The Chartered Institution of Wastes Management (CIWM)

Research into SRF and RDF Exports to Other EU Countries

Final Technical Report

AMEC Environment & Infrastructure UK Limited

July 2013

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Report for

Chartered Institution of Wastes Management
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Executive Summary

This technical report has been prepared by AMEC E&I UK Ltd (AMEC) for the Chartered Institution of Wastes Management (CIWM) in association with, and co-funded by Zero Waste Scotland (ZWS) and the Environmental Protection Agency, Ireland (EPA). It records research undertaken between March and May 2013 into the current waste management practice of exporting Refuse Derived Fuel (RDF) and Solid Recovered Fuel (SRF) from the UK and Ireland as alternative fuels for energy recovery in mainland Europe, and considers the future of this practice against a UK and Irish requirement for alternative energy production. The research was intended to gather evidence to inform the funders on this important and strategic topic.

The research followed two themes:

- Analysis of Published Data into current and future RDF/SRF production in the UK and Ireland, compared against the current and planned capacity for use of the RDF/SRF as a fuel within the UK and Ireland;
- Stakeholder discussions to establish the current market appetite, the regulatory system that supports the current practice and the likely future of the practice.

There is a significant difference between RDF and SRF which determines its ultimate destination. The preparation of RDF requires a basic level of treatment to remove recyclates from predominantly an MSW waste stream, while SRF requires a higher standard of preparation to produce a fuel. RDF is typically destined for standard EfW facilities which also accept unprepared mixed waste streams while SRF is typically used within cement kilns and power stations as an alternative to fossil fuels.

The main regulations underpinning the practice of RDF/SRF export are the EC Waste Shipment Regulations which are directly transcribed into national regulations; the UK Transfrontier Shipment of Waste Regulations 2007 and the Waste Management (Shipment) Regulations 2007 in Ireland. The UK regulations prohibit the export of waste for recovery of disposal without pre-treatment but the Irish regulations do not. This means that there is no regulatory requirement to produce RDF or SRF from waste in Ireland prior to its shipment to other EU Countries.

The analysis of data involved manipulation to determine a possible total amount of RDF/SRF generated across the UK and Ireland. This indicated that, assuming all targets in the individual countries are met with regards to recycling and there is no growth or decline in waste arisings from 2012 levels, there is potentially 26.09 Million tonnes of RDF/SRF available that could be used to generate an alternative energy source to fossil fuels.

In 2012 almost 868,000 tonnes of RDF/SRF was exported to other European Countries from the UK and Ireland. The most popular destinations for RDF export were Denmark, Germany, the Netherlands, Norway and Sweden whereas SRF was predominantly exported to cement kilns in Estonia and Latvia. 85% of RDF/SRF exports were from England in 2012 with an initial increase between 2010 and 2011 but much less difference between 2011 and 2012. The other countries are following suit with little or no exports in 2010 but significant increases between 2011

and 2012. There are currently only a few companies in Wales, Scotland, Northern Ireland and Ireland involved in RDF/SRF export compared to England but this is predicted to rise in future years. With no legal requirement for waste producers in Ireland to produce RDF/SRF prior to export, in 2012 the majority of "RDF" exported was residual municipal waste from one major operator.

There is a significant difference between the amount of RDF/SRF notified to the competent authorities for shipment and the amount actually exported. There are various reasons for this but it results in less than 20% of notified materials actually leaving the five countries. The majority of RDF/SRF exported is from household or other municipal sources with less than 15% produced from commercial or industrial waste.

A wide range of stakeholders were interviewed by AMEC for this project. These included UK and Irish environmental and transfrontier shipment regulators/authorities, waste management companies, waste exporters, waste brokers and receiving facilities. They were each asked a series of questions aimed at prompting discussion around their views on RDF/SRF exports from the UK and Ireland at present and in the future. Some were stakeholders currently exporting RDF/SRF but other stakeholders were opposed to the current practice. The questions considered why the countries are currently exporting RDF/SRF, the quality requirements, the level of cost involved, the type of company involved at present, the effectiveness of the current regulatory regimes and the effect of RDF/SRF exports on domestic recycling levels.

The general view of stakeholders was that export of RDF will continue until there is an economically viable domestic alternative. With increasing landfill tax levels making the export of RDF the cheapest waste management option, this route has become prevalent across the UK and Ireland and it will continue to grow as landfill tax levels increase further. This is exacerbated by a lack of domestic alternatives and high gate fees at the relatively few operating energy recovery facilities.

The market for SRF use is slightly more positive with more contracts becoming available for domestic supply and export. Unfortunately a large proportion of the requirement for SRF by cement kilns is outside of Europe, for example in India, which brings its own regulatory issues.

The comparison of waste arisings, potential RDF/SRF production, current and planned domestic energy recovery infrastructure and current export data indicates a shortfall in domestic capacity for the foreseeable future. Even with all planned and proposed infrastructure developed, the countries are short of providing sufficient energy recovery facilities to meet demand.

The five countries all have targets for increased renewable energy usage and the use of RDF/SRF, although not wholly renewable, can contribute to these targets. They are currently exporting RDF/SRF with energy content equivalent to almost 5 TWh of energy (electrical) or 10 TWh (heat) but this could increase to 7.7 TWh (electrical) or 15.4 TWh (heat) which could provide around 5% of the UK and Ireland's renewable energy. This is a small but significant amount. In financial terms, the UK and Ireland are paying almost £43 Million to Energy from Waste facilities in other European Countries, but could use this "fuel" to reduce the UK and Ireland's spend on coal, save on European EfW gate fees and divert a similar amount to the UK/Irish economy through domestic gate fees.

To be able to safeguard these potential fuels and for the domestic economic market to develop, operators need to be able to compete financially with the European equivalents. Most of these competitors however can offer low gate fees either due to having already paid back their initial investments or due to the level of revenue they can receive from electricity, heat and steam sales.

