Agenda Item	8i.
Report No	CP/09/20

HIGHLAND COUNCIL

Committee: Communities and Place

Date: 19th August 2020

Report Title: Waste Projects Update

Report By: Executive Chief Officer, Communities and Place

1 Purpose/Executive Summary

1.1 This report updates Members on potential national changes for waste collection and disposal, progress with new waste transfer stations planned in three areas, extensions to waste contracts and progress with exploring whether there is a business case to develop an Energy from Waste (EfW) plant in Inverness.

1.2 The Council's waste services operate in a complex environment in terms of market changes, compliance requirements, budget, and procurement. The Council's Waste Strategy Working Group is considering these matters and the minutes from the last meeting are reported separately to this meeting of the Committee.

2 Recommendations

2.1 Members are invited to Note:

i. the potential changes over the next five years arising from legislation and regulations as set out in Appendix 1;
ii. that work is tendered for the development of a new waste transfer station in Inverness and a further tender is expected to be issued this month for a new transfer station in Aviemore. A preferred site is being identified for the new transfer station in Fort William;
iii. the review of the capital programme priorities will consider waste infrastructure requirements alongside other capital projects;
iv. that contract renewals or extensions are underway with three conformed to date and within budget tolerance and provision;
v. the feedback from consultants on the feasibility of an Energy from Waste (EfW) plant in Inverness as summarised in Appendix 2 and as presented in Appendix 3;
vi. there is considerable preparatory works underway and required before the Council could take a decision on whether to proceed with an EfW facility, with current tasks

to identify any wider socio-economic benefits and to understand grid connections and possibilities for the supply of energy generated; and

vii. updates will continue to be provided to future meetings of the Waste Strategy Working Group and to each meeting of this Committee.

3 Implications

3.1 Resource implications

3.1.1 Capital allowances have been made available through the Council's 2018/19 – 2022/23 capital programme for the the intended infrastructure developments at Inverness, Aviemore and Fort William, other infrastructure purposes, and for landfill restoration. The review of capital programme priorities is underway and is planned for discussion at a future Council meeting.

3.1.2 Provision was made in the revenue budget for pressures in waste services for 2020/21. These pressures arise from re-procuring or extending waste contracts and from an annual increase in Landfill Tax. These are likely to be ongoing pressures in future years.

3.2 Legal implications

The Council's Waste Management service operates in a highly regulated environment. This regulatory regime covers the type of collection services that must be provided to households and businesses, the operation of our landfill sites and other facilities, and how material can be processed. Currently the most significant regulatory issue that the Council currently faces is the ban on landfilling our waste as introduced through the Waste Management (Scotland) Regulations 2012. There is to be full compliance by 2025. A range of other statutory obligations may be implemented during the 2020s as described in Section 4.5 and in Appendix 1.

3.3 Community implications (Equality, Poverty and Rural)

The service works with some social enterprises in promoting the re-use and recycling of materials and minimising waste sent to landfill. With support from the shared procurement service, where possible, community benefits are included in contracts procured.

3.4 Climate Change / Carbon Clever implications

3.4.1 One of the aims of the landfill ban is to reduce emissions of greenhouse gases from landfill sites. The methane emitted from landfill sites is significantly more harmful than CO_2, although it is effectively controlled at the sites used by the Council. Working to achieve the land fill ban and support the Government's circular economy ambitions will reduce our impact on the environment.

3.4.2 The use of waste as a low carbon fuel in 3rd party facilities will reduce the Council's carbon footprint. Our footprint would be reduced further in the longer term if an Energy-from-Waste facility is developed.

3.5 Risk implications

3.5.1 The Council's inability to implement a solution to the ban on landfilling Biodegradable Municipal Waste creates significant legal, financial and reputational risks to the Council. This is reflected in the service risk register and the Council's Corporate Risk Register (CR11).

3.5.2

A common risk for each of the required infrastructure developments will be costs submitted by bidders exceeding the capital allowances in the Council's budget. This will be considered as part of the review of the capital programme.

3.6 Gaelic implications
There are no known Gaelic implications arising from this report.

4 Background and Emerging Waste Sector Developments

4.1 The Council has a legal obligation to manage the area's municipal waste, and currently manages over 140,000 tons per annum of household and commercial waste. Around 44% is recycled via the Council's separate materials collection service, as well as our network of Household Waste Recycling Centres and 'bring' recycling points. The remainder is currently disposed of to landfill at:

a. Council owned/operated sites at Seater in Caithness and Granish on the outskirts of Aviemore; and

b. Commercially operated sites at Duisky near Fort William and at Stoneyhill near Peterhead.

4.2 Over the past 10 years it is estimated that the number of households in Highland has grown by over 11,000. Excluding holiday homes and self-catering properties (where Non-Domestic Rates are paid) the number of Council tax paying properties has grown by over 8000 (from 110,856 in 2009 to 119,060 in 2019). This is a 7.4% increase in properties serviced for household waste. Further growth is expected. The Housing Land Audit identifies at least a further 5239 dwellings will be completed between 2019 and June 2024 (4.4% increase). Most growth is expected in the wider Inverness area, around East Ross and Mid Ross, and within Badenoch & Strathspey.

4.3 The Council has a legal duty to provide a commercial waste collection service if requested to do so. We operate one of the largest commercial waste services of any UK authority, comprising approximately 5500 customers. Most are small and medium sized enterprises (SMEs). The number of commercial customers has increased by 22% (from 4500) since 2012/13. Our intention is to continue to grow commercial customers.

4.4 A significant change to current waste management practice is currently being prepared to address the implications of the ban on landfilling biodegradable municipal waste which will come into force from 2025. This ban is one of a number of measures set out in the Waste (Scotland) Regulations 2012 to promote more sustainable resource use and waste management throughout Scotland.

4.4 During 2019/20 Highland Council sent nearly 81,000 tonnes of such waste to landfill. The Council's preparations (short/medium/long term) are further explained at Sections 5 and 6 of this paper.

4.5 Other national changes which we know are coming and those which may materialise are displayed on the timeline at Appendix 1. Whilst not generally notified as yet, there may be changes to some of the timelines. The Deposit Return Scheme (DRS) implementation has, however, been confirmed as 1st July 2022, having initially been April 2021. The changes are likely to have a significant impact on Council operations for waste collection and disposal.

5. Infrastructure Developments – Short/Medium Term

5.1 The Council has previously agreed a number of important developments which are in various stages of delivery. These are described below.

5.2 Longman Waste Transfer Station
The contract notice for a new waste transfer facility was sent to Public Contracts Scotland on 29th July 2020 and is now live and open to the market for tenders. The specification was varied to focus on developing a re-sized waste transfer station that will receive and aggregate for onward shipment to end user destinations a range of recyclates and biodegradable municipal waste from the Inverness area.

5.3 Given Covid disruption a revised project programme is prepared and set out below.

Activity	**Complete By**
Issue Tender	31st July 2020
Tender Returns	30th October 2020
Tender Assessment Report to Client	20th November 2020

5.4 Key steps thereafter would include:
a. preparing a report for Committee and Council with tender recommendations and taking into account budget availability;
b. award of any contract (following a two-week standstill period);
c. technical design and construction phase planning;
d. site commencement (target July 2021); and
e. handover of facility (target August 2022).

5.5 As previously reported, the current capital allowance set for the development in 2018 was £6.695m. To May 2020 there has been circa £790k spent on technical studies and preparatory fees. The Council's capital programme is under review and is planned for discussion at a future Council meeting.

5.6 Aviemore Waste Transfer Station
The waste service is working in conjunction with the Council's Project Design Unit to complete the tender specification for this facility which is of a much smaller scale than the Inverness facility. It is anticipated that the tender will be issued in mid-August 2020 with completion of the facility by Autumn 2021.

5.7 The previously agreed capital programme allowance for other waste infrastructure improvements including the provision of new waste transfer stations in Aviemore and Fort William and other infrastructure (e.g. recycling stations and bottle banks) is £4.091m. This will also be subject to review as part of the Council's capital programme review.

5.8 Fort William Waste Transfer Station.
Two site development options are being explored presently, one of which is owned and in use by Highland Council, the other owned by a commercial organisation. Pre-application advice has been sought with neither site ruled out by Planning at this juncture.

5.9 Initial work investigating the terms under which the commercial land may be made available is on hold pending the space requirement review.

5.10 This financial year the focus will be on determining a preferred development site, putting together the detail of a development proposal, and proceeding towards seeking planning permission.

5.11 Waste Management Contracts
Around 70% of the annual waste (recyclable and non-recyclable) collected by Highland Council is organised through seventeen separate processing and haulage contracts with the private sector. These bring budget risk because of inflationary increases, commodity price reductions and contract renewals due from 2020.

5.12 The contracts under review will reflect the new opportunities new waste transfer stations would provide, as well as aggregating materials for onward shipment to processors outwith the Highlands. To date contract extensions are negotiated up to 2022 for three areas and inflationary cost increases are within tolerance and within the budget pressures expected and funded.

6. Potential Infrastructure Development – Long Term

6.1 As reported under Item 20 to the last meeting of the Environment, Development and Infrastructure (EDI) Committee in November 2019, and as originally agreed at EDI Committee in May 2018, work has been underway to consider a possible long-term solution for Highland waste disposal. This would involve the creation of an Energy-from-Waste (EfW) facility for the Highland area.

6.2 A site search study which reported in January 2020, identified the former Longman landfill site, Inverness as the frontrunner site within the Inner Moray Firth against a range of planning, licensing and operational criteria. A more detailed assessment of the site suitability and viability will be required before key planning and commercial decisions are made. Such assessment will be informed by the greater detail of the EfW plant likely to be required.

6.3 The Waste Strategy Working Group met on 7th August 2020 and received a presentation from the consultancy (SLR Consulting) which has undertaken a study into the feasibility of establishing an energy-from-waste (EfW) facility. This allowed Members to obtain a sense of the potential role for such a facility within our waste management requirements, the scale of investment necessary, and the nature and extent of the lead-in time and preparatory work required before a decision to proceed to procurement could even be considered.

