 2027 target.
2025	10,671,705	357.32	3,813	
2026	10,719,845	327.44	3,510	
2027	10,766,945	297.56	3,204	
2028	10,812,218	291.69	3,154	Linear decrease to reach 2042 target.
2029	10,855,932	285.82	3,103	
2030	10,898,628	279.96	3,051	
2031	10,940,310	274.09	2,999	
2032	10,980,309	268.22	2,945	
2033	11,018,746	262.35	2,891	
2034	11,056,099	256.49	2,836	
2035	11,093,143	250.62	2,780	
2036	11,129,674	244.75	2,724	
2037	11,165,575	238.89	2,667	
2038	11,200,844	233.02	2,610	
2039	11,236,432	227.15	2,552	
2040	11,272,442	221.28	2,494	
2041	11,308,701	215.42	2,436	
2042	11,345,031	209.55	2,377	Reduction based on 2042 Environmental Act target to halve residual waste per person by 2042 based on national methodology, as set out above.

Arisings calculations for Yorkshire and the Humber

Year	People in England (2020-based ONS)	Waste as Fuel per capita (kg)	Waste as fuel (kt)	Comments
2020	5,528,103	392.72	2,171	Waste per capita uses the Applicant's 2,171kte figure for Yorkshire and Humber provided in email from Applicant to UKWIN 15 th March 2022.
2021	5,548,941	392.72	2,179	Waste per capita assumed stable in 2021-2023.
2022	5,568,636	392.72	2,187	
2023	5,587,634	392.72	2,194	
2024	5,605,797	368.93	2,068	
2025	5,623,321	345.14	1,941	Linear decrease in waste per capita 2024-2026 to reach 2027 target.
2026	5,640,704	321.35	1,813	
2027	5,657,800	297.56	1,684	
2028	5,674,179	291.69	1,655	Calculated based on meeting interim target reductions in Environmental Improvement Plan 2023 based on national methodology, as set out above. Linear decrease to reach 2042 target.
2029	5,690,090	285.82	1,626	
2030	5,705,872	279.96	1,597	
2031	5,721,284	274.09	1,568	
2032	5,736,090	268.22	1,539	
2033	5,750,407	262.35	1,509	
2034	5,764,448	256.49	1,479	
2035	5,778,521	250.62	1,448	
2036	5,792,377	244.75	1,418	
2037	5,806,039	238.89	1,387	
2038	5,819,572	233.02	1,356	
2039	5,833,384	227.15	1,325	
2040	5,847,468	221.28	1,294	
2041	5,861,713	215.42	1,263	
2042	5,876,064	209.55	1,231	

Arisings calculations for North Lincolnshire

Year	People in England (2020-based ONS)	Waste as Fuel per capita (kg)	Waste as fuel (kt)	Comments
2020	173,143	1195.54	207	Waste per capita uses the Applicant's 207kte figure for North Lincolnshire provided in email from Applicant to UKWIN 15 th March 2022.
2021	173,668	1195.54	208	Waste per capita assumed stable in 2021-2023.
2022	174,142	1195.54	208	
2023	174,548	1195.54	209	
2024	174,881	971.05	170	
2025	175,145	746.55	131	Linear decrease in waste per capita 2024-2026 to reach 2027 target.
2026	175,377	522.05	92	
2027	175,572	297.56	52	
2028	175,743	291.69	51	Calculated based on meeting interim target reductions in Environmental Improvement Plan 2023 based on national methodology, as set out above. Linear decrease to reach 2042 target.
2029	175,902	285.82	50	
2030	176,052	279.96	49	
2031	176,201	274.09	48	
2032	176,339	268.22	47	
2033	176,491	262.35	46	
2034	176,655	256.49	45	
2035	176,805	250.62	44	
2036	176,961	244.75	43	
2037	177,135	238.89	42	
2038	177,331	233.02	41	
2039	177,531	227.15	40	
2040	177,729	221.28	39	
2041	177,929	215.42	38	
2042	178,133	209.55	37	