2011 Briefing Report:

Residual Waste in the UK

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TOLVIK CONSULTING

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EXECUTIVE SUMMARY

- This Briefing Report provides a high level overview of the balance in the UK over the next 20 years between the projected availability of Residual Local Authority Collected Waste (LACW) and C&I Waste and the potential capacity at Residual Waste Treatment Facilities (RWTFs).
- The current economic climate and, following the 2011 Government Review of Waste Policy in England, the absence of targets beyond 50% in 2020, are likely in the short term to result in a slowdown in the expansion of LACW recycling in England. In the longer term, the pressure across the UK as a whole for increased recycling combined with projections of only modest growth in arisings are such that Residual LACW tonnages are estimated in the Central Case to fall from **20.0Mtpa** in 2009/10 to **17.9Mtpa** by 2015/16 and to **14.0Mtpa** by 2030.
- Based on current procurement arrangements it is estimated that **19%** of Residual LACW is still 'potentially available' in the market (i.e. not covered by long term contracts or subject to a procurement process which is already under way). Of this Scotland, at 49%, has the highest percentage of 'potentially available' LACW.
- The projected downward trend for Residual C&I Waste is more marked. In 2010/11 **Residual C&I Waste** tonnages are estimated to have fallen 7.7% (9.3% in waste to landfill) when compared to 12 months previously; modest in comparison with the 2009/10 figure of 28.5Mt, but demonstrating that the recession, increased resource efficiency and landfill tax are continuing to have an effect. Tonnages are predicted to fall from **12.4Mtpa** in 2009/10 to **10.0Mtpa** in 2015/16; thereafter in the Central Case they are projected, based on current plans for landfill tax, to fall only slightly.
- In the Central Case Total Residual Waste tonnages are therefore projected to fall 28% from **32.4Mtpa** in 2009/10 to **23.2Mtpa** by 2030.
- At present it is estimated there is about 7.2Mt of capacity at RWTFs, with a further 2.2Mt under construction. In the last 12 months, **0.6Mt** of additional RWTF capacity has come into operation and records show an additional **1.9Mt** RWTF capacity consented in England and Wales – suggesting that, in general terms, achieving planning **is perhaps not always an obstacle to RWTF development**. The **real bottleneck in the development of RWTF** capacity (only 0.6Mt) appears to come in moving from consented facility to commencing meaningful construction.
- The report identifies a total of **29.8Mt** of operational and currently planned capacity. If all were to be built there would be significant over-capacity. This is highly unlikely. In practice it is 'merchant' facilities – those relying on Residual C&I Waste tonnages, which are at greatest risk of not being developed. If all **14.4Mt** of RWTFs associated with Local Authority waste supply contracts were developed and circa 33% of merchant plants built **(5.2Mt**), then over-capacity in the Central Case would be avoided.
- However, this analysis excludes 'dirty MRF' capacity in the UK designed for the **production of RDF** either for future treatment in the UK or export. It is estimated that this could deliver up to **3.7Mt** of capacity.
- Excluding the RDF market, headline figures suggest, including existing facilities, a total **need for circa 9.0Mt of merchant RWTF capacity** in the Central Case. However, this could halve if the Downside Scenario were to materialise. For merchant RWTF projects (which will often need to 'tuck-in' around LACW backed facilities) the challenge will therefore be to aggregate sufficient Residual C&I Waste with sufficient certainty within a reasonable catchment area so as to both be able to make an offering competitive with spare capacity at LACW backed facilities and one which is attractive to investors.

- Future gate fees for RWTFs will very much be dependent upon the balance between RWTF capacity and Total Residual Waste tonnages, power prices, potential for landfill bans and RDF export economics. With there being little prospect of a comprehensive landfill ban in the UK, landfill will continue as the disposal point of last resort and so set a price ceiling. Whilst in the short term export markets may continue to put pressure on gate fees, in the longer term in a "balanced market", gate fees of **£75/t-£90/t** are projected. However were the market to eventually move to over-capacity (either locally or nationally), and assuming current power prices, these figures could drop in the spot market to as low as **£30/t- £50/t**.

1. INTRODUCTION

1.1. Background

This Briefing Report updates the previous *'2010 Briefing Report: Residual Waste in England and Wales'* issued by Tolvik in July 2010 and has been expanded to include Scotland and Northern Ireland alongside England and Wales.

The Residual Waste market in the UK is evolving rapidly. Over the last year real and clear policy differences have emerged between England and the devolved administrations in their approaches to Local Authority Collected Waste (LACW) – previously municipal waste (see Section 2.1) – with England showing a 'light touch' whilst Scotland and Wales in particular pushing ahead with ambitious plans.

For Commercial and Industrial (C&I) Waste the findings within the '*DEFRA Survey of Commercial and Industrial Waste Arisings 2010'* (DEFRA C&I Report) generally supported Tolvik's own analysis of the market. When combined with the methodologies used to support over 15 different waste studies conducted by Tolvik in the last year, the robustness of the baseline C&I Waste data in this Briefing Report, whilst still not to the level of LACW, is much improved. With the waste market moving from a regional to an international market, Tolvik supports further planned improvements in the availability of waste data as well-informed decisions generally benefit the market as a whole.

From a financial perspective, the further £8 per tonne of landfill tax and low gate fees at European incinerators, means that the export of RDF is currently looking to be a much more attractive option for operators than previously. This is a relatively new development and is analysed in much greater detail in Tolvik's recently released Briefing Report on UK RDF Exports which is available to purchase at *http://www.tolvik.com/markets-and-data/tolvik-reports.php*

This *'2011 Briefing Report: Residual Waste in the UK'* provides a high level overview of the policy drivers, and the balance in the UK between the projected availability of Residual LACW and C&I Waste as a feedstock and the potential capacity at Residual Waste Treatment Facilities (RWTFs). This it does by reference to Tolvik's comprehensive in-house database which details over 165 operational and planned RWTFs.

The final section of the Briefing Report considers the wider implications of the findings on the Residual Waste market, including gate fees, landfill demand and the relative position of individual waste companies/developers.

Where applicable, comparisons have been drawn between the data presented in this report and the findings for England and Wales in 2010.

The picture painted in this report is necessarily a high level overview of the market with all Residual Waste Treatment Facility and Waste Disposal Authority procurement activities taken as at 1 June 2011 and is no substitute for a project specific analysis, within a defined catchment area, of the local market factors influencing the availability of feedstocks and the associated commercial risks.

1.2. Scope

The scope of this report is focussed upon an assessment of the potential availability of and treatment capacity for Residual Waste in the UK. In this context Residual Waste is defined as the tonnages of non-hazardous, active, combustible LACW and C&I Waste that remain after re-use, recycling and composting activities have taken place.

For the avoidance of doubt, the report excludes in the analysis of the market for Refuse Derived Fuel (RDF) or Solid Recovered Fuel (SRF) unless these facilities are reported in the public domain as intending to accept 'unprocessed' Residual Waste, in which case the capacity for this Residual Waste only has been included. This exclusion is to prevent 'double counting' of capacity at MBT plants and RDF/SRF facilities.

1.3. Approach

Section 2 briefly assesses the drivers behind recent changes in the Residual Waste market, identifying some of the macro political, economic and behavioural factors that have had the greatest influence on Residual Waste tonnages in recent years.

Section 3 looks at the changing landscape of the LACW market and projects Residual LACW tonnages through to 2030/31 under three scenarios.

Section 4 provides an overview of the effects of recent increases in landfill tax and the recession on Residual C&I Waste tonnages and projects future levels of Residual C&I Waste tonnages through to 2030/31 under three scenarios.

Section 5 brings together the tonnage projections for both Residual LACW and Residual C&I Waste to identify the projected total tonnage of Residual Waste across the UK, providing the basis for the capacity versus waste supply balances in Section 6.

Section 6 analyses, using Tolvik's in-house RWTF database, the currently known operational and planned RWTF processing capacity across the UK and provides an assessment of the capacity versus demand balance at both the national and regional level.

Section 7 considers the wider implications of the findings on the Residual Waste market.

2. THE POLICY CONTEXT

2.1. Change in Definition of Municipal Solid Waste

Until recently the term 'Municipal Waste' in the UK referred to all waste collected by Local Authorities. This was at odds with the European definition used in the Landfill Directive in which municipal waste was defined as "waste from households, as well as other waste which, because of its nature or composition, is similar to waste from household(s)". This wider definition includes a significant proportion of waste generated by businesses and not collected by Local Authorities.

In summer 2010 the UK was brought into line with the rest of the EU and two new definitions emerged:

Local Authority Collected Municipal Waste (LACMW) – which refers to the 'municipal' element of the waste collected by local authorities and is the definition that will be used, until 2013, to monitor LATS (and its equivalent) performance.

Local Authority Collected Waste (LACW) – represents all waste collected by local authorities and is a broader definition in that it includes both LACMW and the non municipal fractions such as construction and demolition waste. Since early 2011, statistical outputs from WasteDataFlow reporting database have been branded as Local Authority Collected Waste (LACW).

In this report the term LACW is used to describe all waste collected by Local Authorities in England, Scotland, Wales and Northern Ireland.

2.2. EU Landfill Directive and Landfill Allowances

Until recently, the **EU Landfill Directive** was a key force behind Local Authorities developing waste minimisation schemes, improving recycling and supporting the investment in the infrastructure needed to reduce Residual LACW tonnages to landfill.

By 2009/10, the result of these efforts (and helped by the recession) the tonnages of biodegradable municipal waste sent to landfill were 25% below the Landfill Directive target in England, 26% below in Wales, 12% below in Scotland and 18% below in Northern Ireland.

As a result the UK is now generally regarded as being on course to meet its 2013 Landfill Directive targets and the Government seems comfortable that the widening of the scope of compliance to the EU definition of municipal waste will not change this. As for the 2020 targets, England's Waste Policy Review 2011 states that *"based on reasonable assumptions, and scenario tested for a range of potential risks, England will meet its share of the UK's 2020 target*". Assuming that the waste strategies for the devolved administrations (see Section 2.4) are delivered the UK as a whole is also expected to meet its target.

A natural consequence of the widening of the definition of municipal waste is that the LATS system in England (and its equivalents in the other devolved administrations) will not comprehensively measure the tonnages of biodegradable municipal waste sent to landfill. Furthermore, the negligible trading value of LATS (a consequence of the expected 2013 compliance) has meant that they are no longer of commercial value and it was therefore no surprise that the 2011 Government Review of Waste Policy in England confirmed the abolition of LATS in 2013.

It is also worth noting that by removing LATS, a barrier to improved collection of waste from SMEs has also been removed. This is discussed further in Section 3.5.

2.3. Landfill Tax

Despite tonnages of waste landfilled in the UK under the standard rate of Landfill Tax (now £56/t) falling from 27.2Mt in 2009 calendar year to 25.8Mt in 2010 calendar year, HMRC has reported Landfill Tax revenue received in 2010 calendar year of around £1 billion, up from £833 million in 2009. Thus current falls in waste landfilled are being offset by landfill tax increases.

However, once Landfill Tax reaches the current maximum of £80/t in 2015/16 and with further improvements in recycling and more RWTF facilities coming on stream, Landfill Tax revenues are expected to fall materially. In the current economic climate, the development of a policy tool alongside Landfill Tax may be very appealing to the Treasury. Indeed, *'The Economics of Waste and Waste Policy'* document published alongside the England Waste Policy Review starts to set out the justification, saying "*A single pricing instrument, such as the landfill tax, can achieve the optimal mix of waste management in a 'two treatment world', say landfill and recycling. Once we go beyond this world – to include energy recovery, recycling, re-use and waste prevention –* ***additional instruments are required*** *to ensure a cost effective waste management system*."

2.4. Waste Strategies

The waste strategies for England and the devolved administrations have been developed in particular to address the requirements of the revised EU Waste Framework Directive (rWFD). However, there are significant differences in approach.

In England, the *"Government Review of Waste Policy in England 2011"* published in June 2011 and sets the policy context for England. At a macro level, the Government's policy aim is to work towards a "*zero waste economy*", with the focus being on reducing Residual Waste tonnages to landfill.

The target for household waste recycling & composting for England remain the same as those set by the rWFD and the previous 2007 Waste Strategy of 50% by 2020.

In addition, in March 2011 the waste National Indicators 191, 192 and 193 were removed "*freeing Local Authorities to focus on local priorities"* but also leaving some ambiguity as to how England's household recycling performance will be monitored - although the Review did make reference to revisions to the WasteDataFlow reporting database.

For commercial waste, the Government appears to be taking a 'light touch' with respect to the requirements of the rWFD stating during the consultation process *"all waste management companies which collect commercial and industrial waste must be able to provide a separate collection service for paper, glass, metals and plastics by 2015, if requested, but the pricing of that service will be entirely their own decision.*"

In Scotland, the Government launched Scotland's first "*Zero Waste Plan"(ZWP)* in June 2010. The Zero Waste Plan sets out the Scottish Government's vision for a zero waste society. It describes a situation where '***all*** *waste is seen as a resource; waste is minimised; valuable resources are not disposed of in landfills, and most waste is sorted, leaving only limited amounts to be treated'*.

The Zero Waste Plan sets the non-statutory target of 70% of **all waste** to be recycling & composted by 2025, with a maximum of 5% sent to landfill as well as setting restrictions on the nature and volume of waste which can be sent to EfW. It also introduces for the first time a Carbon Metric Reporting System for recycling performance and over the next few years, it is likely that carbon metrics will become more widespread across the UK waste industry.