6.4 Summary points from the presentation are noted for Members in Appendix 2. The full presentation is available at Appendix 3. The minutes of this meeting are reported separately to this meeting of the Committee.

6.5 Another workstream to complement the SLR study is to understand grid connection requirements and possibilities for the supply of energy generated from an EfW plant at this site. SSEN is being commissioned to report on the grid connection investment requirements for the potential scale of EfW facility being considered. There are two phases:

i. Stage 1 assesses the feasibility of the current locality infrastructure to provide development options. This will provide Highland Council with advice as to what connection infrastructure needs to be applied for. Target completion for this stage is mid-October 2020.

ii. Stage 2, Statement of Works. This is likely to require a further 3 months to undertake. This will provide a quote for the development of local distribution and national transmission equipment necessary to support an EfW plant. The quote is likely to be caveated, and the output may include a statement that SSEN will need to study the national transmission situation in more detail, which will be a subsequent lengthier and costlier process. SSEN won't commit in advance as to what that might entail. The transmission is managed by a separate company within the SSE Group, Scottish Hydro Electric Transmission, and the two companies operate as distinct entities.

6.6 Additionally, Officers will undertake an examination of socio-economic considerations to look into the wider benefits and barriers that may affect the merit of advancing an EfW Longman development. This would include for example the extent to which fuel poverty could be reduced, new jobs could be created and how such a facility could assist with decarbonising Council fleet.

6.7 From the presentation and as shown in Appendix 2, 2027 would be the earliest timeframe for an EfW facility being operationally available should the Council proceed to completion. This means interim waste management arrangements would be necessary to manage the residual waste collected by Highland Council from the end of 2022 when current contracts expire, through to the end of landfilling (December 2024) and the opening of an EfW facility.

6.8 Further work is needed to establish whether a business case can be made, taking into account grid requirements, wider benefits and partnership support, for an EfW plant in Inverness. This work will continue with updates provided to future meetings of the Waste Strategy Working group and to each meeting of this Committee.

7. Conclusions

7.1 The infrastructure developments planned to augment the existing network with new waste transfer stations at Inverness, Aviemore and Fort William will provide important building blocks towards compliance with the landfill ban. For the Inverness and Aviemore propositions the market response is unknown and the capital programme review underway may have an impact.

7.2 Whilst there are on-going statutory obligations, the future operating environment for the Council's Waste Service will change with a number of additional statutory requirements expected to come into force at different times over the next five years.

7.3 There is considerable preparatory works underway and required before the Council could take a decision on whether to proceed with an Energy-from-Waste facility.

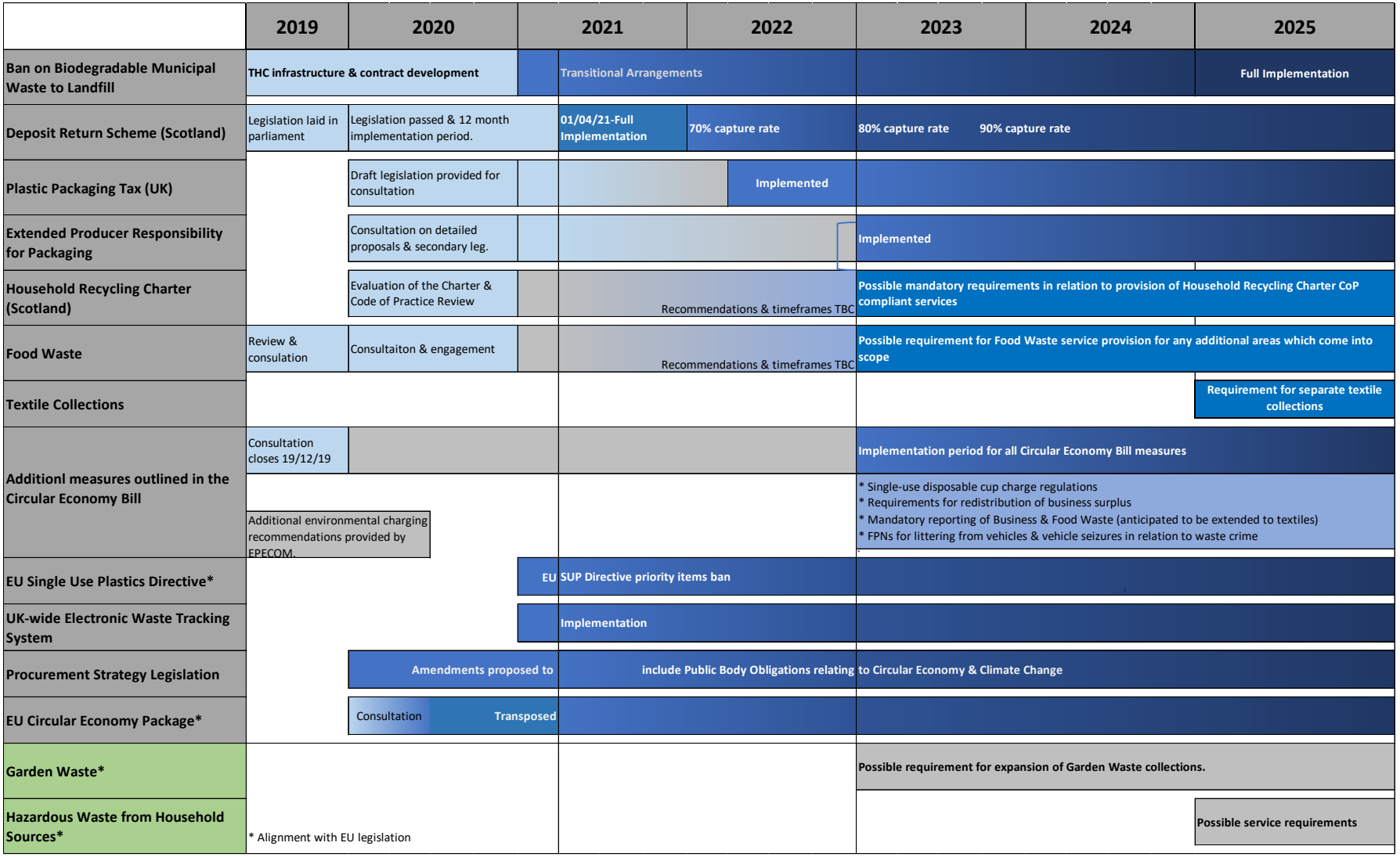
Designation: Executive Chief Officer, Communities and Place

Date: 11 August 2020

Author: Alan McKinnie, Senior Waste Manager,
Stephen Graham Project Manager.

Background Papers:
Appendix 1, Timeline – Waste Collection and Disposal Changes
Appendix 2, Principal Messages from the Energy-from-Waste Feasibility Study Presentation
Appendix 3, Energy-from-Waste Study Presentation

APPENDIX 1 – Timeline of Known and Possible Changes to Waste Collection and Disposal



APPENDIX 2

Principal Messages from the Energy-from-Waste Feasibility Study Presentation, July 2020

1. The study focused on the feasibility of establishing a combined heat and power Energy from Waste (EfW) facility at the Longman site, Inverness. It was undertaken against the backdrop of the Scottish Government determining that landfill operations will not be permissible from 2025 onwards.

2. The **earliest** that an EfW facility could be developed and opened is 2027. To accomplish that the indicative, interim timescales would include:
    a. Preparatory investigations including site studies, confirmation of export grid details, heating duct details, 3rd party feedstock, environmental impact assessment and securing planning permission) by end 2022.
    b. Procuring a preferred solution by end 2023.
    c. Contractor design, construction and commissioning by end 2026.

3. Early stage determinants:
    a. Cost of undertaking preparatory and procurement stages.
    b. SSEN export grid connection – extent of required development and investment cost.
    c. Opportunity to, and cost of incorporating district heating network ducts within the new Longman junction works.
    d. 3rd party feedstock quantities and availability (impacts scale of plant).
    e. The potential to establish a viable heat output plan.
    f. Wider socio-economic benefits that could arise from the development and operation of an EfW facility at Longman.
    g. Funding options for developing an EfW plant.

4. A separate, significant investment project would need to be established for detailing and delivering the heat output solution – that is, implementing the heat output plan that would be submitted as an integral component of the planning application and SEPA permitting process. This project could potentially be supported by a heat network concession for development by a third party.

5. Interim waste management arrangements would be necessary to manage the residual waste collected by Highland Council between from the end of 2022 when current contracts expire, through to the end of landfilling (December 2024) and the opening of an EfW facility (earliest forecast being 2027).

6. Developing such interim arrangements will provide live market pricing insight to the principal alterative to developing an EfW locally, that is, transporting the residual waste to other EfW providers elsewhere in Scotland or the north of England. These interim arrangements will need to be in place to commence from 2023 onwards which means THC would have these prices before formally committing to an EfW procurement process. It is anticipated that there will be 7 operational EfW plants in Scotland during 2024 [2 of which would be mainly

merchant plants – i.e. capacity not wholly given over to a specific local authority customer] with the possibility of a further 3 by 2027.

7. The main carbon advantage is moving from landfill to using an EfW, the transport aspects being less significant.

8. Whichever option is proceeded with (using 3rd parties or developing a local EfW) it is anticipated that the operating costs will be greater than the present landfill solutions.

9. Taking forward a project to create an EfW at the Longman site would be a project of significant scale - development timescale, finances [preparatory costs, potential impact on future capital programmes and revenue budget impacts], staff engagement, stakeholder scrutiny, and as a potential catalyst and platform for further economic and social development.

10. To provide a firm footing for proceeding to any extent with this strategic consideration it is important to seek assurance that there is corporate support for:
    a. The principle of further exploring the provision of an Energy from Waste facility at Longman.
    b. Preparing a fully costed proposal to take forward, in the first instance, the preparatory phase (to the point of being ready to go to tender) and for this to be presented at a future Council meeting for consideration.