There was comment that the export of RDF/SRF should be part of the acceptance of trade within the EC (why we are part of it) and whether sharing of energy producing materials is just part of that European free market trade. There was also comment on the loss of domestic resource and potential jobs that could be gained from managing this material with the UK and Ireland. This is a question of applying the Proximity Principle, as required by the EU Waste Shipment Regulations at an appropriate level; Europe-wide or Nationwide.

In summary, there are a number of issues and questions arising from the study for stakeholders to consider. AMEC has identified two distinct options that could be followed through. The UK and Ireland can either:

1. Allow the practice of RDF/SRF export indefinitely as part of European free-market trading. This requires the process to continue to be subjected to rigorous scrutiny and regulatory controls to ensure the minimisation of illegal operations, or;

2. Allow the current practice to continue in the short term while working towards consistent regulation and promotion of the benefits of RDF/SRF as an alternative fuel source and creator of jobs within the UK and Ireland. To achieve this, the UK and Irish Governments will need to acknowledge the development of thermally efficient plants on a similar basis to wind farms, tidal energy and biomass and provide an appropriate level of financial support.

In either case, the UK and Ireland should continue to promote the development of infrastructure to assist with materials reduction and recovery higher up the waste hierarchy in order to minimise the amount of residual waste generated.

Contents

1. Introduction

1.1 Terms of Reference

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Conclusions and recommendations are then drawn from this research.

1.2 The Difference between RDF and SRF

The terms RDF and SRF are often used interchangeably but refer to very different alternative fuels with very different properties:

- RDF is a crude "fuel" typically derived from Municipal Solid Waste (MSW) or commercial and industrial waste with similar properties to MSW with a Net CV (Calorific Value) of 8-14 MJ/kg (Megajoules per kilogram). It is typically pre-sorted and shredded residual waste with recyclates removed where practical, or the reject fraction of a MRF (Materials Recycling Facility) operation;
- SRF is produced to a fuel standard specified by the receiving plant and can be produced to the European standard specifications set out in CEN15359[1] and shown in Table 1.1 below. It is typically derived from pre-sorted commercial & industrial (C&I) waste or rejects from MRF activities, however there is market evidence that some MSW sourced SRF is being produced and is commercially viable (West and East London are currently exporting MSW (Municipal Solid Waste) sourced SRF), and typically has a Net CV or >15 MJ/kg.

[1] European Standard for Solid Recovered Fuels. Specifications and Classes BS EN 15359:2011
http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030202007

Table 1.1 CEN 15359 SRF Quality Standards

Classification property	Statistical measure	Unit	Classes				
			1	2	3	4	5
Net calorific value (NCV)	Mean	MJ/kg (ar)	≥ 25	≥ 20	≥ 15	≥ 10	≥ 3

Classification property	Statistical measure	Unit	Classes				
			1	2	3	4	5
Chlorine (Cl)	Mean	%(d)	≤ 0,2	≤ 0,6	≤ 1,0	≤ 1,5	≤ 3

Classification property	Statistical measure	Unit	Classes				
			1	2	3	4	5
Mercury (Hg)	Median	mg/MJ (ar)	≤ 0,02	≤ 0,03	≤ 0,08	≤ 0,15	≤ 0,50
	80th percentile	mg/MJ (ar)	≤ 0,04	≤ 0,06	≤ 0,16	≤ 0,30	≤ 1,00

WRAP (Waste and Resources Action Programme) has also recently published guidance on the definition and specification of Waste Derived Fuels (WDF)[2] by way of a classification system. This classification scheme aims to provide unambiguous and clear classification of waste derived fuel (WDF) properties for use by Energy from Waste (EfW) facilities. The system is designed to help fuel users define the fuel parameters of WDF needed to power their facilities by the use of a system of 'Classes' similar to the SRF classes. The system classifies the fuel properties of WDF against 3 main criteria: Economic (characteristics that will affect the economics of the fuel's usage, i.e. biomass content), Technical (characteristics that will affect the performance of the combustion facility) and Environmental (characteristics that will influence emissions to the environment) as shown in Table 1.2.

Table 1.2 WRAP Domestic Waste Derived Fuel Standards

Classification property	Statistical measure	Unit	Classes				
			1	2	3	4	5
Biomass content (as received)	Mean	%	≥ 90	≥ 80	≥ 60	≥ 50	≥ 50
Net calorific value (NCV)	Mean	MJ/kg (ar)	≥ 25	≥ 20	≥ 15	≥ 10	≥ 6.5
Moisture content	Mean	% wt/wt	≤ 10	≤ 15	≤ 20	≤ 30	≤ 40
Chlorine content (dry)	Mean	% wt/wt	≤ 0.2	≤ 0.6	≤ 0.8	-	-
Ash content (dry)	Mean	% wt/wt	≤ 10	≤ 20	≤ 30	≤ 40	≤ 50
Bulk density (as received)	Mean	kg/m3	>650	≥ 450	≥ 350	≥ 250	≥ 100

[2] http://www.wrap.org.uk/sites/files/wrap/WDF_Classification_6P%20pdf.pdf

Classification property	Statistical measure	Unit	Classes				
			1	2	3	4	5
Mercury (Hg)	Median	mg/MJ (ar)	≤ 0.02	≤ 0.03	≤ 0.06	-	-
	80th percentile	mg/MJ (ar)	≤ 0.04	≤ 0.06	≤ 0.12	-	-
Cadmium (Cd)	Median	mg/MJ (ar)	≤ 0.1	≤ 0.3	≤ 1.0	≤ 5.0	≤ 7.5
	80th percentile	mg/MJ (ar)	≤ 0.2	≤ 0.6	≤ 2.0	≤ 10	≤ 15
Sum of heavy metals (HM)	Median	mg/MJ (ar)	≤ 15	≤ 30	≤ 50	≤ 100	≤ 190
	80th percentile	mg/MJ (ar)	≤ 30	≤ 60	≤ 100	≤ 200	≤ 380

The system is intended to help fuel producers classify their WDF so that the potential end user can determine whether they can accept the WDF within their facility. The use of the WDF Class is intended to enable direct and efficient trading of WDF and facilitate a good understanding between the seller and the buyer. The scheme is not intended to define end of waste criteria for waste derived fuels. According to WRAP, the guidance is intended for the domestic movement of WDF and is not intended to inform waste exports.