In Wales, "*Towards Zero Waste"* is the overriding waste strategy document. It too was launched in June 2010 and sets a statutory target of 70% recycling rate by 2025 across all sectors including businesses, households and the private sector, with an aim to achieve zero waste by 2050. A thematic approach to waste is being developed.

As with Scotland, Wales also applies restrictions on the amount of waste that can be sent to EfW but the proposed restrictions only apply to Residual LACW. Unlike in Scotland, recycling EfW bottom ash 'counts' towards the recycling targets in Wales.

In **Northern Ireland**, a consultation on new recycling policy has been held and closed in June 2011. It proposed more ambitious targets for the recycling of municipal waste than those set by rWFD. The Department of Environment of Northern Ireland (DoE) intends to set targets at local government level for 60% municipal recycling by 2020. DoE plans to set similar targets for C&I Waste once it has developed more accurate information on local C&I Waste.

2.5. Landfill Bans/Restrictions

In addition to landfill tax and the targets outlined in Section 2.1.2 and 2.1.3, and following the north European model, restrictions on the types of Residual Waste which can be landfilled are now being considered across the UK.

In **England**, the recent Policy Review includes plans to consult on banning waste wood from landfill and whilst it sets out plans to assess whether further bans may be appropriate in the future the sense is that landfill restrictions are not an approach which is particularly favoured by the Government.

In **Wales**, the Waste Measure 2010 which gives Welsh Ministers the power to introduce Wales-only landfill restrictions received Royal Approval on 15 December 2010. The current plans are for bans on wood, metal, glass, plastic and food waste.

In **Scotland**, December 2010 saw the launch of a consultation on the proposal to ban source segregated glass, metals, textiles, plastics and paper, card and food waste from landfill alongside an extended Duty of Care on **all waste producers** other than householders to source segregate key recyclable materials. The current aim is for draft regulations to be issued prior to the summer 2011 parliamentary recess and for the landfill ban and supporting collection and disposal infrastructure to be in place by 2015.

In **Northern Ireland**, The DoE also published a *'Consultation on the Introduction of Restrictions on the Landfilling of Certain Wastes'* in June 2010. The wastes in questions are: paper/card, food, textiles, metals, wood, green (garden), glass, plastics, WEEE, biodegradable wastes and non-segregated wastes. The consultation closed in October 2010 and the DoE's consideration of the responses received is understood to be still ongoing.

It would appear that all four administrations are sensitive to the risks associated with a sudden implementation of landfill bans and such bans that are introduced are less likely to impact on the market in the way seen in Germany in 2005 for example.

It is worth noting that there has been recent discussion at a European level as to the benefits of a comprehensive ban on biodegradable waste to landfill (as in Germany, Netherlands for example) across the EU by 2025.

	Landfill ban plans	LATS/LAS/NILAS	LACW recycling targets
England	Consultation to ban wood to be held. Alongside a review of the case for introducing bans on other materials	To end in 2012/13	Non-statutory target of 50% by 2020
Wales	Wood, metal, glass, plastic and food waste	In force	Statutory target of 70% by 2025 and zero waste by 2050
Scotland	Glass, metals, textiles, plastics, paper, card and food waste	Suspended and unlikely to be reintroduced	Non-statutory target of 70% to be recycled, and maximum 5% sent to landfill by 2025
Northern Ireland	Yet undecided	In force, to continue at least until 2012/2013	rWFD target of 50% by 2020; consultation to increase target to 60% for LACW by 2020.

Table 1: Summary of Key Policies across the UK

3. LOCAL AUTHORITY COLLECTED WASTE (LACW)

3.1. Background

As Figure 1 shows, in the period between 2003/04 and 2006/07, LACW arisings were relatively constant; the exception being 2005/6 where the figures were distorted in large part by Local Authorities disposing of their commercial waste collections in order to help achieve LATS targets. Between 2007/8 and 2008/9, at the peak of the recession, LACW arisings fell by 4.1 % but there are signs that the overall rate of decline is falling slightly. In 2009/10 the fall was 2.9% and the latest statistics, for the first half of 2010/11, shows a like-for-like reduction of 2.8%.

In Tolvik's opinion, these recent declines are unlikely to continue in the long term and will steadily tail off as demographic effects of both higher population and reduced occupancy per household start to take effect.

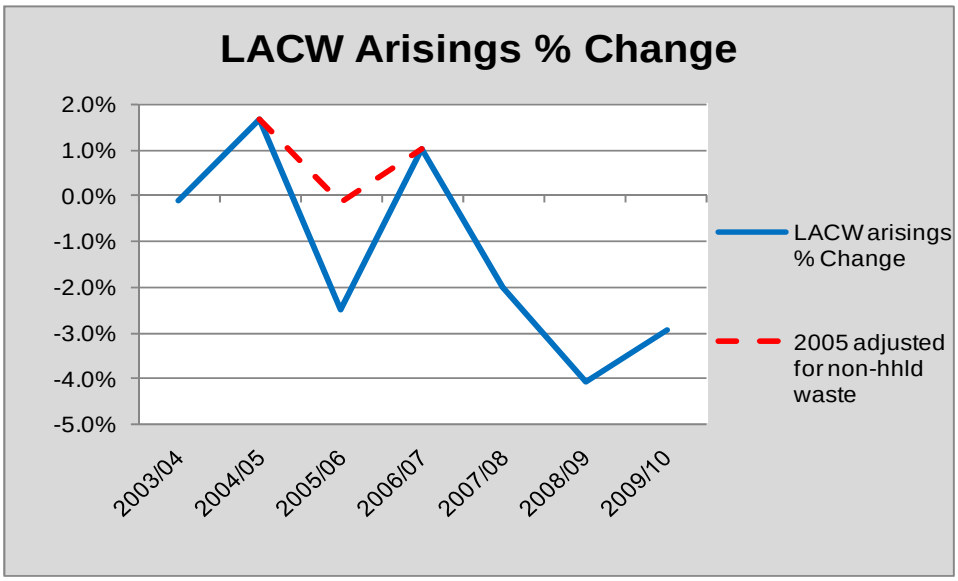

Figure 1: UK LACW Arisings % Change 2003-2009 Source: DEFRA, STATSWALES, SEPA, DOE

In addition to declines in LACW arisings, Residual LACW tonnages have also been affected by a marked improvement in the overall recycling figures for LACW with the rate having risen from a combined 18.1% in 2003/04 to 38.5% in 2009/10. Household waste recycling rates across the UK have similarly increased from 19.0% in 2003/04 to 39.7% in 2009/10 and are continuing to rise, with the latest statistics for the first two quarters of 2010/11 show that England recycled 43.1% of household waste up 1.0% from the same period in 2009/10.

However, it is noted that whilst the improvement in recycling performance is continuing across the UK, sustaining such rapid increases is becoming increasingly more difficult as the 'low hanging fruit' of glass, paper, card and metals have been captured. As Figure 2 shows, the rate of increase has already slowed down since the peak year-on-year increase in recycling of 4.6% in 2004/05 to just 2.0% in 2009/10.

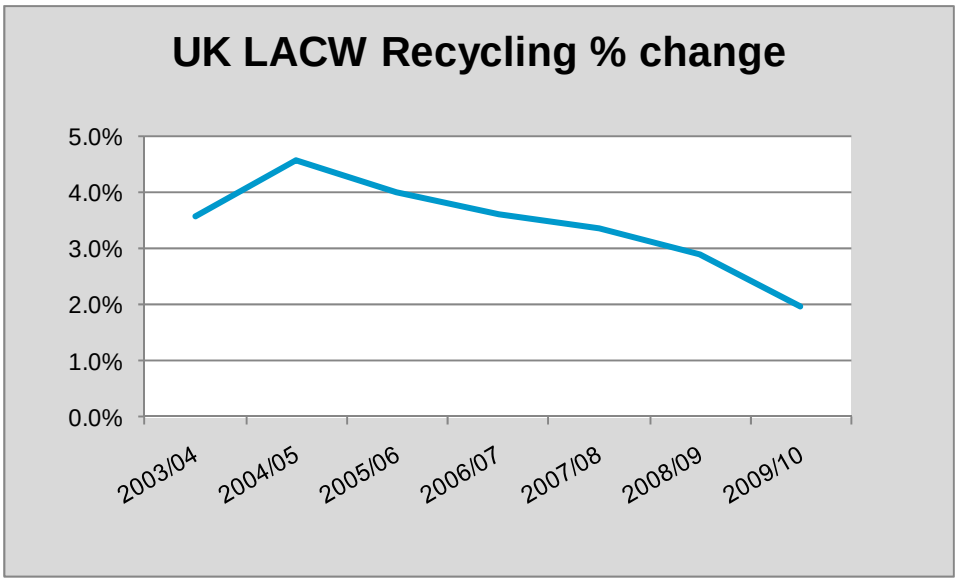

Figure 2: UK LACW Recycling and Composting % Change 2003-2010 Source: DEFRA, STATSWALES, SEPA, DOE

3.2. Projecting Residual LACW Tonnages

Forecasting the level of LACW arisings is the first stage in estimating future tonnages of Residual LACW in the UK.

The level of household waste arisings (which represents 89% of LACW) are influenced by a number of complex factors including population growth, producer responsibility legislation (e.g. the volume of packaging in purchased items), arrangements for the collection of household waste, local demographics and household numbers.

Of these, previous third party research has suggested that the correlation between the number of households and household waste arisings is one of the strongest, and the Office for National Statistics (ONS) projects an average growth in the number of households of just over 1% p.a. through to 2031.

In light of the ONS projections, it is highly unlikely that a continuous ongoing decline in LACW arisings will be sustainable in the longer term. Therefore, from 2012/13 onwards, a household waste arisings growth projection based on 50% of the ONS rate (i.e. circa 0.5%) has been used in this report for the Central Case Scenario and Scenario 1; for Scenario 2 no growth in household waste arisings has been assumed.

These projected growth rates compare with DEFRA's assumption of 0.75% municipal waste growth used in the *'Consultation on Review of Schedule 2 of the Controlled Waste Regulations 1992'* and 0.6% and1.4% growth assumptions used for projecting household waste in DEFRA's recently issued document *'The Economics of Waste and Waste Policy'*. Given that the latter projections were developed in order to assess future compliance with the Landfill Directive it is not unsurprising that they are higher than those proposed in this report given that as such they provide a cushion in measuring performance against targets.

In the period prior to 2012/13, the modelling in this report assumes that the recent declines in arisings will steadily tail off - although this will be dependent on the UK avoiding a 'double dip' recession. It is worth noting that small changes in the assumptions used for the next few years can have a material impact on long term projected tonnages.

Non-household LACW tonnages are influenced by other factors, particularly the appetite of Local Authorities to collect commercial waste. For this report, zero growth has been assumed in non-household tonnages but the effects of changing attitudes to commercial waste collections are discussed in Section 3.5.

The net effect of these assumptions is that by 2030/31 in the Central Case and Scenario 1 LACW arisings across the UK are projected to be circa 35.5Mtpa. In Scenario 2 LACW arisings remain at 32.5Mtpa.

In order to project the future tonnages of Residual LACW, three scenarios have been established based on varying recycling and composting rate assumptions and applied for simplicity to the entire LACW stream.

- **Central Case** – assumes that England and Northern Ireland achieve the 50% rWFD recycling target by 2020/21, with the rate rising steadily thereafter to 60% by 2030 and with the performance of each Local Authority relative to its 2009/10 performance. Similarly for each Local Authority in Scotland future recycling performance is projected to be relative to 2009/10 performance against the 40% ZWP target; the overall effect is a 66.1% recycling rate by 2025 against the 70% ZWP target; with statutory targets Wales is assumed to reach its target of 70% by 2024/25, but with an adjustment for incinerator bottom ash recycling which it is assumed will contribute 7.5% to the overall target;

- **Scenario 1** – assumes the unlikely scenario that there is no further improvement in the 2009/10 recycling and composting rates ('do nothing') for all four administrations; and

- **Scenario 2** – assumes that overall England will exceed rWFD target and achieve an average of Wales' and Scotland's targets by 2020, i.e. 56.9% by 2020 and 66.3% by 2025; Wales and Scotland are assumed to achieve their respective recycling targets and Northern Ireland achieves its proposed consultation target of 60% by 2020.

These assumptions are summarised in Table 2:

	England	Wales	Scotland	Northern Ireland
Central Case	50% by 2020, 60% by 2030	62.5% by 2025	66.1% by 2025	50% by 2020, 60% by 2030
Scenario 1 (do nothing)	No improvement in recycling performance	No improvement in recycling performance	No improvement in recycling performance	No improvement in recycling performance
Scenario 2	56.9% by 2020, 66.3% by 2025	62.5% by 2025	70% by 2025	60% by 2020

Table 2: Recycling rates assumptions

Projecting forward, in the Central Case Residual LACW tonnages are estimated to fall from **20.0Mtpa** in 2009/10 to **17.9Mtpa** by 2015/16. By 2030/31, Residual LACW across the UK is estimated to be circa **14.0Mtpa**.

Scenario 1 and Scenario 2 represent the boundary for Residual LACW scenarios and it is reasonable to assume that future tonnages will fall within these boundaries. One reflects wider political aspirations for the achievement of high recycling and composting rates, whilst the other assumes that, faced with economic pressures there are no further improvements in recycling and composting at both the national and local level.