ENERGY FROM WASTE

Feasibility Assessment

Presentation of Key Findings

Date: July 2020

The Highland Council
Comhairle na Gàidhealtachd

SLR

global **environmental** and **advisory** solutions

SUMMARY OF KEY FINDINGS

Outcome: The development of THC-owned WtE capital infrastructure for processing Highland residual waste offers potential long term commercial and carbon benefits over alternative 3rd party market solutions based outside of the Highlands; however earliest WtE commencement is 2027 and is contingent on positive outcomes from critical preparatory work, i.e. power export grid connection confirmation, securing development planning consent and allocating project capital funding.

The **key assumptions** underpinning the study are:

a. The Highland WtE plant is located on Longman site; vehicle access is via the new A9 Longman Junction and ground / site conditions are similar to those already identified by previous surveys;

b. SSEN can provide a power export grid connection to WtE plant at an acceptable cost and timeframe; *NOTE: TBC by SSEN*

c. Future quantity of 'post-recycling' THC residual waste arisings (currently c.80ktpa) remains above around 65ktpa;

d. WtE plant scale / capacity considered is 88-128ktpa range; feedstocks include 3rd party waste (local commercial waste and/or Western Isles Council waste) to ensure plant always operates full and to optimise plant efficiency and commercial benefits; and

e. WtE plant design is 'heat enabled' to meet statutory requirements for planning and permitting consents; however study assumes no revenue from future heat sales. *NOTE: details of future district heat network (DHN) around Longman require a separate study*.

The **key conclusions** from this WtE Feasibility Assessment are:

1. The development of a THC-owned WtE Plant offers potential long term commercial and carbon benefits over a non-capital solution; however realising these benefits is contingent on positive outcomes from early preparatory work (refer actions (i) – (v) of item 2 in Actions Table) as well as securing development planning consent and capital funding;

2. The earliest that a WtE plant could be developed and opened is 2027 (refer development programme); therefore a non-capital solution for management of THC's residual waste is in any event required for at least the next 6-7 years; and

3. The use of a non-capital merchant solution potentially offers THC with a lower cost option in the short-medium term (particularly if a local 3rd party solution and/or a rail-based haulage solution is used); given the minimum 6-7 year contract term required, these service contract arrangements will provide THC with useful cost data with which to benchmark and assess any future WtE contract procurement process.

Outline Development Programme

The outline development programme for implementation of THC's long-term residual waste solution (for non-capital and capital WtE solutions) is set out below; the immediate tasks include replacement of the existing LACW contract (with review milestones prior to end-2024 and delivery of operational WtE - 2026) and the preparatory actions identified as necessary for a future WtE development.

Years	1 2020	2 2021	3 2022	4 2023	5 2024	6 2025	7 2026	8 2027	9 2028	Notes
1 Procure replacement LACW contract						2 year extension		extension option		Contract must comply with SG landfill restrictions from Jan 2025 and have flexibility to extend until WtE plant commences.
2 WtE Preparatory Actions - including:						start of Scottish landfill restrictions				Includes: SSEN grid; 3rd Party feedstocks; NNDR rate; SEPA pretreatment derogation; DHN ducts; LACW composition survey
Confirm SSEN Export grid details										High Priority action; to confirm cost and timing for export grid connection.
Confirm heat duct details (A9)										High priority action; duct details required by June 2020 for inclusion in new A9 construction works plans
3 WtE Project Funding Position										Determination of THC's project funding position - required prior to commencement of procurement.
4 3rd Party Feedstocks										Establish input from Western Isles Council and private sector waste collectors (e.g. SUEZ) prior to contract procurement
5 Longman Studies										Includes SI, Flood Risk Assessment and all supporting studies for EIA (e.g. ecological).
6 Planning / EIA										Incl. stakeholder consultations (HIAL) and submission of draft Heat Plan. Secure Planning Consent before detailed procurement.
7 Preparation for Contract Procurement										Includes determination of WtE plant scale, feedstocks, funding. May also include soft market testing prior to formal procurement
8 WtE Plant Contract Procurement										May be either DBO or DBFO contract (depending on THC funding position) Assumes initial Bidder shortlisting stage.
9 Design, Construction & Commissioning										D&B Contract includes securing Plant PPC Permit (by Contractor) - after completion of detailed design phase.
10 WtE Plant Operation Commencement										Plant commencement date will be determined by outcome from previous tasks and constuction programme. Earliest 2027 start

Accelerated procurement timeline running in tandem to the Planning / EIA process

Development Programme: Actions (tasks 1-2 of 11)

Immediate Tasks: The immediate tasks for 2020 comprise replacement of the existing LACW contract (with review milestones in late 2024 and 2026) and the preparatory actions (i)-(vii) necessary to confirm WtE project viability and develop specification for project delivery.

Action	Description / Details	Est. Timing
1 Procure Replacement LACW Contract	Procure replacement LACW contract(s) for period to end-Dec 2024, with options to extend to 2027. From Jan 2025 this contract must comply with SG landfill restrictions and have flexibility to extend until WtE plant commences (around 2027). Use contract prices to benchmark costs for alternative WtE contract procurement.	To commence by Q4 2020 (with contract extension review prior to 2025 & 2027*) **WtE Plant Commencement date*
2 WtE Preparatory Actions (refer section 10.1 for details)	(i) Confirm SSEN export grid connection [Q2] (ii) Commence discussions with 3rd party feedstock providers (iii) Commence Longman site studies [Q2] (iv) Review NNDR rates for WtE plant (v) Commence discussions with SEPA regarding derogation of pre-treatment requirements (vi) Discuss / plan DHN duct installation within new Longman Junction works (with Transport Scotland / Jacobs) [Q2]. (vii) Commence LACW compositional analysis [Q2]	Start tasks (i), (iii), (vi) & (vii) in Q2 2020; start other tasks in Q3.

Development Programme: Actions (tasks 3-6 of 11)

Preparatory Tasks: the additional preparatory tasks required concern capital funding, 3rd party feedstocks, site studies at Longman and commencement of the EIA / planning application process; these tasks should all be commenced by Q4 2020. Obtaining the necessary planning consent is a critical step in the process.

Action	Description / Details	Est. Timing
3 Project Funding	Consider internal THC capital funding options and authorise agreed position to take into the WtE contract procurement process.	Start by Q3, 2020
4 3rd Party Feedstocks	Refer item 2 (ii). Requires discussions with WIC, SUEZ and others about minimum tonnage, waste characteristics, delivery arrangements and commercial issues as part of agreement on draft HoTs with suppliers for formal feedstock supply agreements (FSAs).	Complete HoTs / draft FSAs by Q4, 2021
5 Longman Site Studies	Refer item 2 (iii). Includes site / ground investigation, Flood Risk Assessment and other studies required to inform the EIA (e.g. ecological). Assumes EIA studies completed by mid-2021.	Start Q3 2020.
6 EIA / Planning Application	Commence planning application process and associated EIA and stakeholder consultations. Planning application process includes preparation of draft supporting Heat Plan and HIAL consultation. Target submission date for planning application Q4 2021 latest.	Submit planning application by Q4 2021 latest.

Development Programme: Actions (tasks 7-9 of 11)

WtE Contract Procurement: The necessary tasks comprise: preparation of the necessary documents (including Employers Requirements and Specification); contractor selection (via tendering / procurement process) and subsequent implementation. Obtaining the necessary planning consent (Task 6) is a critical step in the process; Task 8 is unlikely to proceed without this. Task 7 is a critical preparatory task.

Action	Description / Details	Est. Timing
7 WtE Contract Procurement – preparation	Preparatory work by THC to include: determination of required plant scale; feedstock NCV & other characteristics; designated site; benchmark cost; funding position; other project-specific requirements – to inform the Employer's s Requirements & Project Specification to take into contract procurement. May also include 'soft market testing' ahead of commencement of formal contract tendering process.	Complete this prior to commencement of contract procurement process.
8 WtE Contract Procurement – tendering	May be either DBO or DBFO contract (depending on THC funding position) with separate or integrated O&M Contract. Assumes initial Bidder shortlisting stage (Q1-Q2 2022). Contractor appointed Q4 2023.	Detailed procurement to commence mid-2022
9 Contract Implementation	Contract to include design, construction and commissioning phase and securing of Plant PPC Permit by Contractor. Minimum of 3 years.	Contract to commence by Jan. 2024

Development Programme: Actions (tasks 8-11 of 11)

WtE Plant Operation and Heat Offtake: The date of commencement of WtE plant operation will depend on completion of the planning, procurement and infrastructure implementation phases; the earliest likely date is considered to be January 2027; the WtE plant commencement date will also define the termination date for THC's existing service contract. NB. A separate project is required for delivery of the Longman DHN network; this should be progressed in earnest once planning consent is granted for the WtE plant and details of the development on the Inverness 'City Region Deal site' are clarified.

Action	Description / Details	Est. Timing
10 Plant Operation	Nature and term of O&M Contract to be determined during contract procurement process. For DBFO contract this will be 20-25 year term; for DBO Contract this may be shorter term (e.g. 5-8 years).	WtE plant starts operation by Q1 2027, earliest.
11 Longman DHN development	Although not essential for WtE plant delivery, this is nevertheless an essential ancillary task that will build on and deliver the aims of the draft Heat Plan prepared at Planning & Permitting stages. It is recommended that funding options via the LCITP initiative are explored.	Commence detailed work after receipt of planning consent for the WtE plant.

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1 Study Background and Objectives

Waste to Energy FS Report: presents feasibility assessment of development of a WtE capital infrastructure by THC on its existing waste site at Longman, Inverness for future long-term management of the residual fraction of its local authority collected waste (LACW).

Study Background and Objectives:

1. THC currently manages c.140 ktpa of LACW and recycles c.44% of this via separate materials collection and its network of HWRCs and materials recycling points. Around 80ktpa of 'residual' waste is landfilled in THC and private-sector landfills in Highland and Aberdeenshire.
2. THC has recently been working to (a) improve separate materials collection services to householders and businesses, (b) develop new in-house THC waste infrastructure across the Highlands to improve its capacity to manage residual LACW inhouse with reduced reliance on 3rd party providers, and (c) plan the closure of its existing inhouse landfills prior to new landfill restrictions taking effect from 2025.
3. With its current residual waste contract (with SUEZ) due for re-tendering during 2020 and the commencement of government restrictions on landfill disposal of residual LACW from 2025, THC wishes to consider its long-term options for future residual LACW management that minimise service cost and risk, while also complying with the new landfill restrictions and reducing the carbon impact of its waste service.