Since this guidance has only recently been issued, the market's reaction to it is not known.

Energy from RDF is typically recovered through traditional incineration methods whereas SRF is a more valuable commodity and due to its more homogeneous nature is preferred by cement kilns and power stations where a constant level of energy is required.

Despite the CEN standard, SRF and the cruder RDF remain classified as "waste" requiring any receiving facility to be Waste Incineration Directive (WID) compliant.

1.3 Terms Used within this Report

For general reference, the following European Waste Catalogue (EWC)[3] codes are relevant to this research and mentioned throughout this report:

- 20 03 01 Mixed Municipal Waste
- 19 12 10 (Combustible waste – Refuse Derived Fuel)
- 19 12 12 (other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11 (hazardous). This can apply to compacted household waste or rejects from materials recycling facilities.

For waste export, the Basel Convention Annex II[4] lists categories of wastes requiring special consideration of which one is Y46: Wastes collected from households, another is Y18: Residues arising from industrial waste disposal operations.

[3] http://www.environment-agency.gov.uk/static/documents/Leisure/EWC_31-03-09_CH.pdf

2. Size of the Market

2.1 UK & Ireland Arisings

It is important to understand the size of the market associated with RDF and SRF and its potential export.

To achieve this, AMEC developed a basic mass flow model. The flow model considered total waste arisings from 2010 on an annual basis from MSW and C&I (municipal like material only) sources. Actual data was used for 2010/11 and for 2011/12 (from WasteDataFlow/EPA National Waste Report)[5] since it was recognised that arisings had declined significantly since 2010. AMEC then deducted the amount of waste re-used, recycled or composted in line with each Nation's targets up to 2025 to leave a potential residual waste stream for each year. For C&I waste, from Defra's 2011 market review, we determined that around 49% of C&I was likely to be of similar composition to MSW and therefore potentially suitable for SRF/RDF production. Applying the basic assumption that waste processing could remove/reduce the amount of residual waste by up to a further 40%, we determined an estimated SRF/RDF tonnage for each country. The outcome of the modelling is shown in the table below.

Table 2.1 Mass Flow Summary

	England	**Wales**	**Scotland**	**Northern Ireland**	**Ireland**
Total MSW 2011 (Mte)	25.6	1.56	3.06	0.95	2.83
Total C&I 2011 (Mte)	47.93	3.57	6.5	1.3	0.56
Residual once Recycling Targets met in 2025 (Mte) (no growth/decline in arisings)	36.28	2.53	1.87	1.11	1.69
Potential RDF/SRF Production (Mte) (60% of Residual)	**21.77**	**1.52**	**1.12**	**0.67**	**1.01**
Total Potential RDF/SRF	**26.09 Million Tonnes**				

Table 2.1 should only be considered as indicative since there are many factors affecting future arisings and processing capabilities that have not been included in this basic analysis. The figure does however suggest a market size (around 28% of current total municipal and municipal like C&I arisings) which can then be compared against projected facility capacities and capabilities in the UK/Ireland and Europe later in the report.

[4] http://www.basel.int/portals/4/basel%20convention/docs/text/baselconventiontext-e.pdf

[5] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85918/mwb201112_statsrelease.pdf, http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/TrendWasteLandfill, https://statswales.wales.gov.uk/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/Annual/TonnesOfWasteGenerated-by-Type-Year, http://www.doeni.gov.uk/lac_municipal_waste_2011-12.pdf, http://www.epa.ie/pubs/reports/waste/stats/National%20Waste%202011_web.pdf,

2.2 SRF/RDF Energy Recovery: Current & Planned Capacity

2.2.1 Introduction

Information on current and planned capacity has been informed by Eunomia's Bi-Annual Residual Waste Infrastructure Review Issue 3[6], WRAP data[7] and AMEC intelligence.

2.2.2 England

According to Eunomia's Bi-Annual Residual Waste Infrastructure Review Issue 3[8], there are a number of WID compliant EfW and cement kiln facilities in England currently receiving RDF and SRF.

The cement kilns receiving SRF and some RDF are Turnstead Quarry, Ketton Works and Hope Derbyshire in the East Midlands and Rugby and Cauldon Cement Works in the West Midlands. These have a combined capacity of 1,027,583 tpa (tonnes per annum) but will accept a proportion of alternative fuels (including SRF) within the feedstock.

England has 22 operational EfW facilities which are spread throughout the country however the majority are located in the South East, London, West Midlands and Yorkshire and Humber regions. The smallest of these facilities is located in the Isles of Scilly (3,500tpa) in the South West, and the largest in Edmonton in the London region with a capacity of 675,000 tpa.

England currently has 14 EfW facilities under construction with the majority of development being in regions where there is currently limited numbers of facilities (South West, North West, West Midlands and North West). These facilities will add an additional capacity of 3,251,000 tpa. These are all scheduled to be operational by 2015.

England has planning consent for another 46 facilities throughout the country. The combined capacity of all these facilities is 10,192,500 tpa.

In addition there are 14 planned and 9 proposed EfW facilities throughout England with combined capacities of 2,284,000 and 1,529,000 tpa respectively.

2.2.3 Wales

Padeswood Works is currently Wales' only operational cement kiln permitted to accept SRF and other refuse derived fuels with a total throughput of 181,368 tpa.