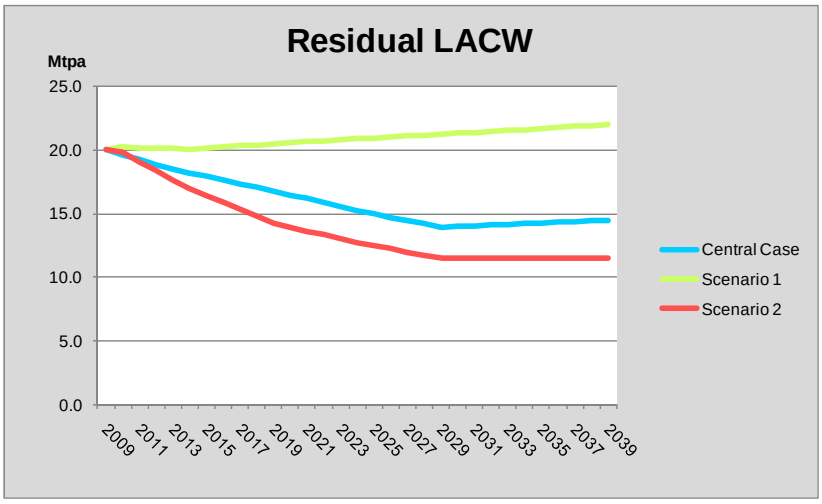

Figure 3: Residual LACW Tonnages in the UK

Given that in general the more accessible elements of the waste stream are currently being captured for recycling and composting, going forward further improvements in recycling and composting rates will only be achieved by more complex, and almost certainly more costly, collection arrangements. The extent to which these can be afforded is, in the current economic climate, open to doubt and to some extent also dependent on the value of the recyclables collected.

3.3. Current Residual LACW Treatment Arrangements

Landfill remains the predominant disposal route for Residual LACW (about 78%) – with most Residual LACW landfilled directly, and only a small proportion of waste landfilled following processing in an MBT/MHT facility or, as is increasingly becoming popular as an interim arrangement, at a 'dirty' MRF.

England sends the lowest share of its Residual LACW waste to landfill – circa 74%, followed by Scotland (circa 90%) and Wales (circa 94%). Northern Ireland landfills almost all of its Residual LACW. The majority of EfW facilities processing LACW in 2009 accepted over 90% Residual LACW and less than 10% Residual C&I Waste. Limited tonnages were sent to MBT/MHT facilities (see Section 6 for more details). It should be noted that the figures in Figure 4 have been adjusted to reflect MBT inputs rather than just the mass loss from MBT inputs as reported in DEFRA statistics.

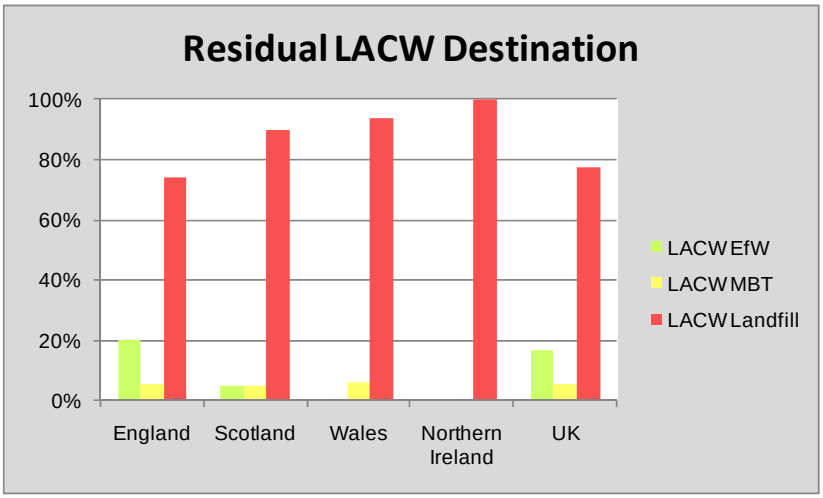

Figure 4: Residual MSW Destination 2009/10

3.4. Current Residual LACW Treatment Procurement Status

Tolvik has reviewed the Residual LACW contractual/procurement status of each of the WDAs in the UK to assess the extent to which potential Residual LACW tonnages are committed to a particular facility/operator.

In this report a WDA's Residual LACW is assumed to be **'potentially available'** where the WDA either has existing arrangements which expire by 2016 (35 WDAs), or where the procurement for a long term contract has closed but where the development of the proposed RWTF facility to support the contract has a low probability of proceeding (10 WDAs). It is estimated that in the Central Case the 'potentially available' Residual LACW is the equivalent of circa **3.1Mt** by 2020.

	Long Term solution in place/preferred bidder	Procurement Commenced	Potentially Available
England	64%	20%	16%
Scotland	16%	35%	49%
Wales	10%	83%	7%
Northern Ireland	0%	81%	19%
Total	55%	26%	19%

Table 3: Residual LACW Treatment Procurement Status

Analysis of potentially available LACW on a regional level for England and for the devolved administrations would suggest that the highest tonnage of Residual LACW not yet committed is in Scotland (49%). In the whole of the UK about 19% of Residual LACW is currently 'potentially available'.

Table 3 reflects DEFRA's decision, as part of the Spending Review process in 2010, to withdraw PFI credits which had provisionally been allocated to seven waste infrastructure projects. Of the seven projects which had PFI credits withdrawn, 3 (North London, South London and Gloucestershire) are proceeding with procurement regardless, 2 (Project Transform and Milton Keynes/Northamptonshire) have been abandoned, one (Cheshire West, Chester, and Cheshire East) is undergoing a judicial review and one (Leicestershire) has yet to make its decision public.

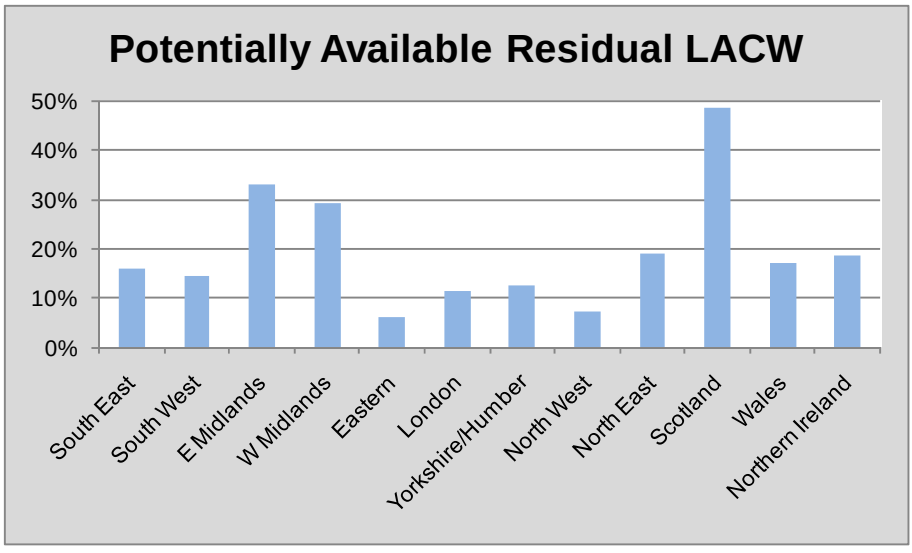

Figure 5: Potentially Available Residual LACW by 2020, share by region/country

3.5. Commercial Waste Collection

As identified in Section 2.2, the introduction of LATS served to dissuade many local authorities (or in many cases their contractor) from collecting commercial waste alongside household waste as there was risk that any potential LATS penalty would more than offset the financial benefits of such collections. In 2009/10 according to WasteDataFlow Residual Commercial Waste was 1.8Mt in the UK – or 9% of the total 20.0Mt.

However, there are a number of factors which suggests that the dynamics are changing and that for many Local Authorities the collection of commercial waste could once again be financially attractive:

- Removal of LATS (see Section 2.2);
- Recent confirmation that the collection of commercial waste by Local Authorities is not subject to VAT (although this is subject to a challenge by Environmental Services Association);
- Potential interest in the use of HWRCs by smaller traders (which, with the removal of the NI indicators, would not be adversely affected by trade use);
- Financial structures on long term waste contracts (particularly where contract waste pricing above GMT has been structured to be attractive).

The 1.8Mt of Residual Commercial Waste means that Local Authorities already in effect 'control' about 12.5% of the Residual C&I Waste market. Were they to become more active in Commercial Waste collection, it could have a material impact on the market.

4. COMMERCIAL AND INDUSTRIAL WASTE (C&I WASTE)

Challenging to assess, let alone project, it is estimated using a number of different data sources that C&I Waste tonnages in the UK accounted for almost two-thirds, circa 59.4Mtpa, of the estimated 91.9Mtpa of LACW and C&I Waste arisings in 2009/10. This figure for C&I Waste focuses on tonnages of 'controlled' wastes and in practice excludes wastes re-used on site or which otherwise do not enter the regulated 'waste supply chain'.

4.1. The DEFRA 2010 Report

The most recently available information, DEFRA C&I Report, was released in December 2010 and relates to 2009. It estimates C&I Waste arisings in England at a national and regional level as well as considering the destination at a national level of these wastes. At the time the report was released, there were criticisms that, given the report looked at the market in the midst of the recession, it was likely to under-estimate C&I Waste tonnages; it should be noted that the findings of the DEFRA report were not inconsistent with Tolvik's previous analysis.

The DEFRA C&I Report suggests that, on average Commercial Waste arisings declined by 2.9% per annum since 2002/3 and that Industrial Waste arisings declined by 5.0% per annum over the same period.

Using its own analysis and based on the DEFRA C&I Report, Tolvik estimates that of the total C&I Waste Arisings across England on average circa **20.6%** is 'suitable' Residual C&I Waste (i.e. meeting the definition of Residual Waste in this report and excluding ashes, sludge etc). In Scotland, 'suitable' C&I Waste is estimated to be slightly higher at 23.3% whilst, in the absence of data to the contrary, this report uses the same rate for Wales and Northern Ireland as that for England.

Applying these percentages to the respective estimates for C&I Arisings, Residual C&I Waste in the UK in 2009/10 is estimated to be circa **12.4Mt**.

4.2. HMRC Landfill Tax Data

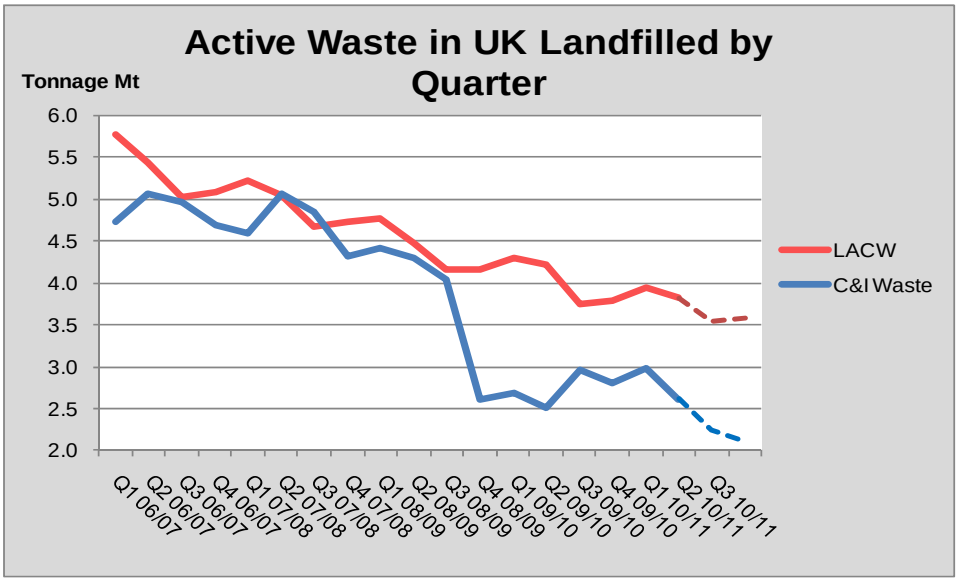

Figure 6: Active Waste Landfilled in the UK Source: HMRC, Tolvik Analysis

By tracking HMRC Landfill Tax data and subtracting Residual LACW tonnages reported quarterly as landfilled, it is possible to monitor the level of active C&I Waste landfilled in the UK. The data is not perfect, as it includes hazardous wastes and other 'unsuitable' Residual wastes. Regional data is not available.

Using this information, overall in the UK there has been a circa 48% fall in Residual C&I Waste to landfill over the period 2006/07 through to 2010/11. Year-on-year analysis shows that the effects of the recession and the £8 per tonne landfill tax escalator have been significant, with annual declines of 18.6% and 28.5% in 2007/08 and 2008/09 respectively; provisional data for 2010/11 suggests a further decline of 9.3% year-on-year. Earlier indications in 2010/11 suggested that tonnages were broadly levelling off as a measure of recovery offset Landfill Tax increases; however the data from the last two quarters has seen a resumption of the downward trend shown in Figure 6.

Based on HMRC data, the total tonnage of active C&I Waste to landfill in 2009/10 was 11.0Mt. Clearly not all Residual C&I Waste is sent to landfill and a limited proportion (estimated to be 1.2Mt in 2009/10) was sent to RWTFs (see Section 6). After adjusting for circa 0.8Mt of hazardous waste sent to landfill, HMRC data would suggest **11.4Mt** of suitable Residual C&I Waste in the UK in 2009/10.