Key Study Assumptions:

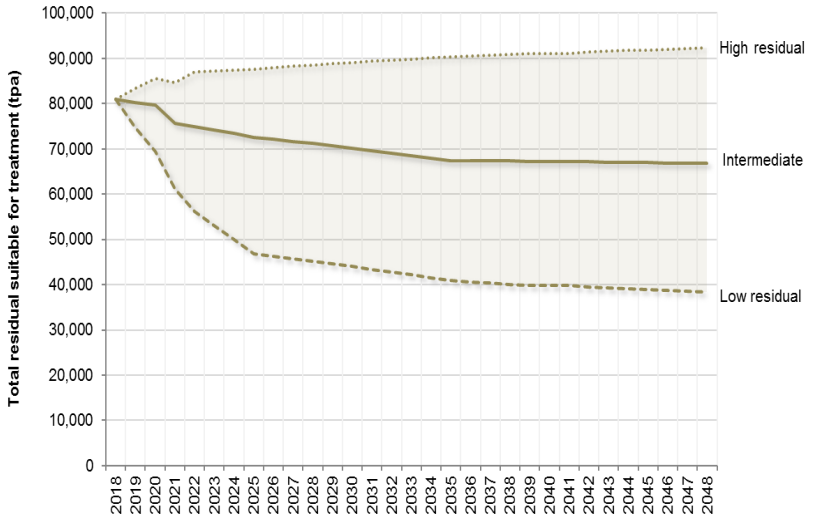
1. FS study considers both capital development (WtE) and alternative non-capital (service contract) options.
2. WtE plant location is IMFLPD 'site IN13' at Longman with vehicle access via the new A9 Longman Junction and shared site entrance with the new WTS facility currently being developed there. The site is located on Inverness Common Good land.
3. WtE plant is 'stand alone' facility with export power grid connection provided by SSEN.
4. WtE design is 'heat enabled' for high efficiency and to secure necessary planning and permitting consents and feed into future Longman district heating network (a separate project).

5. WtE plant design includes feedstock pre-treatment (to recover metals and hard plastics) in accordance with current SG requirements (i.e. no derogation assumed).

2 WtE Plant Feedstocks and Scale (1 of 2)

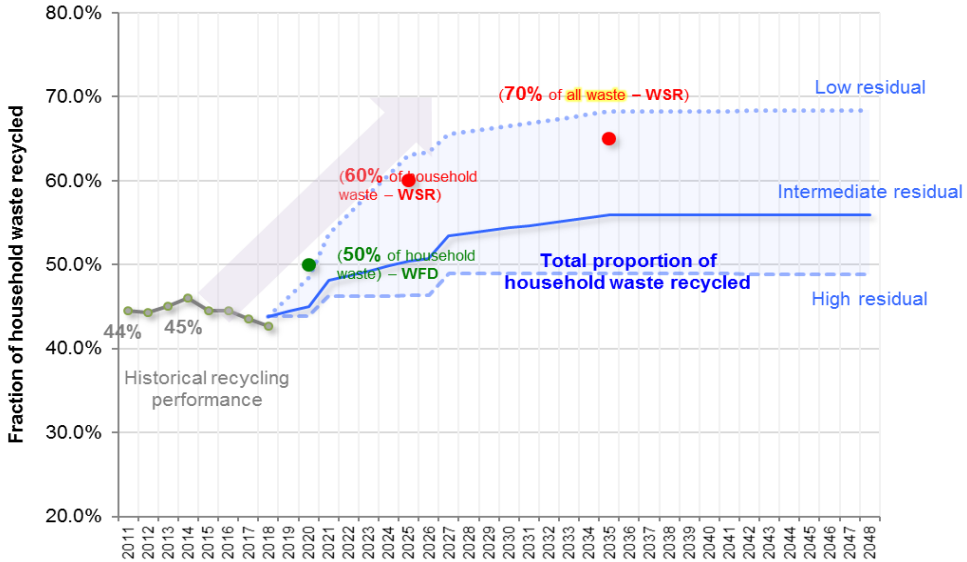
WtE Feedstocks: this section quantifies future LACW projections - as the core plant feedstock stream – based on future THC recycling rates. It also quantifies feedstocks from 3rd Party Commercial & Industrial waste (CIW) sources within Highland and LACW arisings from Western Isles Council (WIC). These projections are used to inform the likely scale of a future Highland WtE plant

THC Residual LACW projections: (low – intermediate - high)



THC Recycling Targets & Assumptions (underlying residual LACW projections)

NOTE: WFD and WSR refer to EU and Scottish Recycling targets in 2020, 2025, 2035.

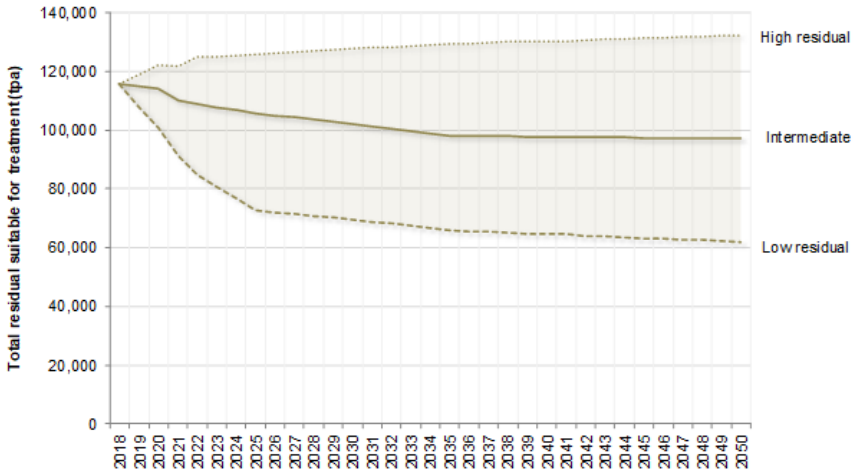


2 WtE Plant Feedstocks and Scale (2 of 2)

Combined THC & 3rd Party WtE Feedstocks: the graph and table summarise tonnage projections, split by source, and based on assumed recycling rates and estimated feedstock Calorific Value (CV). NOTE: recycling rate in range 'intermediate-low' considered most likely outcome for THC, i.e. plant feedstock forecasts within 'intermediate-high' range (for initial WtE plant sizing purposes).

Combined THC & 3rd Party Residual Waste Projections:

NOTE: THC LACW + CIW + Western Isles Council residual waste.



Breakdown of Outcome from WFW Analysis

Scenario	Waste Source	2025 residual tonnes	2035 residual tonnes	2025 CV (MJ/kg)	2025 HH% recycling	2035 HH% recycling	2025 LACW% recycling (target is 60%)	2035 LACW% recycling (target is 65%)
Low Residual (High Recycling)	Highland LACW	46,827	40,898		63.1%	68.2%	60.1%	65.0%
	WIC	10,000	10,000					
	Third Party CIW	15,812	15,101					
	TOTAL	**72,639**	**65,999**	**11.57**				
Intermediate	Highland LACW	72,592	67,441		50.4%	55.9%	47.3%	53.3%
	WIC	10,000	10,000					
	Third Party CIW	23,103	20,561					
	TOTAL	**105,695**	**98,002**	**10.89**				
High Residual (Low Recycling)	Highland LACW	87,668	90,340		46.3%	48.9%	43.0%	45.7%
	WIC	10,000	10,000					
	Third Party CIW	28,056	28,885					
	TOTAL	**125,725**	**129,225**	**10.98**				

3 Longman Development Site

Presents summary of key attributes of designated development site and highlights site-specific constraints and requirements to be included in the specification and development of the WtE Plant

Development Planning Issues:

1. **Inner Moray Firth Local Development Plan 2015:** allocates 'Mixed Use' zoning to site IN8 and 'Industrial' zoning to site IN13 with the latter specifically identified for use for Waste / WtE.
2. **Visibility:** the proposed WtE site has limited direct visibility from residential and business districts of Inverness but will be fully visible to residents around the Moray Firth; therefore it will require some architectural treatment to mitigate this.
3. **Traffic / Vehicle Access:** the site benefits from the planned A9 highway improvements and the new Longman Junction and associated new road entrance at north end of site IN13 which will allow heavy waste vehicles access into the new WTS facility.
4. **Ecology:** the ecological reports note the onsite presence of wildlife, including badgers and nesting birds. A specific study will be required at planning stage it is likely that the WtE construction period may need to be scheduled to avoid sensitive (e.g. nesting) seasons.
5. **Flood Risk:** the site is relatively low lying, coastal and potentially vulnerable to flooding; it will require a site-specific Flood Risk Assessment to determine minimum floor levels for operating areas and reduce flood risk to an acceptable level.
6. **Inverness Airport Exclusion Buffer:** The Longman site falls within Inverness Airport's 13km 'buffer' zone, which triggers requirement for HIAL consultation during the development planning process if the proposed development exceeds 90m in height. NOTE: the WtE stack height is not expected to exceed 80m. Key HIAL concerns relate to height, building surfaces ('glint and glare'), lighting and wildlife management (flocking birds). HIAL are a statutory consultee.
7. **Waste Management Licence (WML):** The wider Longman site currently has a single WML covering the future Inverness City Region Deal site and the new WTS and future WtE. This WML does not permit onsite waste disposal, therefore (a) any surplus excavation material arising from construction would need to be transported offsite for landfill disposal and (b) a future WtE plant Pollution PPC Permit application process to SEPA will need changes to the existing Longman WML.