[6] http://www.eunomia.co.uk/product.php/113
[7] www.wrap.org.uk
[8] http://www.eunomia.co.uk/product.php/113

There is no current EfW capacity following the closure of the Material Energy and Recovery Centre (MREC) in Port Talbot which had a capacity of 52,000 tpa. A 350,000 tpa EfW facility is currently under construction at Trident Park, Cardiff which is due to be completed in 2014.

Consent has been granted for 4 further EfW facilities in Newport, Barry Dock, Hirwaun Industrial Estate and Clydach. Their combined capacities will add an additional 398,000 tpa if built.

2.2.4 Scotland

Scotland currently has three operating EfW facilities; one of these is located in Shetland with 26,000 tpa capacity receiving residual waste from the Islands and nearby Orkney. The other 2 are located in Dundee and Dargavel, Dumfries with capacities of 120,000 and 60,000 tpa respectively. Both of these plants are currently closed although it may be possible for Dundee to re-open later in 2013.

There is also one WID compliant cement kiln with the potential to accept SRF, this is operated by Lafarge Cement at Dunbar. The plant accepts up to 25% (250,000 tpa) alternative fuel but at present only in the form of waste tyres and recycled liquid fuels.

Planning consent has been granted for another 7 EfW facilities which are mostly located within central Scotland. If built these facilities could add an additional capacity of 1.36 million tpa. A further EfW facility of 900,000 tpa has also been proposed within the Glasgow area and Aberdeenshire has a 60,000 tpa facility proposed at Stoneyhill Resource Recovery Park.

2.2.5 Northern Ireland

At present there are no EfW facilities operational or under construction in Northern Ireland. Planning permission has been granted for a 120,000 tpa gasification facility in Derry to serve the North West area and there are plans for an EfW facility in Belfast to serve the Arc21 area at 210,000 tpa capacity.

2.2.6 Ireland

There are currently 4 facilities permitted and capable of receiving RDF/SRF in Ireland. These are Lagan Cement Ltd who commenced receipt of SRF following trials in 2009, Irish Cement Ltd who commenced trials for SRF in 2011, Quinn Cement Ltd who received permission to accept SRF in January 2012 (and may accept from 2014) and Indaver at Carranstown who can receive a wide range of waste materials as feedstock for its 200,000 tpa EfW facility. There are plans for additional facilities e.g. Covanta proposes a 600,000 tpa EfW at Poolbeg and Indaver has plans for a further 240,000 tpa facility in Cork.

2.3 Receiving Plants in Europe

There are many plants in mainland Europe capable of receiving Y46 waste and EWC 20 03 01, 19 12 12 and 19 12 10 including traditional EfW facilities and cement kilns and no shortage of capacity available within these plants. According to Tolvik's 2011 Briefing Report: "UK Waste Exports: or Threat?"[9] .

- Plants in South Western Europe have the lowest R1 efficiency factor (see Section 3.2) of 0.58, as a non-weighted average, so that only 27 (49.1%) out of the 55 plants reach R1≥60.
- Plants in Central Europe have a higher R1 efficiency factor of 0.62, as a non-weighted average, so that 110 (58.5%) out of the 188 plants reach R1≥0.6.
- Plants in Northern Europe have the highest R1 efficiency factor of 0.97, as a non-weighted average, so that 69 (97.2%) out of the 71 plants reach R1≥0.6.
- Low R1≥0.6 results in general, are from small size plants (throughput <100,000 tpa), located in South Western Europe producing electricity only.
- High R1≥0.6 results in general, are related to large sized plants (throughput <250,000tpa), located in Northern Europe with CHP production.

2.3.1 Belgium

Belgium has a limited amount of additional capacity, as traditionally they have a relatively self-contained waste market. It has been reported that in 2009, Belgium's total capacity was 2.55 million tonnes (Mt) with 2.48Mt of waste being processed through these facilities. In 2010 an additional 0.5-1.0Mt of capacity had been planned or was under construction. If all are constructed Belgium would have significant over-capacity. Gate fees are historically around €100 with an additional €3-€7/t incineration tax. Belgium would provide an attractive market if the capacity was available.

2.3.2 Netherlands

In 2009, the Netherlands had 7.2Mt capacity at EfW facilities and a further 0.6Mt under construction. Locally the Dutch only incinerate 6.3Mt of waste leaving a 15% over-capacity in the market. In 2010, 144ktpa of waste was imported into the Netherlands with this estimated to rise to 400ktpa in 2011. This over-capacity in the market has apparently triggered gate fees to plummet from €100/t (with no incineration tax) to less than half of this price. It has been reported in some cases to be in the range of €30-42/t. This was explored further with stakeholders and is discussed in Section 5 of this report.

The level of over-capacity and proximity to the UK make the Netherlands an attractive export market.

[9] http://www.tolvik.com/markets-and-data/reports/UK_Waste_Exports.pdf

2.3.3 Germany

The German market is the largest in North Europe and the thermal treatment market total capacity in Germany is estimated to be 26.3Mt which can be divided into 3 sectors:

- EfW – 19.3Mt
- RDF (Power Plants) – 5.0 Mt
- RDF (Co Incineration) – 2.0 Mt

The total feedstock supply from the German market is reported by Tolvik[10] to be 20.2Mt showing a 17% over-capacity. This has seen regional variations in gate fees from as low as €40/t and as high as €110/t.

2.3.4 Denmark

Denmark has an estimated 3.5Mt of EfW capacity with only 3Mt of suitable combustible waste, highlighting a 20% overcapacity. Incineration tax in Denmark is extremely high at approximately €50/t. This high tax is likely to deter exporters using these facilities restricting Denmark's ability to address over-capacity through importation.