4.3. Landfill Site Returns

A third data source is the individual site returns provided to the EA, SEPA and NIEA. The EA and SEPA have made available in the public domain a comprehensive set of data relating to 2009. An analysis of these returns and data provided by NIEA under the Freedom of Information Act suggests circa 12.4Mt of suitable Residual Waste was landfilled as shown in Table 4:

	Mt
England	10.5
Wales	0.5
Scotland	1.1
Northern Ireland	0.3
UK Total	**12.4**

Table 4: Residual C&I Waste to Landfill, 2009 Source: EA/SEPA/NIEA

Adding the 1.2Mt estimated to have been processed at RWTFs (as per Section 4.2) produces an estimate of **13.6Mt** of suitable Residual Waste.

4.4. Projecting Residual C&I Waste Tonnages

Taking the three different data sources provides a range of 11.4Mt – 13.6Mt with a median of 12.4Mt – i.e. an uncertainty of 10% around the estimated **12.4Mt of 'suitable' Residual C&I Waste**.

In order to project future Residual C&I Waste tonnages, it is necessary to consider both C&I Waste arisings and Residual Waste rates.

Historically, analysis has pointed to a direct link between GDP and C&I Waste arisings. In much of northern Europe, and now in the UK, this direct link has weakened, in large part due to effects of producer responsibility legislation and improved resource efficiency in supply chains. Furthermore with wider high profile voluntary commitments such as the Courtauld Commitment and Halving Waste to Landfill, corporate social responsibility has become not a company specific rather than an industry specific issue. As a result, whilst it is reasonable to assume that GDP growth will stimulate waste

production, the effect on C&I Waste arisings will not be linear and the effect on Residual C&I Waste even less direct.

Tolvik has used its own in house modelling which takes into account the latest GDP forecasts, waste minimisation and the impact of the landfill tax escalator to develop three scenarios; Central Case, Upside and Downside, with variations in forecast arisings and Residual Waste rates assumed for each. In developing the projections it has been assumed that landfill tax rates will only increase in line with inflation post 2014 and that comprehensive landfill bans will not be introduced in England.

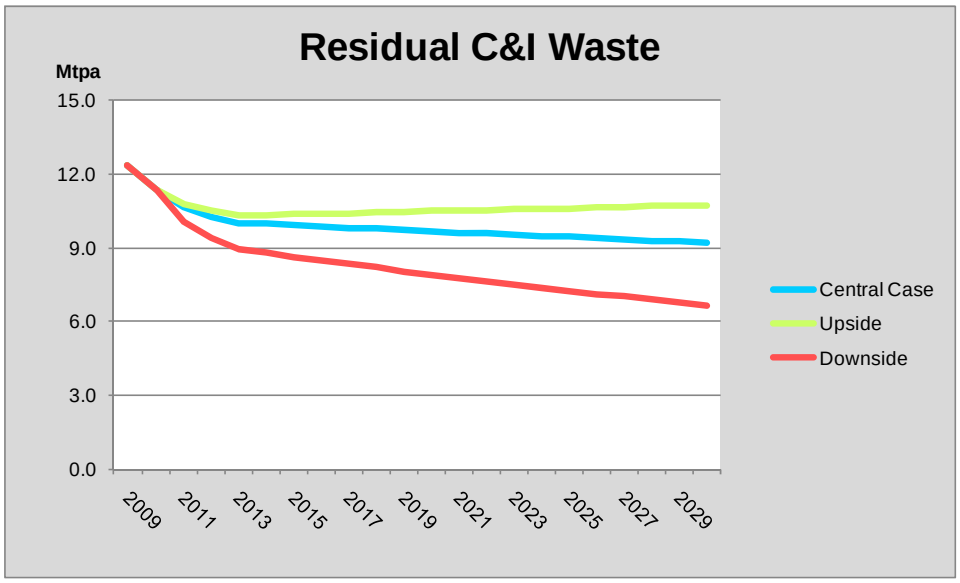

Figure 7: Residual C&I Waste in the UK Source: Tolvik Analysis

The analysis suggests that in the Central Case, Residual C&I Waste tonnages will have fallen to **10.0Mtpa** in 2015/16 and to **9.2Mtpa** by 2030/31.

In the Upside Scenario, tonnages are modelled to fall to **10.4Mtpa** by 2013/14 and then rise steadily thereafter; whilst the Downside Scenario assumes continued pressure to divert C&I Waste and tonnages falling to **6.6Mtpa** by 2030/31.

4.5. Comparison with 2010 projection

In its previous *"2010 Residual Waste in England and Waste Report"*, Tolvik projected Residual C&I Waste in England and Wales to fall by 10% between 2009/10 and 2010/11. Current analysis suggests that C&I Waste tonnage in the whole of the UK will have fallen by 7.7% between 2009/10 and 2010/11 with a 9.3% fall in tonnages to landfill.

The Central Case and Downside projections of Residual C&I Waste in England and Wales in this report are broadly consistent with the projections for these two scenarios in Tolvik's 2010 report. Due to the expected trends arising from the CSR agenda, the Upside Scenario has been revised downwards.

5. TOTAL RESIDUAL WASTE

5.1. Total Residual Waste in the UK

Projections for the Total Residual Waste across the UK have been derived through combining the Residual LACW and Residual C&I Waste projections in Sections 3 and 4:

Central Case = Residual LACW Central Case + Residual C&I Central Case

Upside Scenario = Residual LACW Scenario 1 + Residual C&I Upside Scenario

Downside Scenario = Residual LACW Scenario 2 + Residual C&I Downside Scenario

The resulting Central Case sees Total Residual Waste reducing to 27.8Mt in 2015/16 and to 23.2Mt in 2030/31. The Downside Scenario projects Total Residual Waste tonnages of 25.0Mt in 2015/16 and 18.1Mt in 2030/31.

The methodology behind the Upside Scenario is such as to make it the least likely scenario, and for this reason has been excluded from further analysis.

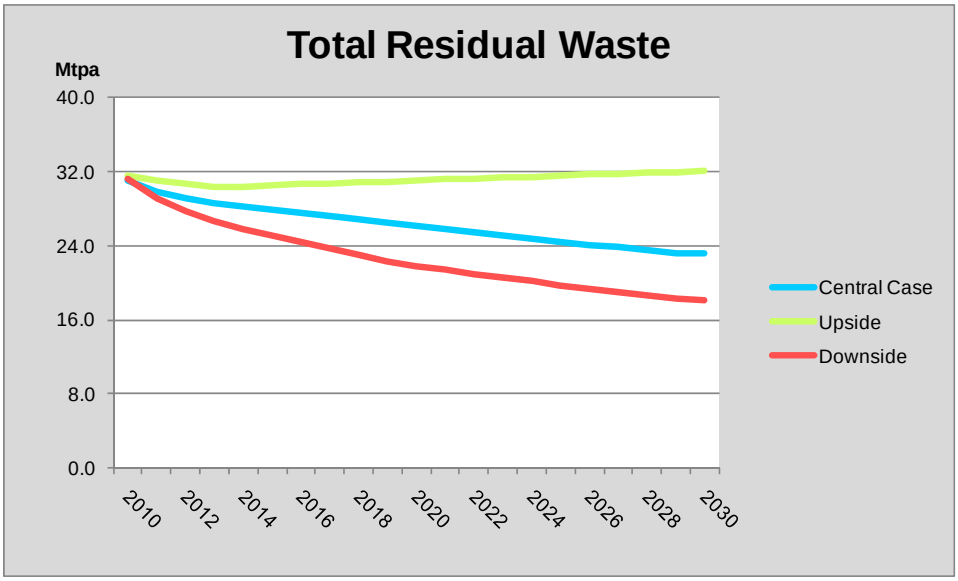

Figure 8: Total Residual Waste Tonnages in the UK

Total Residual Waste Mtpa	2015/16	2020/21	2025/26	2030/31
Central Case	27.8	26.1	24.4	23.2
Upside	30.5	31.0	31.6	32.0
Downside	25.0	21.8	19.7	18.1

Table 5: Total Residual Waste Tonnages in the UK

6. RESIDUAL WASTE TREATMENT CAPACITY (RWTF)

6.1. Context

Broadly RWTFs fall into three categories:

- where the Residual Waste is 'mined' for further recyclables (as in Mechanical Biological Treatment (MBT) plants or Mechanical Heat Treatment (MHT) facilities) and the waste undergoes more than physical treatment but for which are of themselves not 'complete' solutions,
- where the Residual Waste used as a source of 'renewable' energy (e.g. in conventional Energy from Waste (EfW) facilities, gasification/pyrolysis plants or in biofuels production) or, in some cases,
- a combination of the two.

For the avoidance of doubt this report excludes 'Dirty MRFs' and other solely physical treatment facilities from any analysis of RWTFs on the basis that such facilities represent a means by which enhanced diversion of C&I Waste will be achieved rather than a means of ultimately treating Residual Waste itself.

6.2. Current Operational RWTF Capacity

Within the information in Tolvik's database of RWTFs, there is some ambiguity as to the capacity of individual facilities. For some of the older RWTFs, the capacity reported in the public domain is the 'gross' capacity – i.e. assuming that the RWTF is available 100% of the time. For more recent facilities, the capacity is 'net' – i.e. assuming an average availability of 85-95%. Table 6 highlights the potential scale of this difference in approach where 'availability', according to individual permit reports for existing EfWs in 2009, averaged 83.3% (down from 85% in 2008).

This report works on the assumption that all capacities are 'gross' but where the calculated utilisation is over 90%, it is reasonable to assume that there would be insufficient RWTF capacity to treat Residual Waste.

As at June 2011, the total RWTF operational capacity across the UK is estimated to be **7.2Mtpa**, up from 6.6Mt in June 2010, meaning that over the past 12 months circa **0.6Mt** of additional capacity has become operational.

Mtpa	Est. Gross Capacity	Availability	Est. Available Capacity
EfW Capacity as at June 2010	5.0	83%	4.2
New EfW Capacity – last 12 months	-	83%	-
MBT/MHT Capacity as at June 2010	1.6	83%	1.3
New MBT/MHT Capacity- last 12 months	0.6	83%	0.5
Total 2011	**7.2**	**83%**	**6.0**

Table 6: Currently Operational RWTF Capacity UK Source: Tolvik RWTF Database

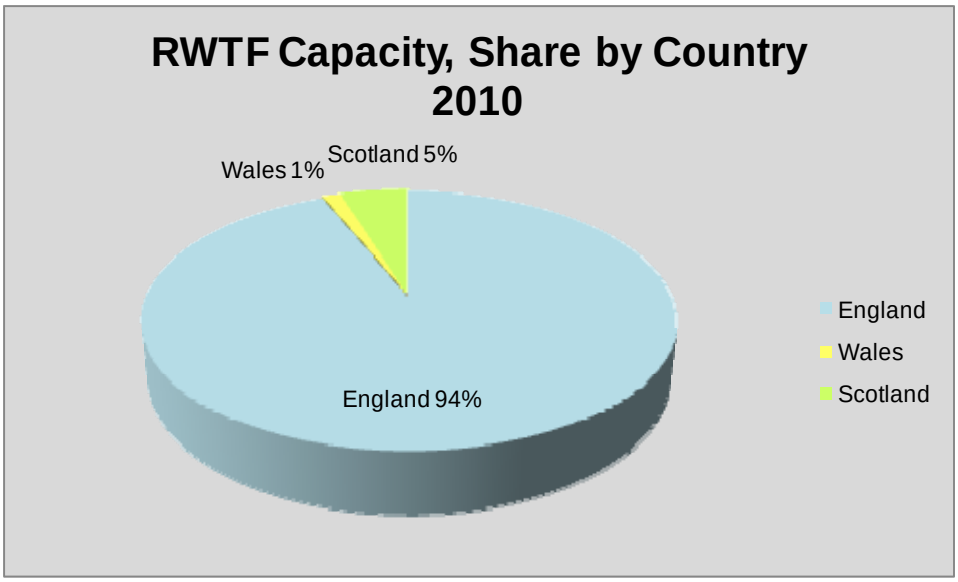

Figure 9: Currently Operational RWTF Capacity by Country: Tolvik RWTF Database

A further **2.2Mtpa** of RWTF capacity has been identified as under construction, making a total of circa **9.5Mtpa** of RWTF capacity currently operational or under construction across the UK as a whole. Of this additional capacity much is due to become operational in the second half of 2011.

6.3. Current Planned Capacity

Analysis of Tolvik's in-house database of currently known planned RWTFs, identified from planning authorities, press releases and other sources, when combined with the existing facilities in Section 6.1 suggests that there are circa 165 RWTFs throughout the UK either operational, under construction or at some point in the planning process (i.e. with planning consent, seeking planning consent – including under appeal, or will required to be developed as part of a local authority procurement).