Site / Ground Conditions:

1. **Made Ground** – Previous SI work carried out for the WTS project identified 4-8m of made ground overlying natural fluvial deposits. This will require a piled solution to support the heavy building structure and suspended ground floor slab.
2. **Active Waste** - much of the 'made ground' includes active waste from historic landfill operations, therefore the building substructure will need gas protection systems in accordance with CIRIA guidance. It is assumed that passive venting systems are used (e.g. gas membrane with venting provided by granular fill materials with localised venting). Bulk excavation into active waste will need to be limited.
3. **Groundwater** - is relatively high at the site and so excavations during the construction phase will require dewatering. Our initial design is assumed to use a shallow subsurface bunker for incoming waste storage. The high cost of excavating and offsite disposal of waste with high groundwater levels will need to be considered against alternative options such as construction of an elevated tipping hall.
4. **Surface water** - has the potential to become contaminated with leachate from waste materials. Site drainage systems will need to separate out clean and dirty surface water flows, and dirty flows may require onsite treatment prior to discharge to sea, or alternatively connection into the foul sewer system.

4 WtE Technology Assessment

Presents findings from review of current market offering of technologies suitable for the Highland WtE project taking account of likely plant scale, waste feedstock types, energy offtakes, costs and market availability in UK.

THC WtE Project-specific Requirements:

1. **Plant Scale:** - expected to be in range 70-130 ktpa, which is considered relatively small-scale compared with most EfW plants in the UK; however, examples of operational municipal waste WtE plants at this scale exist, e.g. Peterborough, Exeter, Isle of Man.
2. **Feedstock:** - the primary plant feedstock is residual Municipal Solid Waste (now referred to as LACW); this feedstock limits technology choice due to its heterogeneous nature and typically lower NCV.
3. **Energy Efficiency:** - SEPA require plant to achieve 'R1' recovery status , and also require conventional EfW to be "CHP" enabled, i.e. to have the capability to add e.g. a district heat network to the plant.
4. **Air Emissions Control:** - flue gas from the plant must meet the Emission Limit Values (ELVs) as stated in the Industrial Emissions Directive for waste combustion; these ELVs are quoted within this report.
5. **Longman Site:** - poor ground conditions at the development site will prevent excavation of a deep below ground waste fuel bunker, which is the preferred arrangement at many WtE plants. NOTE: plant cost estimates are based on a shallow fuel bunker.

Viable Technologies Summary:

The use of modern conventional moving grate combustion driving a steam turbine is considered to be the preferred technology combination for this WtE. Typically these grates will accommodate a feedstock NCV range of 7-13MJ/kg. *NOTE: Moving Kiln combustion technology and ORC energy generation technologies may also be suitable (subject to market conditions at time of procurement).*

Combustion Technology	Energy Generation
Moving Grate	**Steam Turbine**
Moving Kiln	Organic Rankine Cycle

5 WtE Plant Energy Offtakes

Summarises power and heat energy offtakes from the WtE plant (at the likely size range) and provides initial assessment of the heat demand / offtake profile based on existing local end-users and planned future infrastructure developments around Longman. To support submission of draft WtE plant Heat Plan (to SEPA).

Electricity Export:

1. The core energy production from the WtE plant is electricity, which must be exported via the local HV electricity grid operated by SSEN. There are currently no immediate large scale power users adjacent for Private Wire connection although this should not be ruled out in future as it may be commercially attractive).
2. Power export at the proposed plant scale range (70-130ktpa) is 5.8-11.7MWe (also subject to plant operational mode ('power only' or 'CHP').
3. SSEN will require a formal application from THC to trigger a detailed assessment of the likely cost and timeframe for installation of a power export grid connection; this takes 3 months and costs £2,000 excl VAT to commission. A connection to the 11 kV grid is possible at the line to the east of the A9. However upgrades to nearby transformers will also likely be required to provide the necessary capacity and a proportion of the cost of this work will be passed on to the THC WtE project. The outcome from SSEN's formal study will confirm the detailed costs and timeframe.

Heat Offtake/ Export:

1. Initial review of local heat demand indicates that several high heat end-users exist in/around Longman. The future Highland WtE plant will have capacity (est. 4.5-8MWth) to provide heat to more heat end-users than has currently been identified. A full District Heat Network (DHN) will be required to determine the scope and footprint of the Longman DHN (including new end-users on the Inverness City Region Deal site), identify specific heat customers, heat delivery pipework routes, capital installation costs and projected future end-user contracts and revenues. The DHN project is separate to the WtE project and would not be started in earnest until the WtE plant has secured planning consent.
2. A draft Heat Plan for the Highland WtE Plant will be required to support future planning and permit applications (*NOTE: SEPA is a statutory consultee to the Planning application process)*. Based on evidence from recent WtE projects in Scotland, it is apparent that the draft Heat Plan need only establish that the WtE plant is heat-enabled and has a locally accessible heat end-user market that can potentially be supplied in future. There is no reason to think that these conditions would not be satisfied for a future Highland WtE plant located on the designated development site at Longman.

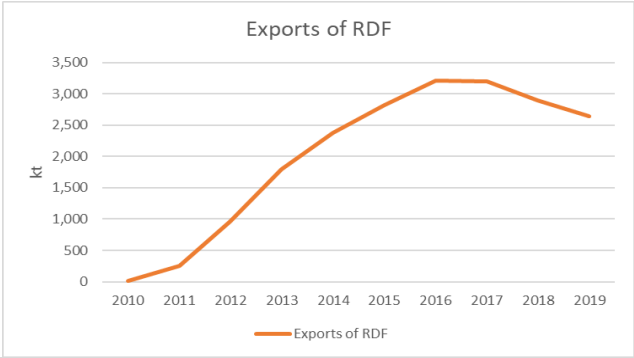
6 Third Party Waste Processing Markets (1 of 2)

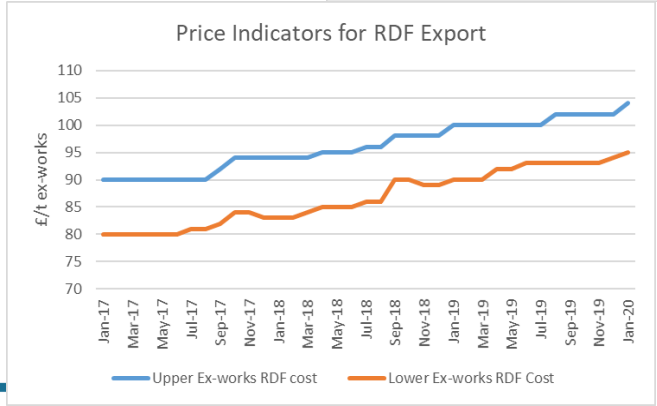
This section reviews the prevailing conditions and trends in the UK's RDF and domestic WtE sectors with respect to RDF export price trends and EU export conditions.

Key Factors driving decline in RDF export market:

1. **Increasing build out of domestic WtE infrastructure:** to fill UK waste processing infrastructure gap and provide domestic UK treatment capacity, rather than continued reliance on European WtE facilities. In addition, several operational UK EfW facilities have applied for planning and operational permit variations to increase capacity (as a result of a higher than expected facility availability and a lower than expected waste NCV) thus increasing total domestic capacity.
2. **Introduction of RDF Import taxes:** Netherlands Dec '19; Sweden April '20.
3. **Continuing uncertainty regarding export arrangements post-Brexit:** e.g. import/export taxation, inspections and delays at ports etc causing local authorities and waste management companies to retain waste in the UK even if it moves waste management down the hierarchy to landfill (e.g. Essex County Council awarded contracts for landfill disposal of 200ktpa of residual waste when its existing RDF export contract finishes March 2020).
4. **Closure of 4 of 6 lines at the AEB plant, Amsterdam: combustion line closures** for safety improvements commenced May 2019, and reduced capacity to 30% of total (c.420,000 tonnes).
5. **RDF export cost increases:** the fall in the £-Euro exchange rate since June 2016 has increased RDF export costs over the last 3 years; RDF export contracts typically include part of the cost, in Euros.

Declining RDF Exports / Increasing costs (2016-19)





6 Third Party Waste Processing Markets (2 of 2)

This section reviews the prevailing conditions and trends in the UK's RDF and domestic WtE sectors with respect to current and future WtE domestic capacity in Scotland and N.England.

Third party Merchant capacity assessment (Scotland and N. England):

Scotland: There are currently 5 operational WtE facilities in Scotland (including the small-scale plant on Shetland) with 4 new facilities under construction and a further 4 facilities with planning permission either granted or at an advanced stage (and with a reasonable likelihood of delivery). By 2024 it is expected that 7 WtE facilities will be operating in Scotland with a combined capacity of c.1.2 Mtpa. Capacity for THC waste is most likely to be available at EarlsGate and Levenseat in the short term and Shieldhall or Irvine by 2024/25, with the potential for additional merchant capacity to be offered beyond that at Avondale and Greengairs.

Northern England: there are currently 3 operational EfW facilities on Teesside with a combined capacity of c. 1 Mtpa, all of which are operated by SUEZ. The bulk of this capacity is dedicated to processing waste from long-term local authority contracts. SUEZ have secured planning consent for an additional 200ktpa capacity EfW facility at Haverton Hill, which may serve public sector and commercial customers in NE England and Scotland from 2023.

The key conclusions are:

1. The current trends in the RDF export market and future uncertainties and volatility in this sector mean that the 'RDF export' option (previously considered in the 2018 Business Case) is no longer a viable or secure option for inclusion in the options analysis for this feasibility assessment.
2. With respect to THC's position of requiring a solution for management of its c.80ktpa of residual LACW, it is apparent that a substantial bank of 3rd party merchant WtE capacity (in Scotland and N. England) is scheduled to become operational from around 2024 onwards. Prior to that date (and implementation of the delayed SG restrictions on landfill disposal of residual municipal waste from Jan 2025), THC should seek to replace its current contract with SUEZ (which cannot be extended further) with an interim residual waste contract. This interim contract could continue to be landfill-based until December 2024, but after that would require to comply with SG landfill restrictions.
3. From 2024, the options for obtaining competitively priced contracts with 3rd party merchant WtE operators increase (due to higher merchant capacity) and THC should use the time gained by an interim contract (e.g. to end-2024) to inform its approach to the residual waste market to (a) obtain the commercial benefits from an emerging domestic merchant WtE sector and (b) price benchmark the alternative option of procuring implementing its own WtE plant.