2.3.5 Sweden

Sweden has a network of highly efficient incineration facilities with total processing capacity recently exceeding domestic waste production by 600ktpa. Further capacity is also under construction pushing additional capacity up to approximately 2.0Mt. Until recently this over-capacity provided Norway with a market to export waste to meet its landfill bans; however these imports are no longer sufficient to meet the over-capacity shortfall. The Swedish EfW market has increased its competitiveness in the market with the removal of incineration tax fees in 2010 and spot gate fees reported to be as low as €10-30/t. Again this has been explored with stakeholders and is discussed within Section 5of this report.

Sweden is one of the most attractive European markets for the export of UK/Irish produced RDF however the cost of transport does not appear to be as financially favourable in comparison with the Netherlands.

2.3.6 Norway

Norway has recently increased thermal treatment capacity from 1.1Mt to a projected 1.8Mt. This increase is expected to provide Norway with a modest over-capacity. Norway removed its incineration tax in 2010 at the same

[10] http://www.tolvik.com/markets-and-data/reports/UK_Waste_Exports.pdf

time as Sweden however according to Tolvik[11], the Norwegian market is not as attractive as the Swedish due to systematic changes within the Norwegian market.

2.3.7 Estonia

Estonia's total capacity of 0.3Mt has been designed to meet local landfill diversion requirements. Projected gate fees at these facilities are €30-40/t. Tolvik[12] considered there was little opportunity for Estonia to accept imported RDF to these facilities but there is current demand for SRF for cement kilns as discussed in Section 4 of this report.

2.3.8 Latvia

Latvia has a relatively high reliance on renewable fuels for its heat and power, reported to be around 42%[13]. Use of municipal waste/RDF as a fuel is not common practice with most of their renewable energy coming from waste wood and waste oil. Opportunities for RDF/SRF imports are limited to acceptance within a small number of cement kilns and are dependent on the demand for cement within the country.

2.3.9 Spain

In 2010, Spain had 11 incinerators and recovered energy from a total of 2.2 Million tonnes of waste. Spain is not known to have significant spare capacity within its EfW facilities. It actively promotes self sufficiency and has an incineration tax of between €5.7-16.5 per tonne.

2.3.10 Portugal

In 2010, Portugal had 3 incinerators and recovered energy from a total of 1.05 million tonnes of waste. This was against a domestic input of around 900,000 tonnes suggesting that a small amount of waste was received from other countries. Portugal has an incineration tax of between € 1.06 – 1.59 per tonne but given the small number of facilities and domestic use figures, the potential for significant import is considered to be low.

[11] http://www.tolvik.com/markets-and-data/reports/UK_Waste_Exports.pdf
[12] http://www.tolvik.com/markets-and-data/reports/UK_Waste_Exports.pdf
[13] http://www.eea.europa.eu/soer/countries/lv/soertopic_view?topic=waste

3. Regulatory Background

3.1 Waste Export Legislation

3.1.1 Introduction

Since March 1992, transboundary movements of wastes destined for recovery operations between member countries of the Organisation for Economic Co-operation and Development (OECD) have been supervised and controlled according to Council Decision C(92)39/FINAL on the Control of Transfrontier Movements of Wastes Destined for Recovery Operations[14]. Developments under the Basel Convention resulted in the adoption of Council Decision C(2001)107/FINAL in May 2002. As OECD Council Decisions are legally binding for member countries, the OECD Decision C(2001)107/FINAL has to be implemented in member states through the enactment of national legislation.

3.1.2 EC Waste Shipment Regulations (WSR)

The principal legislation is the EC Waste Shipment Regulations (WSR) which categorises wastes for export (and import) within the EU/OECD member states into two categories:

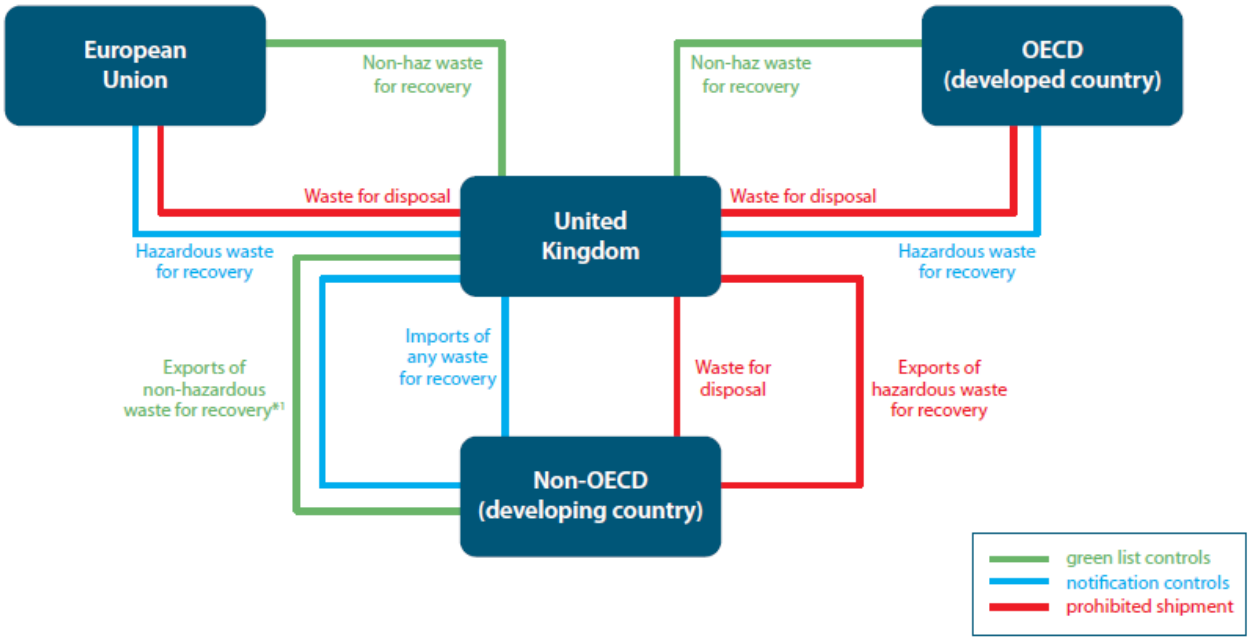
- Green List – wastes considered low risk to the environment falling within the defined Green List (largely recyclables). There are lower level controls with no requirement for prior approval or notification by the relevant authorities;
- Amber List – wastes being sent for Disposal or Recovery.
  - For other forms of waste (i.e. not on the Green List) which are to be 'recovered', there is a requirement for prior notification (generally on an annual basis) to the relevant authorities supported by documentation to validate the recovery route – e.g. guarantees, evidence of contract. Technically the relevant authorities do not approve such exports, rather they 'will not object'.
  - Disposal – export is generally not permitted other than in specific, exceptional circumstances in accordance with the relevant Waste Management Plan for each member state.