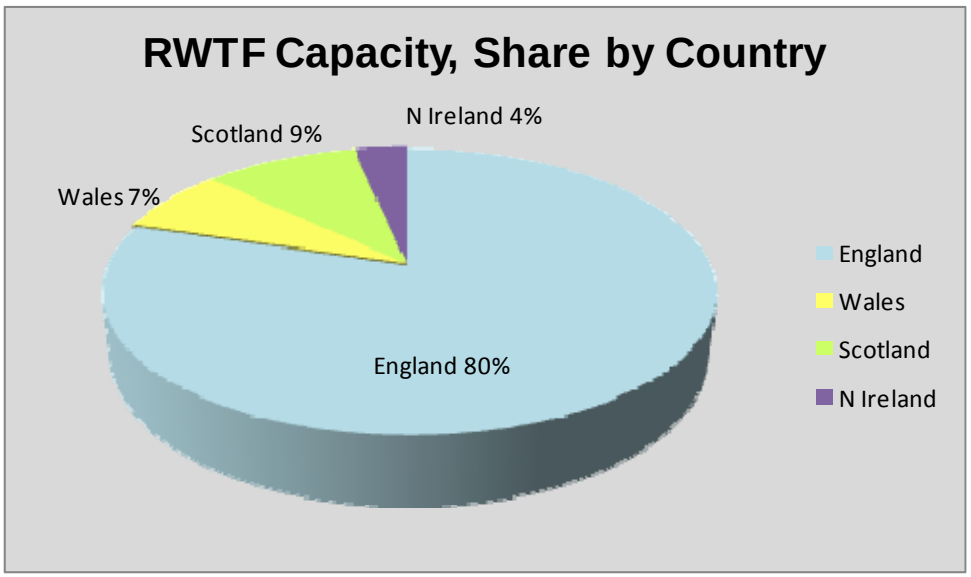

Figure 10: Projected RWTF Capacity by Country Tolvik RWTF Database

It is estimated that the total capacity of these RWTFs is circa 29.8Mt, i.e. a potential 20.4Mtpa of capacity is still to be built. Figure 10 shows the projected split of RWTF capacity by country share assuming all currently planned projects are constructed.

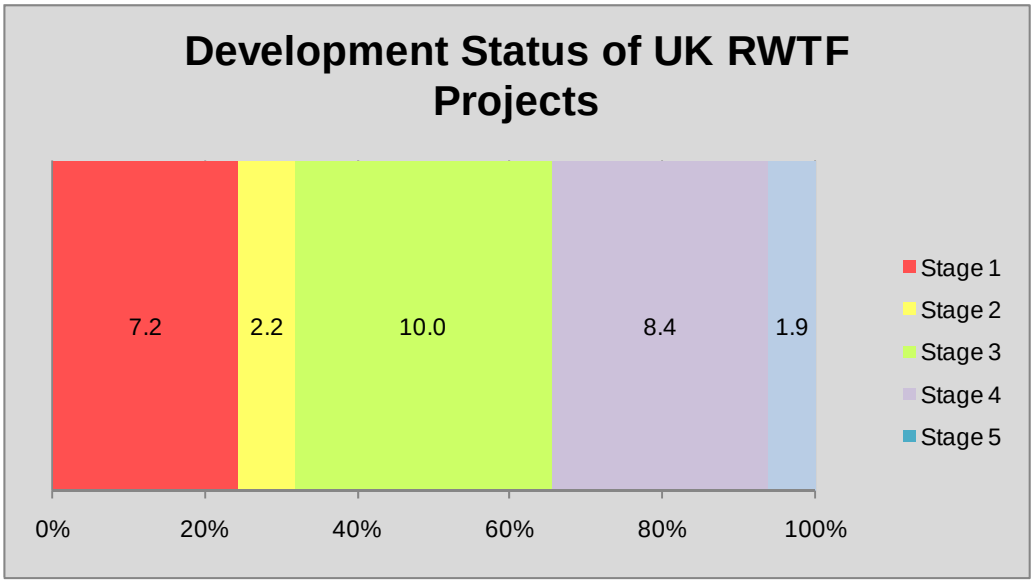

Figure 11: Development Status of RWTF Projects Source: Tolvik RWTF Database

Figure 11 breaks down the development status of these RWTF projects by development stage (with the figures showing capacity in Mt) where:

- **Stage 1:** Currently operational RWTFs;
- **Stage 2:** RWTFs currently under construction;
- **Stage 3:** RWTFs with planning permission;
- **Stage 4:** RWTFs for which a planning application has been submitted; or proposed RWTFs for the processing of MSW, whether by way of PFI or otherwise, for which the procurement process is currently under way;
- **Stage 5:** RWTFs refused consent and within time limits for appeal; other RWTFs for which plans have been announced but for which a planning application has yet to be submitted.

6.4. Comparison with 2010

A direct comparison can be made with Tolvik's 2010 Briefing Report to the extent it covers England and Wales. The 2010 report identified a planned RWTF capacity for England and Wales based on identified RWTFs of 26.4Mt. The equivalent shows the projected capacity to be circa 25.9Mt.

The apparent decline of 0.5Mt (less than 2%) between the two reports could be for a variety of reasons identified through the continuous review and update of Tolvik's internal databases, including:

- the removal of projects that have been publicly abandoned
- the effect of new planning applications
- data robustness as projects develop through the procurement stages the planned capacity cited at OBC stage can change

In terms of changes in development stages vis-a-vis the 2010 report, the most significant year on year change has been in the level of RWTF capacity that has achieved planning consent over the previous 12 months.

Table 7 suggests an increase of **1.9Mt** of RWTF capacity in Development Stage 3 – i.e. secured planning consent. This would suggest that achieving planning is perhaps not in general terms the major obstacle to RWTF development as is often cited.

Moreover, it would suggest that moving from a consented facility to the commencement of construction is the real bottleneck in the development pipeline where in the last 12 months new construction accounted for just 0.6Mt. This would tie up with the reported complexities in raising finances and achieving financial close which, whilst marginally less difficult than last year, still sees funders cautious to invest.

Development Stage England & Wales only Mt Capacity	2010 Report	2011 Report	Difference
Stage 1	6.3	6.9	0.6
Stage 2	2.2	2.2	0.0
Stage 3	**6.3**	**8.2**	**1.9**
Stage 4	9.9	6.7	(3.2)
Stage 5	1.7	1.9	0.2
Total RWTF Capacity	26.4	25.9	(0.5)

Table 7: Development Status of RWTF Projects Source: Tolvik RWTF Database

6.5. Current Planned Capacity – Feedstock

Of the identified RWTF capacity in the UK circa 48% is planned primarily to process LACW (i.e. where over 80% of the treatment capacity is assumed to be for Residual LACW), circa 35% is planned as wholly merchant facilities (i.e. treating Residual C&I Waste), with the remaining 17% expected to treat a combination of merchant waste and LACW (see Figure 12).

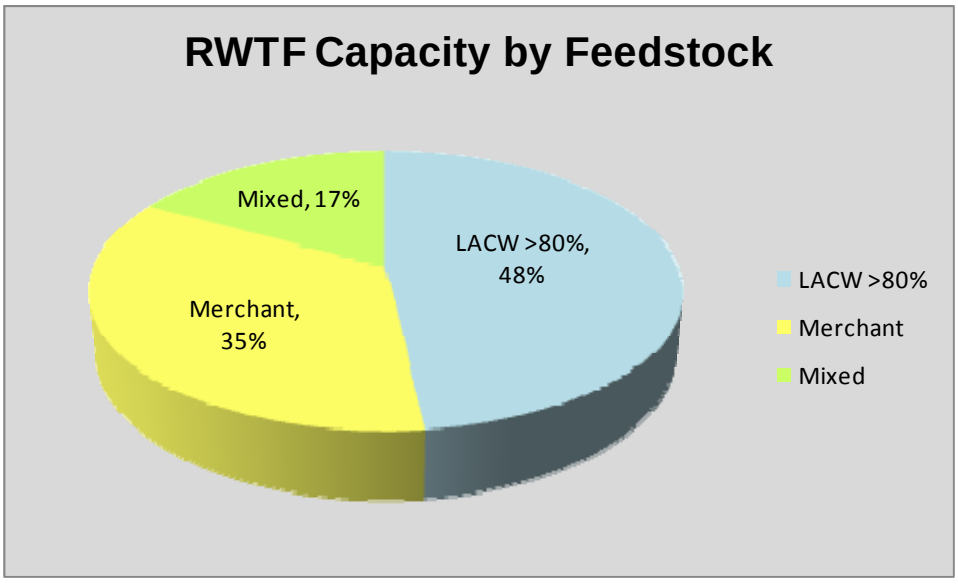

Figure 12: Capacity by Feedstock Type 2015/16 Source: Tolvik RWTF Database

6.6. Current Planned Capacity - Technology

Figure 13 highlights the capacity split between the different technology options for identified operational and planned RWTFs. In the context MBT/EfW are generally those RWTFs being developed in response to Local Authority procurements for which either the technology choice for the shortlisted bidders is not the same, or for which the final solution is a combination of MBT and EfW (eg North Yorkshire PFI).

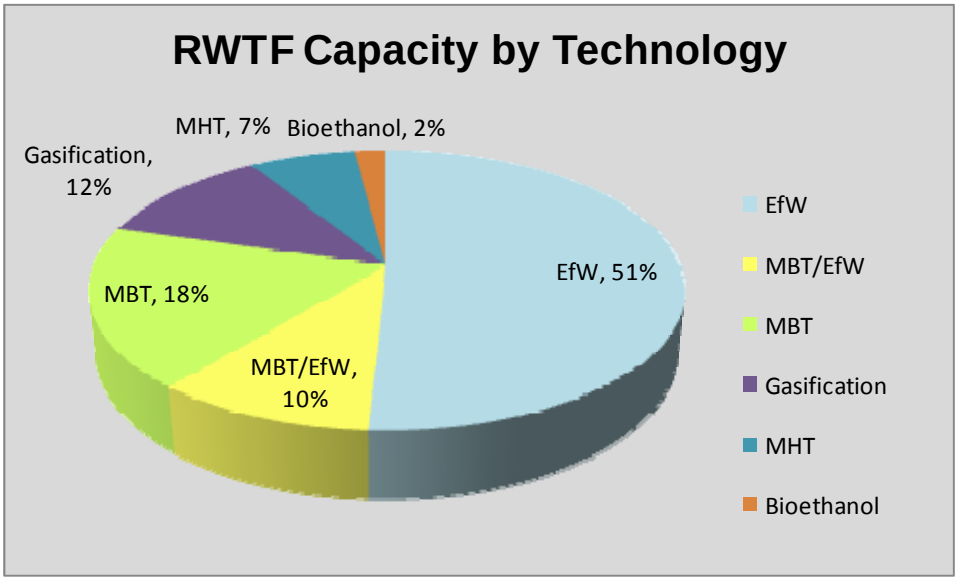

Figure 13: Capacity by Feedstock Type 2015/16 Source: Tolvik RWTF Database

6.7. Development of Planned Capacity

In terms of RWTF capacity development and its timing profile, Tolvik's analysis suggests that by the end of 2011, circa 30% of the total identified RWTF processing capacity will be operational, with the remainder 70% (assuming all currently known planned RWTFs are constructed) coming on stream post 2012. Figure 14 shows the profile of the potential RWTF processing capacity.

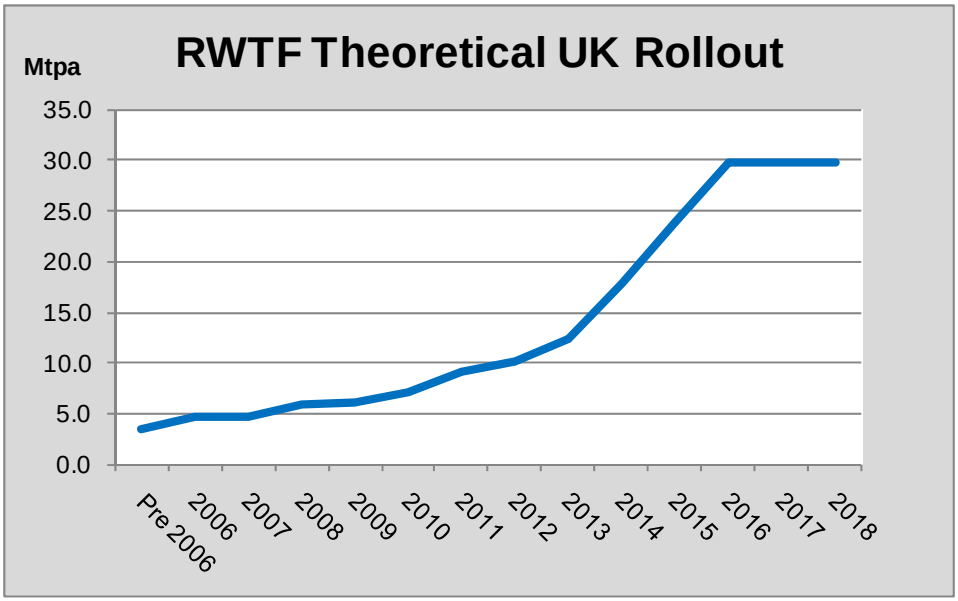

Figure 14: Capacity RWTF Rollout profile Source: Tolvik RWTF Database

6.8. Market Balance Projection – All RWTFs

When this total RWTF capacity is compared with Central Case Total Residual Waste tonnages and assuming no decommissioning of RWTF capacity once built, it would suggest that there will be a potential surplus in RWTF overcapacity in 2016 of circa **2.0Mt**, which increases over the period reaching **6.6Mt** by 2030/31.

For the Downside Scenario it would suggest a potential surplus in RWTF processing capacity of circa **4.8Mt** in 2015/16, reaching **11.7Mt** by 2030/31.