7 Technical Options Analysis – *Capital and non-Capital* (1 of 4)

Defines agreed WtE-based 'capital' solutions and alternative 3rd Party 'non-capital' options and develops technical costs for each option (incl. key capital, operating, lifecycle and transportation costs and revenue streams) for analysis, comparison, sensitivity testing and options shortlisting for detailed Financial Analysis

The 3 capital options selected for analysis (72-128ktpa):

1. **72ktpa plant** (based on 9tph grate): this option would accommodate the following scenarios:
    - 'Highland LACW only' plant at 'intermediate' LACW projection; or
    - Highland LACW + all 3rd party streams (CIW + WIC) at 'low residual' LACW projection.
2. **88ktpa plant** (based on 11tph grate): this option would accommodate the following scenarios:
    - Highland LACW + c.16ktpa 3rd party waste (CIW and/or WIC) at 'intermediate' LACW projection; or
    - 'Highland LACW only' plant at 'high residual' projection (NOTE: this projection would exceed plant design capacity after initial years).
3. **128ktpa plant** (based on 16tph grate): this option would accommodate the following scenarios:
    - Highland LACW + all 3rd party waste (CIW + WIC) at 'high residual' LACW projections.

The 5 non-capital options selected for analysis:

4 Transfer and haul THC LACW to central Scotland (by road).

5 Transfer and haul THC LACW to central Scotland (by rail).

6 Transfer and haul THC LACW to N. England (by road).

7 Transfer and haul THC LACW to N. England (by rail).

8 Transfer and haul THC LACW to proposed merchant WtE at Inverurie (by road).

Notes:

The road options assume direct haul to 3rd party end users from the six large THC WTS facilities, i.e. Seater, Invergordon, Portree, Fort William, Granish and Longman.

Rail options assume delivery from these six WTSs to the new Longman WTS for loading into rail containers and shuttle haulage of rail containers to Inverness railhead for loading.

The only capital item in these non-capital options is for the rail containers but we have amortised these capital costs, so that all costs under these options are revenue costs and so the outcomes apply equally to all LACW projections.

7 Technical Options Analysis – *Capital and non-Capital* (2 of 4)

Defines agreed WtE-based 'capital' solutions and alternative 3rd Party 'non-capital' options and develops technical costs for each option (incl. key capital, operating, lifecycle and transportation costs and revenue streams) for analysis, comparison, sensitivity testing and options shortlisting for detailed Financial Analysis

WtE Capital costs £98-124M (2019 costs and excluding risk, OB, funding)

Capex £	Option	1 Longman 72ktpa EfW plant	2 Longman 88ktpa EfW plant	3 Longman 128ktpa EfW plant
	Site acquisition	**0**	**0**	**0**
Civil works - buildings, ground works etc.	Civil & Buildings	22,505,961	23,332,084	29,815,322
	Mobile Plant	761,000	761,000	761,000
	Contingency (on Civils + Other)	2,250,596	2,333,208	2,981,532
	Fees	6,071,431	6,269,700	7,885,677
	EPC Contractor Margin	2,813,245	2,916,510	3,726,915
	Civil works total	**34,402,232**	**35,612,503**	**45,170,447**
M & E costs - process plant, utilities etc.	M&E	58,853,350	61,813,663	71,999,169
	Contingency (on M&E)	5,130,393	5,390,641	6,286,070
	M&E total	**63,983,743**	**67,204,303**	**78,285,239**
	DH CAPEX	0	0	0
	MT and EfW CAPEX total	**98,385,976**	**102,816,806**	**123,455,686**

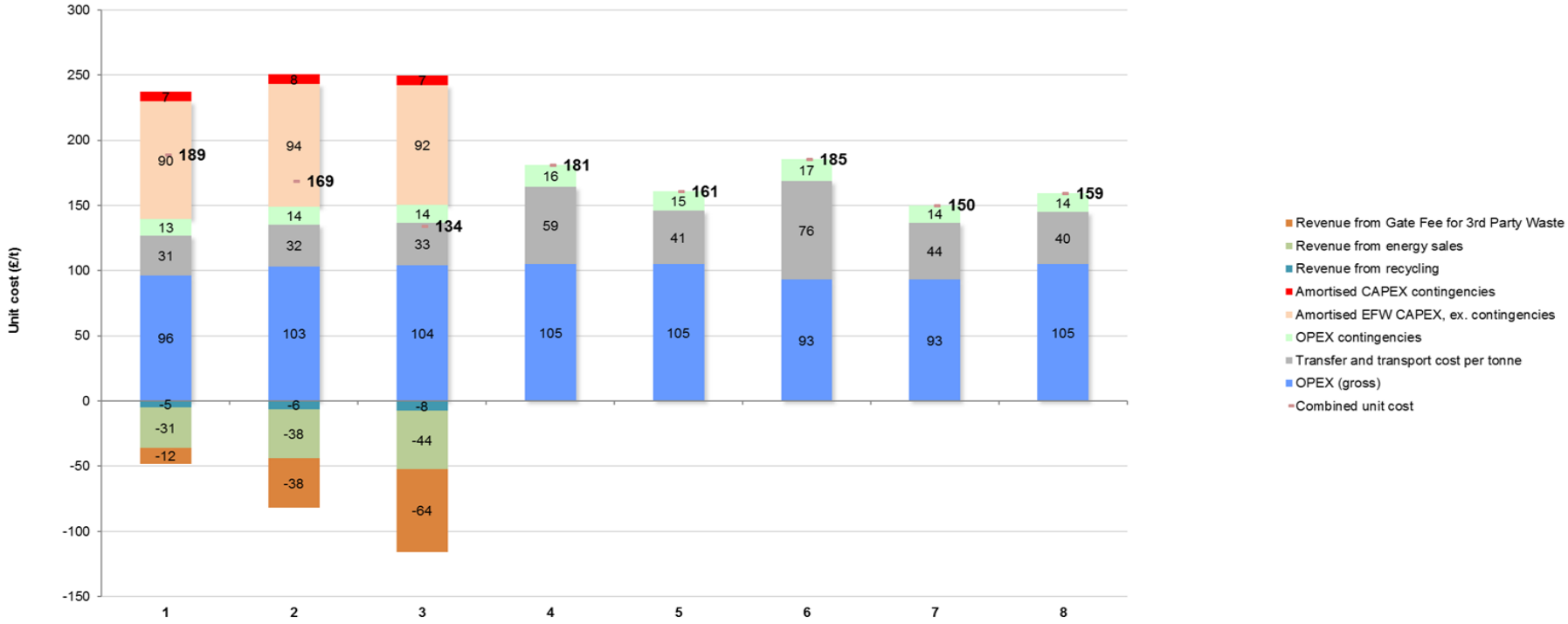
The **technical costs analysis**:

1. Provides detailed cost breakdown for the 3 Capital WtE options for a Longman WtE plant at three different scales (refer table) and also for the 5 non-capital options, based on haulage to 3rd party merchant plant(s).
2. In addition to the technical costs for construction of WtE infrastructure at Longman, the capital costs are market facing (wrt operational WtE plants at this scale) and also include external adviser fee costs for Planning/EIA, specification preparation, contract procurement and project management of the infrastructure delivery.
3. The outcome from the technical costs analysis of the 3 capital options and 5 non-capital options is shown graphically on the next slide – as a breakdown of the cost elements and revenue streams for each option (in unit cost terms).
4. The outcome from this provides the basis for options shortlisting for subsequent detailed Financial Analysis, taking account of project funding, project risk and Optimism Bias and contract / delivery routes.

7 Technical Options Analysis – *Capital and non-Capital* (3 of 4)

Presents results from 'technical costs' analysis of 3 Capital (WtE) and 5 non-capital options (including revenue from plant energy sales, 3rd party feedstock gate fee and recycling). Required capital investment is amortised over 25 years. *NOTE: Technical Costs EXCLUDE project finance, risk, OB and delivery costs (refer slides 21 & 22)*

Technical Options Analysis: Breakdown of Costs / Revenues by Option and Unit Cost



7 Technical Options Analysis – *Capital and non-Capital* (4 of 4)

Presents results from 'technical costs' analysis of 3 Capital (WtE) and 5 non-capital options (including revenue from plant energy sales, 3rd party feedstock gate fee and recycling). Required capital investment is amortised over 25 years. *NOTE: Technical Costs EXCLUDE project finance, risk, OB and delivery costs (refer slides 21-24)*

The **key conclusions** from this WtE Feasibility Assessment are:

1. The benefits of larger scale on the capital WtE plant options comprise (a) economies of scale and (b) increased revenue from 3rd party feedstocks into the plant. However this latter benefit requires secure 3rd party feedstock contracts. Without the revenue stream from 3rd party plant users the unit costs for the WtE Capital options would exceed £200/tonne for all three plants sizes.
2. The non-capital options unit costs fall within a narrower cost range (£150-£185/t) and it is apparent from these that (a) road haulage costs increase with distance and may become excessive for transportation much further than central Scotland and (b) rail haulage appears to potentially offer significant cost benefits, particularly for long-distance haulage (although this option requires a rail-head at the destination plant and therefore is not universally available).
3. Overall, the lowest cost options from this analysis appear to be:
   Option 3: £134/tonne (net) – although this option also requires the largest capital investment and security over the necessary 3rd party feedstocks (from WIC and commercial sources) to deliver this; NOTE: this unit cost is for the 'high residual' LACW projection and therefore uses a higher LACW denominator - so caution is required when comparing it directly with the other options (which are all based on the lower 'intermediate' LACW projection).
   Option 7: £150/tonne – this option benefits from lower 3rd party WtE gate fees potentially currently available in England and relatively low rail transport costs for long distance haulage. While it indicates the potential advantages from both these elements, it is conditional on there being a low gate fee and an existing railhead at the destination merchant WtE plant.
4. The results also indicate the benefits from a short road haulage distance to the 3rd party solution, e.g. to Inverurie Option 8 (where a local solution may be available in future).

8 Financial Analysis of Shortlisted Options (1 of 4)

Presents results of Financial Analysis of shortlisted options from Technical Costs Analysis based on Financial modelling over a 25 year period in accordance with HM Treasury Green Book guidance on public sector investment projects, identifying inflationary, financing, optimism bias and risk figures within the analysis.