Municipal, C&I waste and the subsequent RDF/SRF are not regarded as Green List. The WSRs specifically exclude the export of municipal waste stating that mixed municipal waste with EWC Code 20 03 01 is subject to the same provisions as shipments of waste destined for disposal. Wastes mechanically treated to become RDF or SRF (classed as EWC 19 12 10) are however permitted where they are intended for recovery. Annex 2 of the Waste Framework Directive (WFD) 2006/12/EC provides the definition for 'recovery' relevant to the WSR. This includes the full range of activities which would generally be regarded in the UK as 'recycling' operations together with the processing of waste at identified thermal treatment facilities which meet the classification "R1 - Use principally as a fuel or other means to generate energy".

[14] http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=221&Lang=en&Book=False

Therefore, subject to prior notification to the relevant authorities, exports of waste which are not on the Green List and for which thermal treatment is the identified option are only permitted if sent to an R1 facility.

SEPA's website[15] provides the following figure, a rough guide, concerning the import and export of waste:



3.1.3 UK Transfrontier Shipment of Waste Regulations 2007

The Transfrontier Shipment of Waste Regulations 2007 (abbreviated as TFS) sets out the requirements for the enforcement of the European Union Regulation EC/1013/2006 on the shipment of waste within the UK. The government is currently consulting[16] on proposals for the proposed Transfrontier Shipment of Waste (Amendment) Regulations 2013, designed to update the 2007 Regulations.

The WSR's, specifically regulation 11, required Member States to prepare a Waste Management Plan and, amongst other things, gives the following guidance:

It is important for the Community as a whole to become self-sufficient in waste disposal and desirable for Member States individually to aim at such self-sufficiency.

For the UK this plan is the UK Plan for Shipments of Waste 2012[17]. The Plan sets out the Government's policy on shipments of waste for disposal to and from the UK. It implements the UK policy of self-sufficiency in the disposal of waste by strictly limiting when waste may be shipped to or from the UK for disposal and prohibits the shipment of mixed municipal waste (EWC 20 03 01).

[15] http://www.sepa.org.uk/waste/waste_regulation/transfrontier_shipment.aspx
[16] https://www.gov.uk/government/consultations/improving-enforcement-and-control-of-the-waste-exports-regime
[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69546/pb13770-waste-shipments.pdf

Any shipment of waste for which notification is required under Regulation (EC) No. 1013/2006 on shipments of waste is subject to the Plan. The Plan supports the EU Regulations and the Transfrontier Shipments of Waste Regulations 2007 and anyone shipping waste should do so in accordance with both the Regulations and the Plan.

In addition to the requirement to prepare a Waste Management Plan, the Regulations set out the requirements for shipment of waste within the community, whether import to the UK or export to another Member State. The Regulations also set out the requirements for export and import of waste from third countries and requirements to be followed for the transit of waste.

The proposed changes, which are set out within the current consultation document, cover a number of key areas:

- setting up the required legal gateway to allow Her Majesty's Revenue and Customs to disclose relevant exports data to competent authorities (CAs) in the UK. This will help CAs develop better intelligence on illegal waste exports;
- clarifying the role of the CAs for the transit of waste and the marine area(currently the Secretary of State fulfils this role which was a short-term measure);
- allowing the Border Force to stop and detain suspect containers should the opportunity arise;
- changing the fees payable for the import and export of waste into and from Northern Ireland. This will better reflect resources needed to enforce the 2013 Regulations and deliver the requirements of the WSR in Northern Ireland.

Changes are also needed as a consequence of the establishment of the new Welsh CA, Natural Resources Wales (NRW). Enforcement functions for waste imported and exported into and from the UK which start or finish in Wales therefore need to be transferred to the new Welsh CA as of 1st April 2014.

3.1.4 Ireland Waste Management (Shipments of Waste) Regulations, 2007

Proposals for the import and export of waste to/from Ireland are subject to the provisions of S.I. No. 419 of 2007 Waste Management (Shipments of Waste) Regulations 2007 which give effect to the Waste Shipment Regulations under Irish Law.

They are similar in nature to the UK Regulations but that shipments of mixed municipal waste (waste entry EWC 200301) collected from private households, including where such collection also covers such waste from other producers, to recovery or disposal facilities are permitted and subject to the same provisions as shipments of waste destined for disposal (prior written notification and consent procedures).

3.2 Definition of Recovery

In the revised WFD (Directive 2008/98/EC) the hierarchy prioritises waste prevention followed by preparing for re-use, recycling, recovery and finally, least favourably, disposal.

The Waste Framework Directive (WFD) Article 3 makes the following definitions:

- 'recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations; [Article 3(15)]

- 'disposal' means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations; [Article 3(19)]

Despite the lists of recovery and disposal operation provided in the Annexes of the WFD, the classification of a recovery operation or a disposal operation becomes uncertain when considering waste incineration. A Municipal Solid Waste Incinerator (MSWI) could be classified as either a recovery operation (R1 - used principally as a fuel or other means to generate energy) or a disposal operation (D10 - Incineration on land). As waste policy has evolved, and become increasingly focused on moving waste 'up the hierarchy', national targets for recycling and recovery reflect this shift in emphasis. The distinction between 'recovery' and 'disposal' has become progressively more relevant, both commercially and economically.