Mtpa	**RWTF Capacity Versus Total Residual Waste**	
	2015/16	**2030/31**
RWTF Capacity	29.8	
Total Residual Waste	27.8	23.2
Difference	2.0	6.6
Headline Utilisation	93.2%	77.8%

Table 8: RWTF Capacity versus Total Residual Waste – Central Case

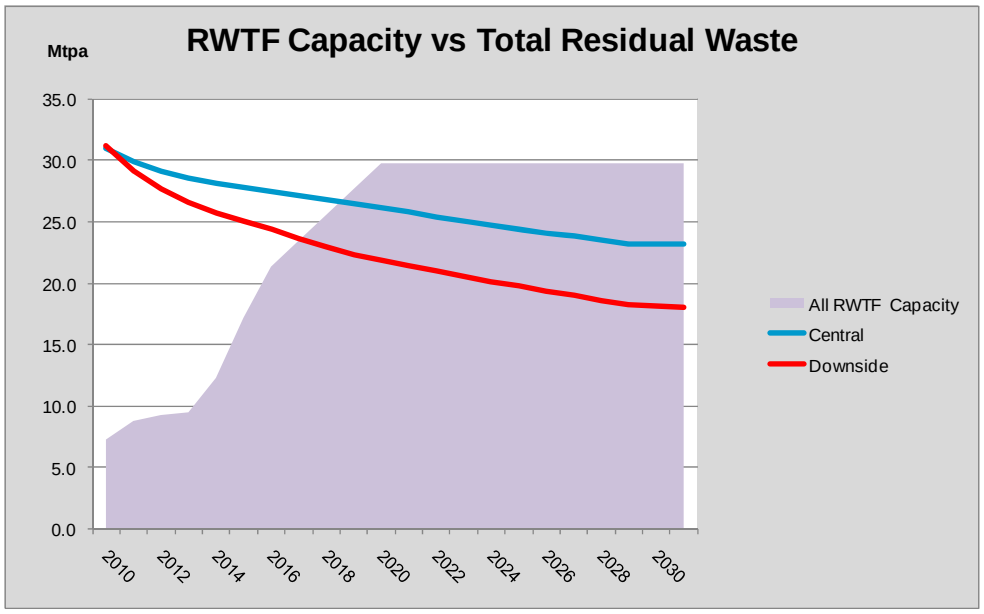

Figure 15: RWTF Capacity vs Total Residual Waste

6.9. RWTF Capacity versus Residual Waste - Regional Analysis

Notwithstanding the overall picture, there are significant regional variations (and for the purpose of this report, Wales, Scotland and Northern Ireland have been classified as a region).

Figure 16 considers at a regional level the 29.8Mt of identified operational and planned RWTF capacity with the Central Case Total Residual Waste in 2015/16 of 27.8Mt and expresses any capacity surplus as a percentage of RWTF capacity – i.e. a national over-capacity of 6.8%. This basic analysis suggests that if all currently known planned RWTFs are constructed then there will be a potentially significant over capacity in the North East and Wales.

The most significant under-capacity would appear to be in the East Midlands and South East, which would suggest that there remain RWTF development opportunities in these regions.

It should however be noted that the figure for the North West is distorted by the exclusion of RDF treatment facilities from the analysis where a combined capacity of over 1.5Mt is planned.

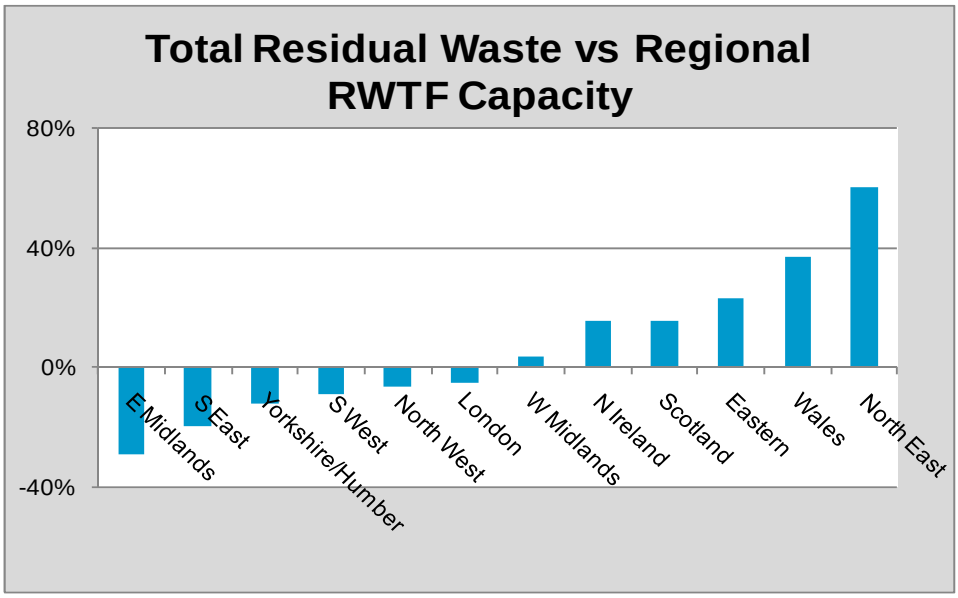

Figure 16: 2015/16 Total Residual Waste vs. Regional RWTF Capacity Versus

6.10. Probability Adjustment

In reality, not all currently planned RWTF capacity will be constructed. As recent trends show, converting a RWTF project from a plan to an operational facility remains challenging. The continuing declines in Residual Waste tonnages, increased competition from north European facilities and limitations on the availability of capital and the skilled resources necessary to deliver complex RWTF infrastructure highlight that even if planning is achieved, actually delivering a fully operational RWTF project is a complex and time consuming process.

Level	Probability Parameter			
	Planning	**Developer/ Funding**	**Technology**	**Feedstock**
1	Granted	Tier 1 Corporate	Fully Proven; Multi-provider	LACW > 80%
2	Non EfW	Tier 1 Project Financed	Fully Proven; Limited provider	Mix LACW/Merchant
3	Small EfW	Tier 2 Corporate	Internationally proven	Own supply/Merchant
4	Large EfW	Project Developer with funding	Demonstrated	Wholly Merchant
5	-	Project Developer unidentified funding	Unknown	-

Table 9: RWTF Probability of Development Criteria

It is therefore necessary to apply a high level assessment of the 'probability of development' for each RWTF; this report has identified four key risk parameters:

- Current stage of planning;
- Identity of developer is and how the project is expected to be financed;
- A view on the proven-ness of the technology being used; and,
- The feedstock mix expected to be used to operate the RWTF.

Table 9 provides possible criteria to develop the probability of development for RWTFs across the UK and a percentage weighting has been applied to each parameter using Tolvik's professional judgement.

For RWTFs designed primarily for the processing of Residual LACW, it could be argued that the overall risk profile is lower than those for merchant facilities and hence the 'probability of development' is higher. By definition, the developers of such LACW aligned facilities, having passed through the procurement prequalification process, are likely to be Tier 1 developers – either large waste companies or specialist PFI bidders. They will have **access to funds** to not just appeal any planning refusals, but also to provide the necessary equity. At the same time there is little doubt that RWTFs built primarily for the processing of Residual LACW are likely to be more attractive to debt funders than merchant facilities. This is for a number of reasons, not least **technical** (where only proven technologies are likely to succeed in a competitive procurement) and the prospect of a significant **proportion of contracted revenues** (generally underpinned by a Guaranteed Minimum Tonnage).

Set in this context, it has therefore been assumed for simplicity and consistency with the 2010 Report that all primarily LACW RWTFs will (eventually) be constructed. This would suggest a total LACW aligned RWTF processing capacity of circa **14.4Mt.** In practice, as DEFRA noted in its paper supporting the withdrawal of PFI credits to seven projects, some degree of short to medium term project failure is likely.

Applying Tolvik's probability adjusted methodology to all non-LACW aligned RWTFs suggests an additional processing capacity of **5.2Mt** (circa 33.5%), so suggesting a probability adjusted total of 19.6Mt. This probability analysis is broadly in line with the medium deployment scenario identified in DECC's '*Review of the generation costs and deployment potential of renewable electricity technologies in the UK*', conducted by Arup issued June 2011.

Furthermore, any analysis of RWTF capacity also needs to take into account the potential for decommissioning of RWTFs.

6.11. Probability Adjusted RWTF Capacity versus Total Residual Waste

Mtpa	**Prob Adj RWTF Capacity Versus Total Residual Waste**	
	2015/16	**2030/31**
LACW RWTFs	14.4	
Non-LACW Projects	5.2	
Total RWTF Capacity	19.6	
Total Residual Waste	27.8	23.2
Difference	(8.2)	(3.6)
Headline Under-capacity	141.8%	118.4%

Table 10: Prob Adj RWTF Capacity versus Total Residual Waste – Central Case

Table 10 and Figure 17 suggest that if the assumptions outlined in Section 6.10 were to apply then in the Central Case there would be a **shortfall in RWTF processing capacity** and, in the Downside Scenario, capacity and Total Residual Waste supply would come into balance in the mid 2020s.

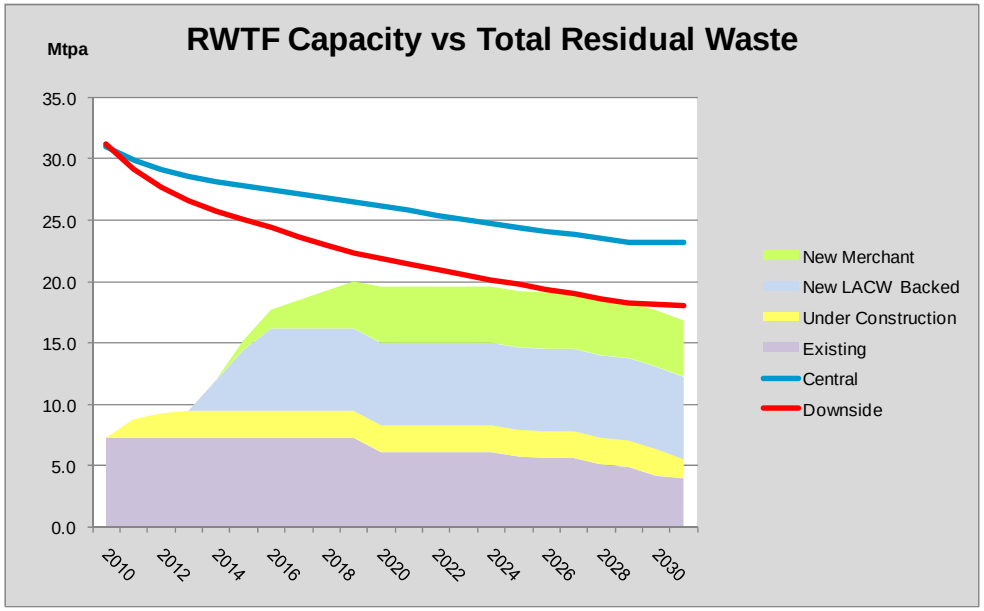

Figure 17: RWTF Capacity Versus Total Residual Waste - Probability Adjusted

However, it should be noted that this excludes UK and export capacity for the treatment of RDF/SRF arising from 'dirty' MRFs. If, as per Tolvik's "*UK Waste Export – Opportunity or Threat?*" report there is capacity, excluding MBT/MHT, for the production of RDF of **1.6-3.7Mt** and potential UK RDF treatment capacity of over 3.0Mt, then much of the shortfall in treatment capacity could be taken up through RDF processing and treatment.

7. IMPLICATIONS

7.1. Landfill

In 2009/10, it is estimated that less than 12% of Total Residual Waste was processed in an RWTF, whilst the remainder continued to be landfilled. Notwithstanding the projected decline in Residual Waste tonnages in the next few years, and irrespective of the whether or not all planned RWTFs are actually constructed, it is clear than in the short term landfill will continue to have an important role to play in the disposal of Residual Waste.

Identifying a reliable estimate for the availability of landfill void is not straightforward. According to Environment Agency and SEPA statistics, the total non-hazardous landfill void capacity in 2009/10 stood at circa 439 million cubic metres in England & Wales and at 65.6 million tonnes in Scotland; Northern Ireland data is not available. Of this circa 25% is likely to be used for inert wastes and/or 'lost' in cell engineering. Some may be subject to the 'winning' of void through aggregate extraction. Other capacity may have planning consent but not a permit whilst a number of large landfills have planning end dates which, with the recent decline in Residual Waste, may not be met.

Analysis of the data of current landfill void and landfill inputs suggests that while landfill void is decreasing and no new large non-inert landfills are being opened, existing landfill life (measured by reference to the prevailing input levels) is increasing due to falls in input tonnages.

As Figure 18 shows, landfill life in England and Wales increased from 9.2 years in 2000/01 to 12.9 years in 2009/10. In Scotland, landfill life at current inputs has also been increasing since 2007 and at 2009/10 inputs stands at circa 16 years (see Figure 19). In practice the projected declines in future inputs means that void is likely to be much extended beyond the timeframes shown in the Figures.