Four (4) Shortlisted Technical Options for Financial Analysis:

Option 2: LACW would be treated in an Energy-from-Waste (EfW) Plant located in or near Inverness with capacity to treat 88,000 t of waste per annum, or 11 t per hour operating for 8,000 hours per year. This represents approximately 91.3% of the total number of 8,760 hours in the year, allowing for 30 days every year for plant shutdown and maintenance.

Option 3: building and operating an EfW facility with capacity to treat 128,000 t of waste per annum, or 16 t of waste per hour, again allowing for a month's shutdown each year.

Option 4: transferring LACW by road to a treatment facility in central Scotland, paying a gate fee to the facility operator for each tonne of waste treated. The operator would be selected following a competitive tender.

Option 5: transferring LACW by rail to a treatment facility in central Scotland, paying a gate fee per tonne of waste processed through the facility as under Option 4. Under Option 4, the Council would transfer LACW from its existing network of transfer stations onto road vehicles for onward transport to a treatment plant in central Scotland. Under Option 5, the Council would use existing WTS infrastructure to bulk and transfer LACW from its existing transfer station network onto the rail network at the Inverness rail freight terminal.

Two (2) Funding Options used in the Financial Analysis:

Design, build and operate (DBO): Under this financing option, THC would raise the funding required to build the EfW plant from the PWLB. The loan would be repayable over 25 years, equating to the plant's estimated lifetime, at a rate of interest of 3.8%, which is the Council's current weighted average cost of capital (WACC) for loans from the PWLB. Under DBO, the Council would retain ownership of the plant, and would enter into a fixed price Design and Build (D&B) contract with a prequalified contractor to build and commission the plant, and a separate Operating and Maintenance (O&M) contract to run the plant. The O&M contract could potentially be with the DBO contractor, at least for an initial five-year operating period. The advantages of combining the D&B and O&M contracts for at least the first five years of the EfW plant's operation is that it would minimise the risk of interface issues that could arise between two separate contractors. Under DBO, ownership of the plant, and ultimate responsibility for the management of risks associated with it, would rest with the Council. Some of these risks would be transferred to the D&B and O&M contractors under the terms of agreements entered into with them, which would be fixed price as far as possible. However, under existing contractual practice, certain risks, for example relating to increases in insurance premiums, National Non-Domestic Rates (NNDR) and the rate of landfill tax (LFT) payable on tonnages of residual waste disposed to landfill would be passed back to THC as they would be outwith the contractor's control.

Design, build, finance and operate (DBFO): Under the DBFO option, THC would enter into a 25-year Project Agreement with a selected private sector partner, who would then be responsible for raising the funding required to build the plant, and for operating it over a 25-year period. At the end of the agreement, the EfW plant would either be handed over to the Council or decommissioned, at the Council's option. Under the DBFO alternative, the risks associated with financing, constructing, commissioning and operating the plant would ultimately rest with the private sector partner.

8 Financial Analysis of Shortlisted Options (2 of 4)

Results of Financial Analysis of 4 shortlisted options (two capital and two non-capital) over a 25 year period, using DBO and DBFO delivery models for the two Capital options. Non-Capital options are on gate fee basis.

Shortlisted Options modelled in Financial Analysis:

Option 2: 88kta capacity WtE plant processing 71,660 t LACW & 3rd party waste;

Option 3: 128kta WtE plant processing 88,240 t LACW & 3rd party waste;

Option 4: haul 71,660 t LACW by road to 3rd party WtE plant in central Scotland;

Option 5: haul 71,660 t LACW by rail to 3rd party WtE plant in central Scotland.

The capital options (Options 2 & 3) were modelled using both DBO and DBFO delivery models. Under DBO the capital finance is provided by THC based on assumed borrowing from the PWLB (@3.3% over 25 years); under DBFO it would be privately financed by the Contractor and repaid via service gate fee over a 25 year contract term.

All costs include an uplift for project risk; the DBO Capital options (2, 3) also include an optimism bias uplift in accordance with HM Treasury guidance for public sector projects.

No.	Summary Description	Direct Council Finance	Private Finance
2	EfW – 88,000 tpa capacity	2 - DBO	2 - DBFO
3	EfW – 128,000 tpa capacity	3 - DBO	3 -DBFO
4	Road Haulage to Central Scotland	4 – Gate Fee	
5	Rail Haulage to Central Scotland	5 – Gate Fee	

Outcome from Financial Analysis:

The forecast year 1 (2027) costs shown below indicate a costs increase for all options, compared with THC's 2019 service costs for the management of 80,703 tonnes of residual LACW (reported as £11.74 million or c.£145/tonne LACW). The results indicate the potential cost benefits from (a) a larger scale WtE plant (subject to funding and 3rd party feedstock security) and (b) a rail-haulage based service contract option (where available).

NOTE: the Financial Analysis uplifts the unit costs from the technical costs analysis due to the addition of project funding, risk and delivery costs. This unit cost uplift for the WtE options (Options 2 and 3) includes a financing cost of £10-£11 / tonne since these involve initial capital outlay, which Options 4 and 5 don't require.

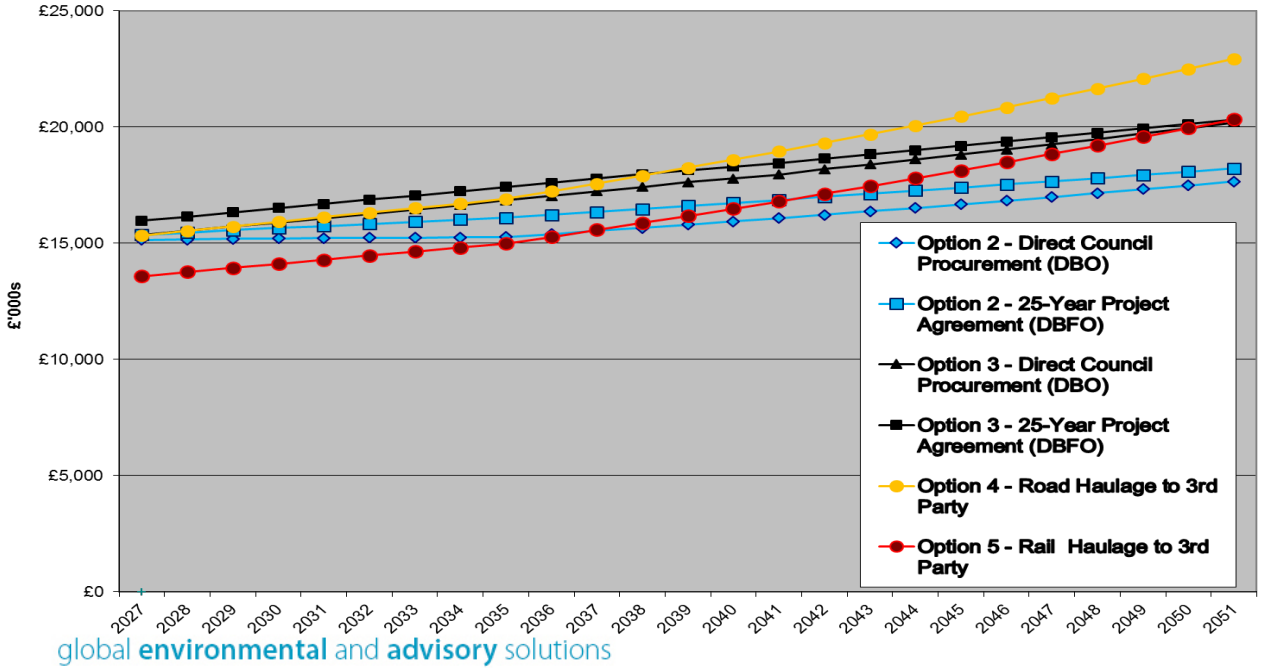
Financial Analyses Costs (2027) – total £million (£/t) in 2019 prices

Option	DBO / Service	DBFO
2	12.9 (180/t) [DBO]	13.1 (183/t)
3	13.1 (148/t) [DBO]	13.6 (154/t)
4	13.1 (183/t) [Service]	n/a
5	11.6 (162/t) [Service]	n/a

8 Financial Analysis of Shortlisted Options (3 of 4)

Results of Financial Analysis of 4 shortlisted options (two capital and two non-capital) over a 25 year period from an assumed commencement date of 2027, using DBO and DBFO delivery models for the two Capital options. Non-Capital options are on a gate fee basis.

The projected annual cost of each option over the 25 year period 2027-2051 is shown below (2027 costs):



Notes on 25 year Options Costs Projections Graph:

The results over an assumed 25 year term indicate that, of the two capital options, Option 2 (88 ktpa) is significantly lower cost, in absolute terms, than Option 3 (128 ktpa) because it is smaller in scale. However, Option 3 is cheaper in cost per tonne terms provided its capacity can be fully utilised, i.e. securing sufficient waste from non-Council sources (e.g. commercial waste and/or Western Isles residual waste).

The graphs also illustrate the potential benefit from the capital solutions over the non-capital solutions over a 25 year term. This is due to the expected increase in the costs of treatment by an external contractor more or less in line with inflation, whereas the costs of running a Council-owned WtE plant, once commissioned, would be expected to increase less than inflation, since the capex would be a sunk (fixed) cost so only the O&M cost would rise with inflation.

NOTE: It is similar to the choice between buying and renting a house – renting is cheaper than buying in the short term but over a longer period buying becomes better since rents will tend to rise with inflation over time, while the capital cost of buying is fixed at the point of sale, so only maintenance costs increase.

8 Financial Analysis of Shortlisted Options (4 of 4)

Results of Financial Analysis of 4 shortlisted options (two capital and two non-capital) over a 25 year period, using DBO and DBFO delivery models for the two Capital options. Non-Capital options are on gate fee basis.