In 2003, the European Court of Justice made two judgements that established principles to differentiate between R1 operations and D10 operations. To be classed as an R1 operation the process must meet the following criteria:

- The combustion of waste must generate more energy than the process consumes;

- The greater part of the waste must be consumed during the operation;

- The greater amount of the energy generated must be recovered and used (either as heat or electricity);

- The waste must replace the use of a source of primary energy

These judgements superseded the previous standards used by Member States (such as calorific value of waste, quantity of harmful substances and energy efficiency of the process) without addressing the specifics of classifying a plant, so still did not ensure a consistent application of the WFD across Europe.

The Revised WFD now specifies that incineration facilities dedicated to the processing of municipal solid waste can be classified as R1 only where their energy efficiency is equal to or above:

- 0.60 recovery status - for installations in operation and permitted in accordance with applicable Community legislation before 1st January 2009

- 0.65 recovery status - for installations permitted after 31st December 2008

3.3 Export Procedures

3.3.1 Scotland, England, Northern Ireland & Wales

Application

To move notified waste from the UK an applicant/notifier must first make an application, known as a 'notification', to the competent authority of dispatch. These are:

- Environment Agency (for England and Wales (until 1st April 2014 then Natural Resources Wales));
- Scottish Environment Protection Agency (SEPA);
- Department of Environment Northern Ireland.

The competent authority will provide the notifier with a uniquely numbered Notification Document and a Movement Document. In order to complete the documents, the applicant must have:

- A contract with the business to which the waste is being sent for recovery;
- A financial guarantee in place to cover the cost of dealing with the waste if things go wrong
- Insurance to provide cover for any liability if the shipment causes harm to third parties
- Evidence that the waste is being dealt with in an environmentally sound manner at all times
- Evidence of compliance with relevant legislation concerning moving and recovering the waste.

Once complete, the two documents (known as the notification package) and all supporting information are provided to the competent authority of dispatch. The application cost depends on the frequency of movement currently starting at £1,450 for up to 5 movements and up to £14,380 for more than 500 movements.

Assessment

The competent authority checks that all necessary information has been provided and then sends a copy of the package to the competent authority of destination and to any competent authority of transit. Once satisfied that all documentation has been properly completed, the competent authority of destination acknowledges the notification back to all other parties including the notifier. The competent authorities then have 30 days to:

- Agree to the notification without conditions; or
- Agree with conditions; or
- Object to the notification in writing.

Moving the Waste

Once the necessary written consents have been provided by the competent authorities and the financial guarantee arrangements are in place, the consignee completes the Movement Document and sends copies to the person receiving the waste and to all competent authorities involved giving at least 3 days notice. A copy of the notification package must then accompany the waste to the recovery facility.

Processing the Waste

Upon receipt, the receiving facility completes the Movement Document and sends a signed copy to the notifier and the competent authorities involved. The facility must then recover the waste within one year and confirm by completing the Movement Document and sending a signed copy to the notifier and all competent authorities. This is called the "certificate of recovery/disposal"

In summary the movement of waste from or into England or Wales must be undertaken in accordance with the following procedures:

- apply in the right way with the relevant fee to the Environment Agency. The applicant can get an original numbered notification form and movement form from the International Waste Shipments team. Once completed, these forms should be submitted to the International Waste Shipments team for assessment.
- Put a financial guarantee in place to make sure enough money is available to deal with the waste if things go wrong, including the cost of returning the waste to the UK.
- Draw up a contract for the recovery of the waste, including specific terms, with the business that will be receiving and recovering the waste.
- Make sure there is insurance against liability for damage to third parties.
- Obtain all necessary permissions from the competent authorities in all countries concerned before moving the waste.

The same procedures exist concerning the import/export of waste to, or from, Scotland.

The Environment Agency has provided a waste export tool, available on their website[18]. The tool allows the user to determine the regulatory controls that are in place concerning the export of wastes for recovery to specific countries. The tool only concerns exports from England and Wales. The tool allows the user to identify the waste type to be exported, the country to which it is being exported, and the notification controls in place.

3.3.2 Ireland

A similar procedure to that described in Section 3.3.1 above is followed in Ireland. The designated competent authority in Ireland is Dublin City Council National TFS Office (NTFSO) (designation awarded by the Department

[18] http://www.environment-agency.gov.uk/business/sectors/124357.aspx

of Environment, Community and Local Government) and they require some additional information to that of the UK Authorities, namely:

- A list of proposed carriers/hauliers of the shipment;
- A transport itinerary.

3.4 Regulatory Enforcement

3.4.1 Introduction

It is the role of the competent authorities to enforce the regulatory regime concerning waste exports but the countries environmental regulators role to enforce waste storage and treatment. In this regard, position statements have been issued by each country's regulators as summarised below:

Environment Agency, England & Wales[19]
All exports from the UK of waste destined for disposal are prohibited. Exports for recovery are permitted in some circumstances, depending upon the classification of the waste and the status of the country of destination. The Agency states that in exceptional cases it may be possible to classify unsorted or partially sorted municipal/household waste in terms of its green list fractions, subject to the applicant being satisfied that certain conditions apply. The EA consider it unlikely that unsorted or partially sorted mixtures of municipally collected wastes can be accurately described in terms of their green list components. As a result the Amber list is appropriate for mixed municipal/household waste. The export of mixed municipal waste (20 03 01) is prohibited by provisions contained within the WSR and the UK Plan for the Shipments of Waste. RDF correctly classified as 19 12 10 Y46 can be exported only for recovery to EU/OECD member states using the prior written notification and consent procedure. The EA recognises that the export of RDF is increasingly common with month on month exports steadily growing from around 3,000 tonnes in November 2010 to a peak of around 92,000 tonnes in October 2012. No RDF exports have been returned but there are some quality issues from competent authorities of destination. EA operational staff have audited all RDF production and storage sites and are in the process of producing an audit report, are developing clear compliance methods and have developed an action plan for RDF. The approach set out by the EA makes clear the following: • Exports of municipal waste are prohibited (disposal or recovery) • Exports of treated municipal waste from a waste management facility are potentially permitted • The EA do not prescribe the level of treatment required but the waste must have undergone some form of treatment. Treatment can comprise mere physical treatment such as shredding, sorting and compaction. • The waste destined for export must meet the requirements of the destination facility • The waste must be destined for recovery, not disposal.