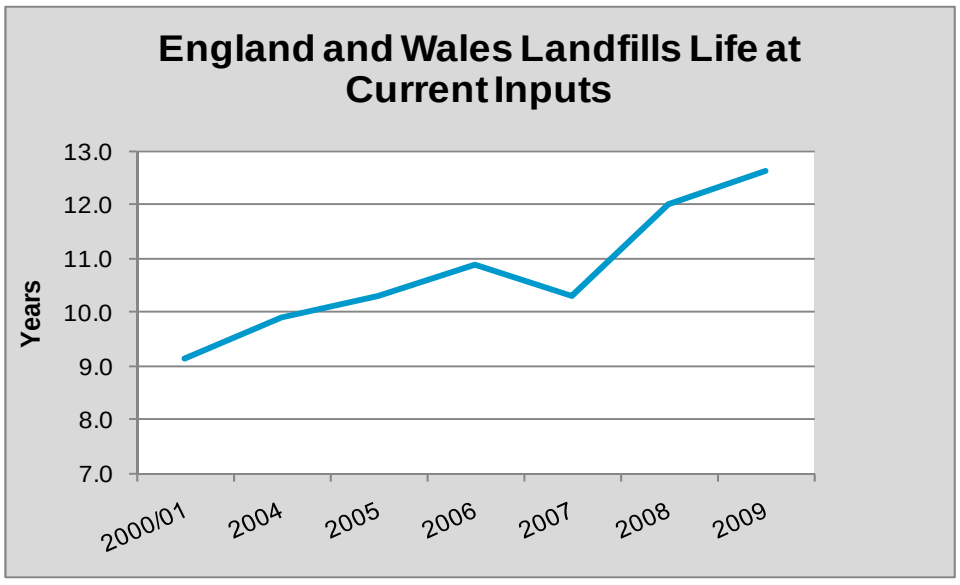

Figure 18: Non-Inert Landfills Life at Current Inputs, England and Wales Source: EA

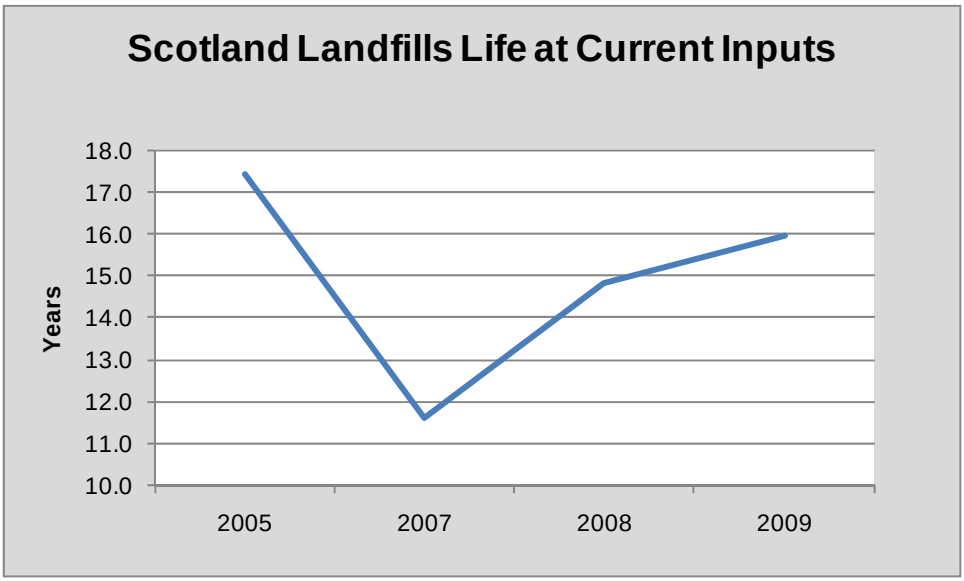

Figure 19: Non-inert Landfills Life at Current Inputs, Scotland Source: SEPA

For the whole of the UK, Tolvik has used projected Central Case Residual Waste tonnages (Table 5) and probability adjusted RWTF capacity (Table 11) to project UK landfills life to 2030/31 (assuming no new non-inert landfills or additional void capacities are consented). Decreasing tonnages of Residual Waste and more RWTF capacity coming on stream are expected to result in falling inputs into landfill, thus increasing landfills life from current circa 14.7 years to 24.8 years by 2030 and significant landfill void would, at least nationally, remain.

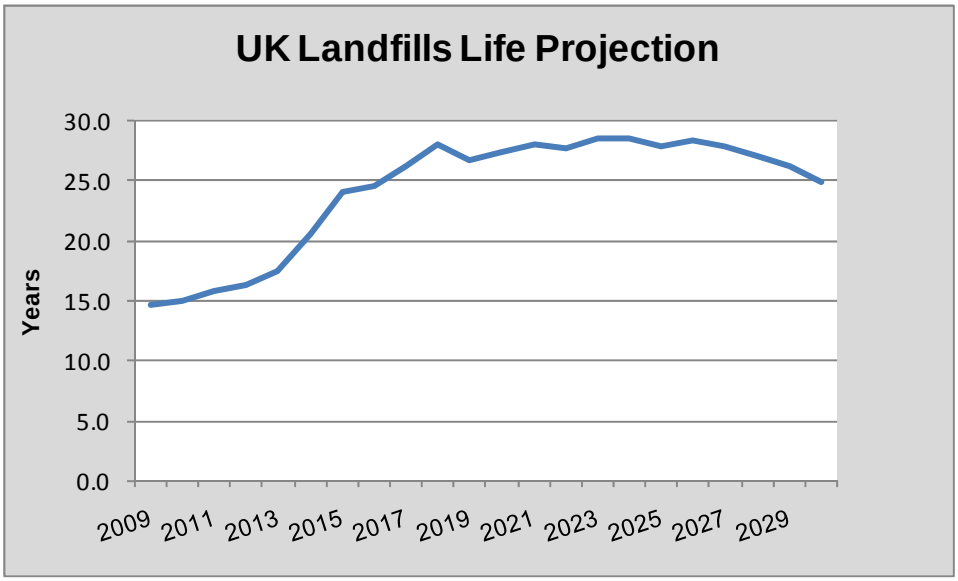

Figure 20: UK Landfills Life Projection Source: Tolvik Analysis

The '*WRAP 2010 "Gate Fees Report*' indicated that regional variation in available landfill capacity is a significant factor behind the differential in gate fees. To assess this, Tolvik has undertaken an analysis of remaining landfill life and median gate fees (see Figure 21); this suggests that the correlation is not as pronounced as suggested by WRAP.

In Tolvik's opinion, factors, such as transport distances and age and duration of Local Authority contract terms have at least as significant an impact.

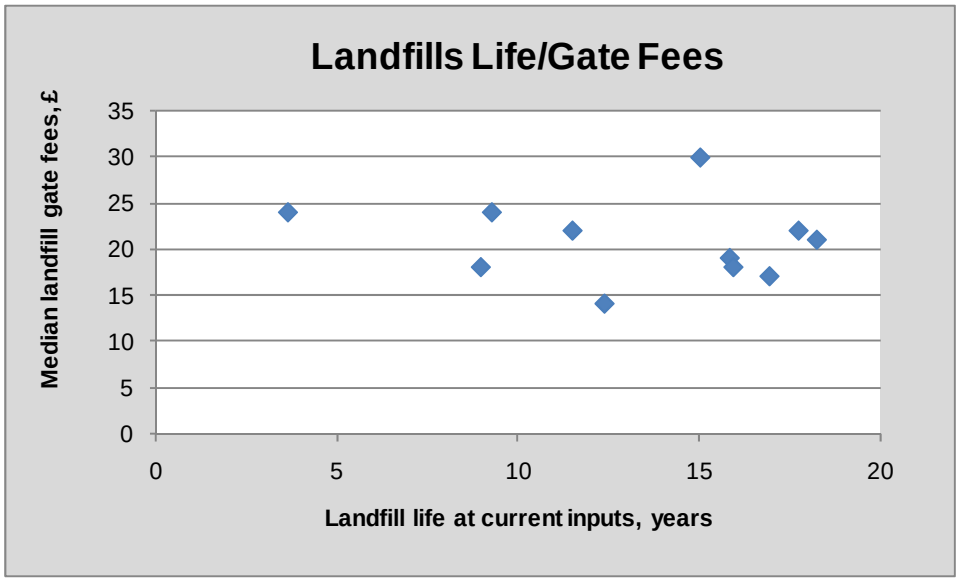

Figure 21: Median Landfill Gate Fees/Landfills Life Correlation Source: WRAP, Tolvik Analysis

7.2. Exports

The previous Briefing Report identified that the slow rate of development of RWTFs meant that the potential for waste exports needed to be considered. At the time, whilst some increased export of high quality SRF was foreseen, the recent significant increase in interest in the export of RDF derived from Residual Waste with limited treatment was not. This was in large part because the political and environmental implications associated with waste export were expected to be a significant market constraint.

In practice, such considerations have not constrained the market to date and instead decisions on RDF export have been driven by economics.

Further details on RDF exports can be found in Tolvik's recently issued Briefing Report '*UK Waste Exports – Opportunity or Threat?*' available via www.tolvik.com

7.3. Development of Wholly Merchant Facilities

Figure 22, a variance of Figure 17, highlights both the potential and the risks for developers of merchant RWTFs.

The potential requirement (shown in green) in the Central Case is for circa **9.0Mt** of additional capacity if all Residual Waste is to be diverted from landfill. The risk is that this merchant market could halve if the assumptions used in the Downside Scenario were to materialise. This is particularly relevant for such projects which, unlike existing RWTFs (which may be fully written down) or LACW-backed RWTFs (where there is the 'comfort' of a certain gate fee and, generally minimum tonnages), typically are less able to marginally price gate fees so as to maintain competitiveness and maximise inputs. In addition it does not take into account the competitive impacts of the export market.

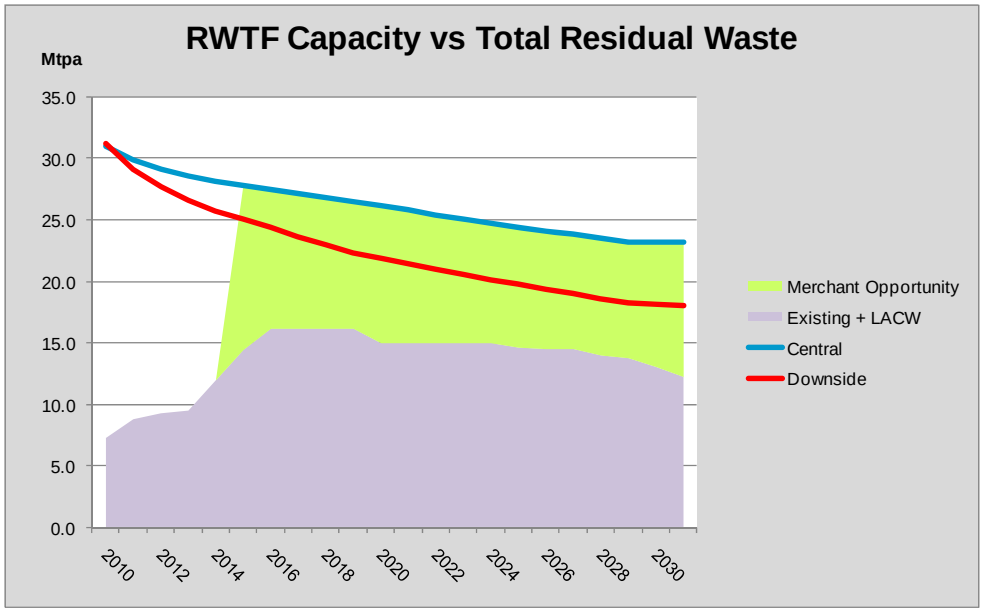

Figure 22: Merchant RWTF Opportunities

The second key challenge is for merchant RWTF developers to be able to aggregate sufficient Residual C&I Waste within a reasonable catchment area so to make a competitive offering; in most geographies data suggests that developers will need to consistently capture well over 50% of all merchant Residual Waste available so as to be certain of operating at full capacity, something which may be challenging and is unlikely to be an attractive proposition to funders with a low risk appetite – either debt or equity.

One potential solution would be for developers to look to control significant tonnages of Residual Waste themselves through vertical integration. Whether the cost and constraints imposed by such security would be sufficient to make this attractive, remains to be seen. However even this position is of itself unlikely to be sufficient to break the potential deadlock as investors with a lower appetite for risk will still want to see some guarantee as to the availability of waste to a project over an extended period time. This suggests that it may be those with significant balance sheets who are best able to exploit such opportunities.

7.4. Residual Waste as a Resource

Until recently, the acceptance of the concept of “waste as a resource” was generally limited to the most enthusiastic environmentalists – for whilst the market readily accepted the value of metals, paper and card, in practice these materials represented a relatively modest portion of the overall waste stream.

With the future balance between Residual Waste availability and RWTF capacity looking to tighten, it is becoming clear that Residual Waste has the potential to be a resource – not (at least yet) to the extent that operators will pay for it, but certainly to the extent that they may be willing to accept it at a gate fee significantly lower than the ‘standalone’ cost of processing the waste and particularly so for any marginal capacity.

A key to this will, of course, will not just be the value of the recyclables within the waste, but also the value of the energy content - either electricity or heat. A recent report for DECC by Redpoint Energy considering the potential effects of the electricity market reforms on wholesale electricity prices

projected under most scenarios a steady rise in electricity prices in real terms from the current £50-£55/MWh towards £80/MWh by 2023.