Key Findings from Financial Analysis:

- While initially the service contract option offers a lower cost than the capital options, by around mid-term these options become more costly than the capital options (due to the effects of assumed service price indexation) even where the cost benefits to the service option of rail haulage are fully realised;
- The DBO route for the capital options is lower cost than the DBFO route; however the cost differential between the DBO and DBFO routes is marginal, with the uplift in DBO costs from Optimism Bias being effectively balanced by the financing costs included in the DBFO options.
- Despite the higher total annual costs of Option 3, the unit costs illustrate the commercial benefits from the larger scale plant and the lower unit costs that would fall to THC (*NOTE: provided that the plant operates at full capacity and with 3rd party waste taking up any free capacity*).

Summary:

In summary it is apparent that the future WtE-based residual waste management service (post-2025) will be more expensive (in real terms) than the current landfill-based one. The options for minimising any future increase in service costs should focus on:

a) procurement of a competitive service contract in the short-medium term (at least to 2027) with 3rd party merchant provider(s); and

b) potential development of a Highland WtE project by around 2027 that in addition to generation of power export sales also benefits from 3rd party gate fee revenues from the outset, with the addition of heat export sales revenue in the longer term.

9 Carbon Cost Assessment of Shortlisted Options (1 of 2)

This section assesses and compares the carbon impacts of the shortlisted capital and non-capital solutions and outlines the main assumptions, results and interpretation of a carbon assessment of the shortlisted options based on established Life Cycle Assessment (LCA) principles

Options modelled and objectives:

The **options** shortlisted are as follows:

- Medium scale (88 ktpa) Energy Recovery Facility (ERF) – in both 'Electricity only' and 'CHP' modes;
- Large scale (128 ktpa) ERF – in both 'Electricity only' and 'CHP' modes;
- Transfer and bulk haul of residual waste to a third party ERF in central Scotland by road; and
- Transfer and bulk haul of residual waste to a third party ERF in central Scotland by rail.

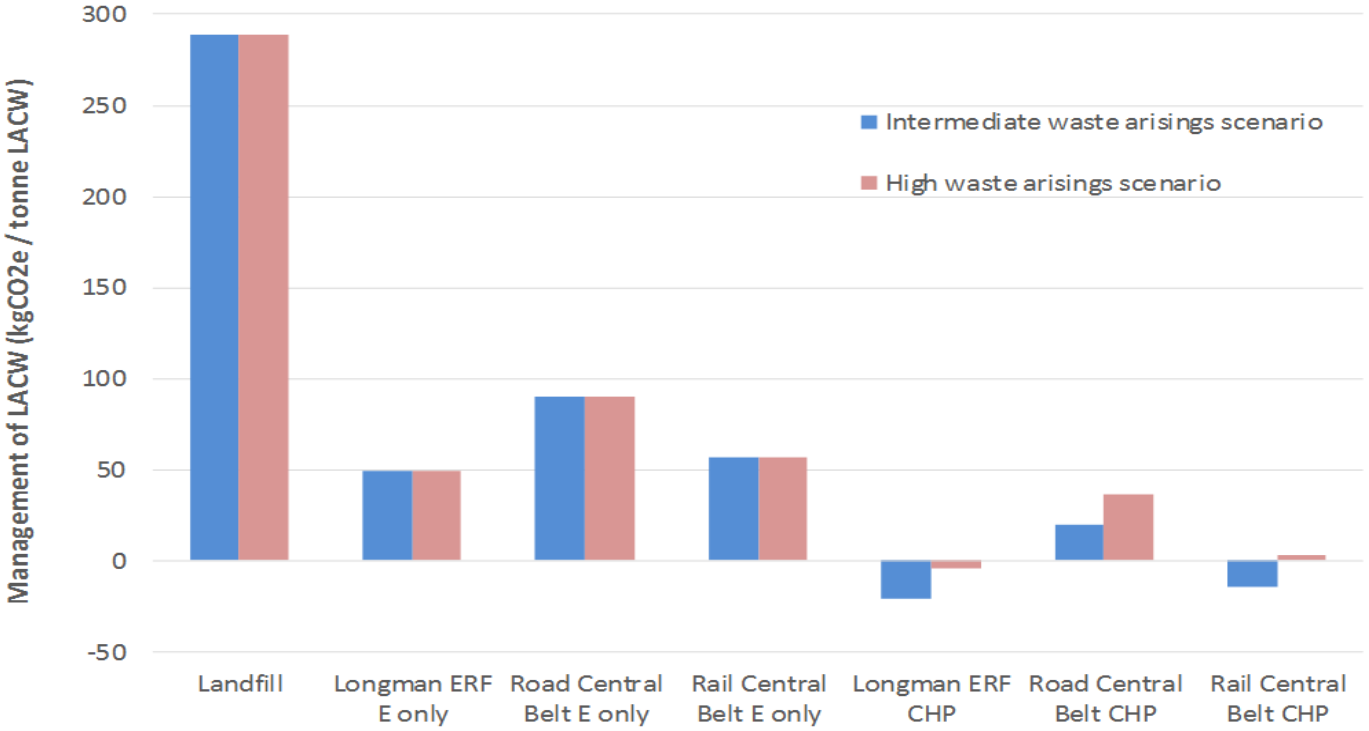
The **objective** of the carbon assessment is to assess the environmental impact of the management of residual LACW projected to be generated by THC in the assessment year 2027 (the year in which an ERF, if developed by THC, is assumed to commence operations).

The key findings from this Carbon Assessment are:

The results indicate that the options which include pre-treatment and energy recovery provide a substantial net carbon benefit when compared to the baseline of continued disposal to landfill. With regard to energy recovery, options utilising CHP facilities perform better than those operating in 'electricity only' mode. Where like for like facility performances are assumed, a solution which is proximate to the point of waste generation will outperform one which requires longer haulage distances. Lastly, if the haulage of waste over long distances is unavoidable, transport by rail is better than transport by road.

9 Carbon Cost Assessment of Shortlisted Options (2 of 2)

The Carbon Impact of Management of Residual LACW per tonne of LACW Managed



10 Study Findings

The key findings from the technical / financial analysis of the capital / non-capital options are summarised below:

1. THC's 2019 budget for the management of 80,703 tonnes of residual LACW management is reported as £11.74 million; this equates to c.£145/tonne LACW (in 2019 costs).
2. Currently, this material is managed through a combination of landfill disposal at THC's own landfills and reliance on 3rd party solutions; the main 3rd party contract is the haulage and disposal contract with SUEZ for Inner Moray Firth residual waste arisings, with delivery to their Inverness WTS. All of these arrangements are scheduled to terminate imminently as THC seeks to close its landfills and retender its current contract with SUEZ.
3. SLR's modelling and analysis of a future WtE facility assumes operational commencement in 2027; this is considered to be the likely earliest start date for a new Highland WtE plant located on the designated development site at Longman, taking account of the need to complete site-specific studies, EIA/Planning application, project funding arrangements and contract procurement, prior to implementation of the plant delivery via the design, construction and commissioning works phase.
4. Based on SLR's THC waste projections analysis, it is considered that the most likely future trajectory for Highland's LACW tonnage will be closer to the 'intermediate' and 'high residual' scenarios than the 'low residual' case, since at this stage THC is not currently planning any material changes to, or investments in its existing waste service that would significantly increase the current recycling rate of 44%; these two scenarios forecast LACW tonnage in 2027 of 71,662 tonnes and 88,240 tonnes for the 'intermediate' and 'high residual' scenarios respectively, with the forecast recycling rates in 2027 limited to 49-54% and little increase thereafter.
5. Based on this WtE plant scale and MSW-based feedstock, the preferred technology option is conventional moving grate with steam turbine; however other technologies are available which may become better established in the WtE sector over time. Therefore at the point of future WtE contract procurement, while moving grate and steam turbine will likely remain THC's preferred choice, consideration should be given to receipt of alternative technology offers within the procurement process, where these demonstrate clear commercial value and are technically proven and robust.
6. The preliminary technical and costs modelling of WtE Capital solutions was based on WtE plants at capacities 72kta, 88kta and 128kta. However economies of scale impacts, combined with the significant benefits of gate-fee revenue streams from 3rd party plant users, indicate that the small-scale 72kta plant has a significantly higher unit cost (£189/t) than the other plant sizes, due to its smaller scale and lack of headroom capacity to process 3rd party waste. It was also considered to be too small to accommodate future projected THC LACW quantities.
7. The outcome from the technical modelling and associated preliminary costs analysis indicates that both the larger scale capital options and also the non-capital options are potentially viable as a future solution for the management of THC's LACW stream; this outcome also illustrates the potential benefits from (a) the larger scale WtE options (subject to capital availability and 3rd party feedstock security) and (b) using rail rather than road (where possible) for longer distance waste haulage for the non-capital options.
8. The Financial Analysis of the shortlisted options (88kta & 128kta WtE plants and haulage by road or rail to merchant facilities in central Scotland) also indicates that both capital and non-capital solutions could be considered as future solutions and that although the non-capital solution offers a lower cost solution at the outset, taken as a whole over a 25 year period, the capital solutions may offer alower overall cost. The Financial Analysis also confirmed that the larger scale plant and use of rail haulage (where possible) offered lower cost options to THC.
9. The outcome from the carbon analysis of the shortlisted capital and non-capital options confirmed that both options represent a substantial improvement on the carbon cost from THC's current landfill-based waste management arrangements. The analysis also indicated that in general, the capital solutions provided a reduced carbon impact compared with the non-capital solutions (assuming a CHP plant rather than just a 'power only' plant); however the use of rail haulage rather than road, provides a significant benefit to the non-capital solutions, with the carbon cost of a 'power only' WtE solution and rail-based non-capital solution broadly equivalent.
10. A draft Heat Plan for the Highland WtE Plant will be required to support future planning and permit applications; this must confirm that the proposed WtE plant design meets SEPA's plant efficiency requirements and is heat-enabled, with a locally accessible heat end-user market that can potentially be supplied in future. While the physical separation of the WtE site from existing commercial heat users by the A9 corridor and the likely lengthy development period required for the adjacent Inverness City Region Deal site may present challenges for the establishment of a future Longman district heat distribution network, there is no reason to think that these issues would prevent delivery o a suitable draft Heat Plan to support the WtE plant planning or permitting process.