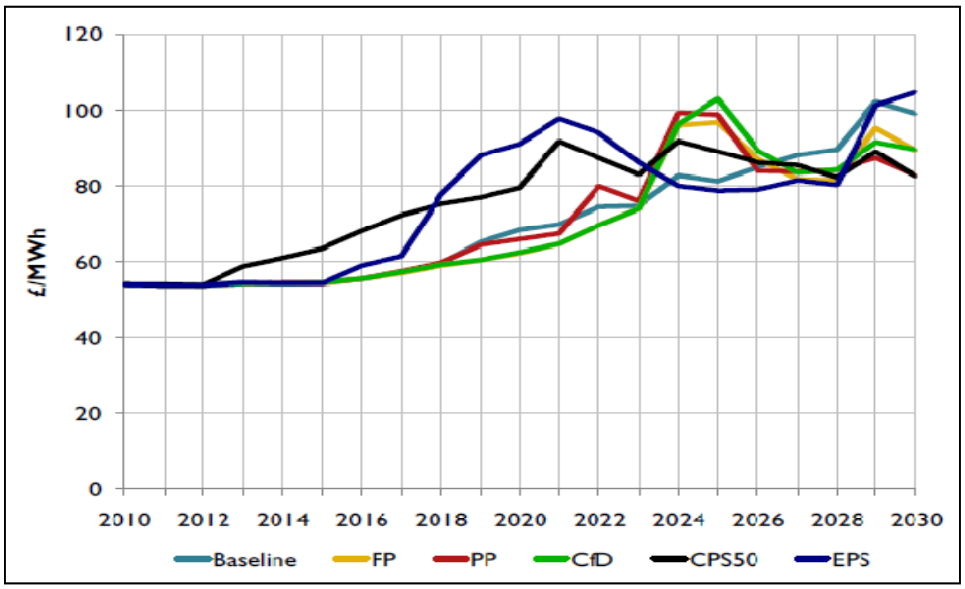

Figure 23: Projected Wholesale Electricity Prices Source: Redpoint for DECC

To put this into context, power at £80/MWh for a more efficient EfW would be worth the equivalent of circa £50/t and every £10/MWh movement from this the equivalent of just over £6/t.

7.5. Market Share

In a market in which Residual Waste tonnages are declining and any RWTF capacity which is constructed will last 20-25 years at least, it would not be surprising if there were a rush to secure market share; as post construction opportunities for growth in such a market other than through consolidation are likely to be limited.

If it is assumed that all RWTFs are developed and, for those RWTFs being developed in response to LACW procurements which are beyond the ISOS stage, the proposed RWTF capacity is divided equally between all remaining bidders (i.e. an equal likelihood of success), then an analysis of the RWTF market suggests the greatest capacity will be held by SITA, Veolia and Viridor as shown in Figure 24.

The analysis also suggests a significant degree of market fragmentation, with the top 8 developers representing 57% of the total RWTF market capacity. This is a change from the current landfill market, where a substantial portion of non-hazardous void capacity is in the control of 6 players – WRG, Viridor, Biffa, Veolia, SITA and Cory which are estimated to have over 75% of the total consented landfill capacity.

Figure 25 shows leading operators' existing and planned RWTF capacity split between LACW-backed and merchant facilities. In some cases a judgement has had to be made as to the split (particularly for larger EfWs which may have a number of local authority clients) and, with time, it is possible merchant facilities could become LACW-backed. With this caveat, Figure 25 shows Veolia and Shanks having a focus on the LACW backed market, whilst the other leading operators/developers development plans show a mix between LACW and merchant backed projects.

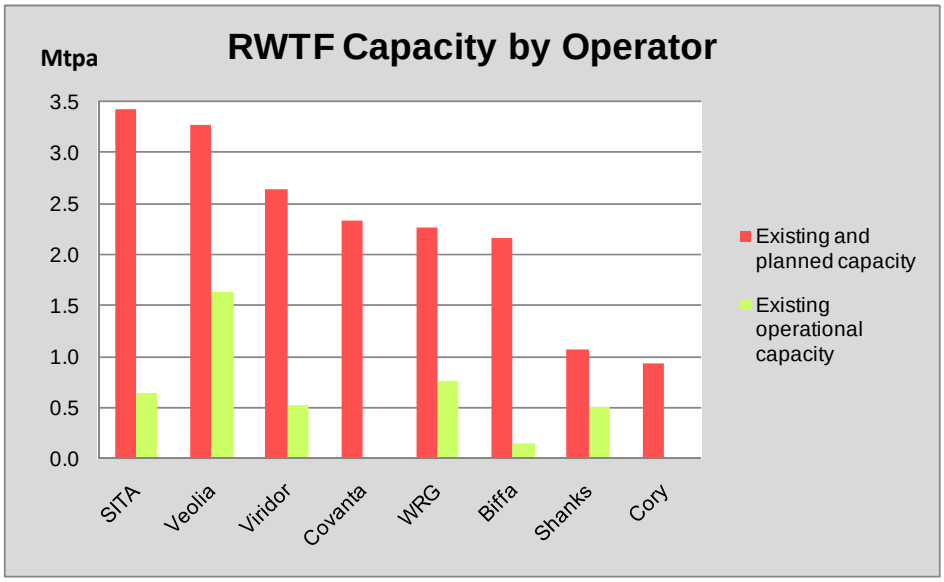

Figure 24: RWTF Market Share Source: Tolvik RWTF Database

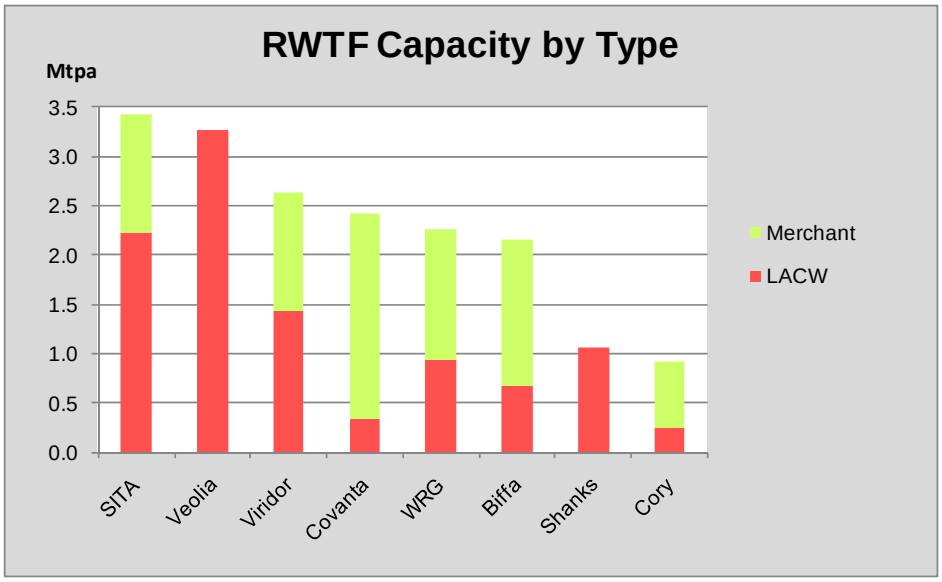

Figure 25: Leading RWTF Operators Capacity by Type Source: Tolvik RWTF Database

7.6. Gate Fees – Short Term

In the 2010 Briefing Report it was suggested that in the short term before significant RWTF infrastructure is developed it is likely that, for most RWTFs, competition for uncontracted Residual Waste would come from landfills. With the rapid potential expansion of the RDF export market, it has become clear that this needs to be expanded to include 'dirty' MRFs producing a low specification RDF and where such facilities are available, so it is likely to be the least cost option.

With respect to **landfills**, the WRAP *Gate Fee Report 2010* suggested that nationally LACW landfill gate fees were in the range of £11/t to £44/t with prices varying greatly between regions reflecting void availability (as discussed in Section 7.1). As reported in the previous report the significant recent decline in tonnages of Residual Waste to landfill, means that in some markets landfill gate fees have

fallen to just above the marginal landfill operating cost at around £8/t. With Landfill Tax at £80/t, this suggests a landfill gate fee floor of **£88/t.**

The recent surge in interest in exports (particularly since April 2011) suggests that with current European spot gate fees at incinerators of €30-€50/t, **dirty MRFs** are able to compete with landfill at a cost of £8/t + £56/t = £64/t. This may at the low end of the spectrum as it is understood that in some examples European incinerator operators are taking some short term contractual pain in return for higher gate fees as UK landfill tax rises.

It is not unreasonable therefore to assume that, subject to their availability, until such time as incineration markets in Europe harden and/or the value of recyclables fall, dirty MRFs at an average gate fee of circa **£65-£70/t** are likely to set the market price.

7.7. Gate Fees – Medium to Long Term

In the medium to long term, it is likely that RWTF gate fees for merchant wastes (as opposed to any tonnages secured under long term contracts) will be driven by a combination of the RWTF capacity/supply balances projected in Sections 6, the export market and the effect of power prices on marginal operating costs/revenues. Tolvik is in the process of developing a model to project the effects of various assumptions on such gate fees.

Assuming power prices remain at current levels, nationally the previous report identified four scenarios. These have been reviewed and updated and are set out below:

RWTF Under Capacity – this scenario assumed a market in which there were significant landfill restrictions, no exports and insufficient RWTF capacity. This is no longer a valid assumption given the absence of landfill bans (in England at least) and the development of the export market**.**

A Balanced Market – this scenario assumed Residual Waste supply exceeded RWTF capacity but that there were no material landfill restrictions; extending this to the assumption that in the medium term the north European market 'corrects itself' to be in a balance as per the UK (so making dirty MRFs less attractive. It is then reasonable to assume that RWTF gate fees will be set by reference to the closest competitors. The spot price is likely to be a function of RWTF gate fees + any proximity benefits. In the context of 2011 figures this suggests **£75/t - £90/t.**

Localised Overcapacity – this assumed RWTF capacity exceeds Residual Waste supply at a local level and gate fees need to be reduced to reflect the additional transport costs to attract waste from further afield. In the context of 2011 figures the gate fee at such locations would be of the order of **£50/t - £75/t.**

National Overcapacity – in which RWTF capacity exceeds Residual Waste supply at a national level and northern Europe continues to be at over-capacity. In the short to medium term, gate fees could drop to a marginal cost basis; for those RWTFs with contracted tonnages at a reasonable gate fee, the scope to reduce merchant gate fees will be greater than wholly merchant facilities and in time it is likely that the less economic facilities would be mothballed. In this scenario, average gate fees for merchant waste are likely to be **£30/t - £50/t** depending on the location of the RWTF and the waste available within its own local catchment area.

Appendix 2 – Definitions & Glossary

C&I Waste	Commercial & Industrial Waste
CSR	Corporate Social Responsibility
DECC	Department of Energy and Climate Change
Dirty MRF	Basic recycling facility processing mixed Residual Waste into recyclables and a low grade RDF
DoE	Department of Environment of Northern Ireland
EA	Environment Agency
EfW	Energy from Waste
HMRC	Her Majesty's Revenue & Customs
HWRC	Household Waste Recycling Centre
ISOS	Invitation to Submit Outline Solutions
LACW	Local Authority Collected Waste
LACMW	Local Authority Collected Municipal Waste
LATS/LAS/NILAS	Landfill Allowance Trading Scheme/Landfill Allowance Scheme/ Northern Ireland Landfill Allowance Scheme
MBT	Mechanical Biological Treatment
MHT	Mechanical Heat Treatment, also known as autoclave
Mtpa/Ktpa	Millions of Tonnes per annum/Thousands of Tonnes per annum
ONS	Office for National Statistics
pa	per annum
PFI	Private Finance Initiative
RDF	Refuse Derived Fuel
Residual	Residual Waste Non hazardous, active, municipal and commercial and industrial waste tonnages that remain after recycling & composting activities have taken place
Residual Waste Treatment	any form of residual waste treatment and/or disposal that uses a specific technology ie MBT, EfW, Gasification to treat and or dispose of residual waste. This definition excludes recycling & composting and landfill.

rWFD	Revised Waste Framework Directive
RWTF	Residual Waste Treatment Facility
SME	Small and Medium Enterprise
SEPA	Scottish Environment Protection Agency
SRF	Solid Recovered Fuel
WAG	Welsh Assembly Government
WDA	Waste Disposal Authority
WRAP	Waste & Resources Action Programme
ZWP	Zero Waste Plan

Appendix 3 – Key References and Data Sources

- DEFRA: *'Government Review of Waste Policy in England 2011'* – England Waste Policy Review
- Welsh Assembly Government: '*Towards Zero Waste – One Wales: One Planet'* – Towards Zero Waste
- Scotland Government *'Zero Waste Plan'* – ZWP
- DoE: *'Consultation Document on A New Recycling Policy'*
- DoE: '*Consultation on the Introduction of Restrictions on the Landfilling of Certain Wastes'*
- DECC: '*Review of the generation costs and deployment potential of renewable electricity technologies in the UK'*
- DECC: *'Electricity Market Reform Analysis of Policy Options – A Report by Redpoint Energy in association with Trilemma'*
- DEFRA '*The Economics of Waste and Waste Policy 2011'*
- DEFRA Municipal Waste Statistics 2009/10 and Municipal Waste Quarterly Statistics;
- EA Waste Information, 2009;
- Waste Data Digest Data Tables – '*SEPA Waste Data Digest*';
- Wales MSW Statistics 2009/10 – STATSWALES;
- DEFRA '*Survey of Commercial and Industrial Waste Arisings 2010* – DEFRA C&I Report
- ADAS '*National Study into Commercial & Industrial Waste Arisings, April 2009'*
- HMRC Landfill Tax Data : https://www.uktradeinfo.com/index.cfm?task=bulllandfill&hasFlashPlayer=true
- ONS: Household Projections to 2031
- WasteDataFlow
- WRAP: *'Gate Fees Report 2010: Comparing the cost of alternative waste treatment options'*
- Tolvik RWTF Database
- Desk research using various websites and periodicals