[19] Natural Resources Wales take over responsibility from 1st April 2014

Department of Environment, Northern Ireland
A combination of provisions within the WSR and the UK Plan for Shipments of Waste, effectively prohibit exports of municipal waste for recovery, however this prohibition does not extend to treated residual municipal waste from waste management facilities. The rules are unclear on the extent of treatment that municipal waste must undergo to remove it from the scope of the prohibition. Our Approach Exports of municipal waste are prohibited Exports of treated residual municipal waste from a waste management facility are potentially permitted We do not prescribe the level of treatment required; however the waste must have undergone some sort of treatment. This may comprise physical treatment such as shredding, sorting and compaction. The waste destined for export must meet the requirements of the destination facility The waste must be destined for recovery, not disposal. New provisions within the revised Waste Framework Directive may result in more stringent controls and more restrictive controls once its requirements are in force, we are currently liaising with the Department regarding those provisions.

Environmental Protection Agency, Ireland
It is now becoming common place in Ireland to export baled municipal waste for energy recovery that has been subjected to minimal treatment at waste management facilities. The National TFS Office has been engaging with the EPA on the appropriate EWC classification of material exiting EPA licensed facilities. The “treatment” carried on the municipal waste at the waste management facilities varies widely and can range from rudimentary or basic treatment with separation of large items followed by baling of the waste to more sophisticated treatment operations including shredding, removal of metals using magnets and trommelling/screening the waste into oversize and fines fractions. The question is, what is the minimum “treatment” necessary to justify a reclassification of the waste code from EWC code 20 03 01 mixed municipal waste to EWC code 19 12 ** – waste arising from mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified. It appears that the key point at which mixed municipal waste may move from 20 03 01 to a 19 12 ** code relates to where a waste treatment operation has or has not substantially altered the properties of the waste. The EPA is of the view that for a waste to move from EWC code 20 03 01 to 19 12 **, the waste must have undergone a treatment process that substantially alters the properties of the waste. A wide range of possible preparation techniques to produce RDF or SRF are possible including sorting (manual as well as mechanical), biological treatment, crushing, grinding, shredding, separation, screening, washing, drying, cooking, homogenisation, compacting etc. Key to the production of RDF/SRF is that the net calorific value of the waste is increased by the processing.

Scottish Environment Protection Agency
SEPA is committed to improving the quality of Scottish waste exports and preventing the illegal shipments of waste to and from Scotland. SEPA's overall objective is to disrupt the illegal export of waste from Scotland and the initial focus is on: A. Disrupting the illegal export of Waste Electrical and Electronic Equipment (WEEE). B. Disrupting the illegal export of mixed household waste. SEPA is focusing on these waste streams because of their hazardous nature and the significant environmental and social impacts they can have on the destination country. Toxic metals commonly found in electrical goods can contaminate land and water where appropriate treatment facilities do not exist. Unsorted household waste can contain a range of materials, from steel and aluminium to paper and plastic, and can even be contaminated by food and clinical waste. If there is a lack of sorting and recycling facilities in the destination country, there is often no option other than to landfill the waste or burn it in the open.

3.5 Environmental Permitting

3.5.1 England & Wales

The storage of RDF prior to export has come under increasing scrutiny recently given two, recent, high profile cases of improper storage[20]. Until April 2013, the Agency considered the storage of RDF at the dockside prior to export to be considered as a 'low risk' waste activity and therefore not subject to the requirement to obtain an Environmental Permit – the Environmental Permitting (England and Wales) Regulations 2010 allow for the storage of certain wastes at a dockside prior to export or import to take place under an exemption.

However, the EA withdrew this position following evidence of poor operating standards, inadequate containment, storage of inappropriate types of waste in excessive quantities, and local amenity problems such as odour, pests and flies. The EA is currently developing an appropriate permitting approach but in the interim, the EA will not pursue an application for an environmental permit so long as a number of criteria are met which include:

- The waste conforms to the classification EWC 19 12 10 - Combustible Waste - Refuse Derived Fuel. The waste has to meet the calorific, moisture content and other properties specified by the receiving EfW facility.
- The total amount of RDF (EWC 19 12 10) stored at any one time does not exceed 10,000 tonnes.
- The RDF is stored at the location for no longer than 3 months.
- The RDF is stored in a secure place.
- The RDF is stored as one of the following:
  - Fully wrapped bales that prevent the ingress of water, odour release and access by pests, on an impermeable surface with a sealed drainage system, or indoors.

[20] http://www.letsrecycle.com/news/latest-news/waste-management/illegally-dumped-rdf-found-at-site-in-birmingham

- Inside a secure and sealed container on an impermeable surface with a sealed drainage system.
- If not fully wrapped or containerised, inside a building that prevents the ingress of water, odour release and access by pests.

Importantly, these criteria are not applicable where RDF is stored internally at a site within 200 metres or externally within 500 metres of a European Site, RAMSAR site or Site of Special Scientific Interest[21]. This affects a number of facilities currently exporting material requiring them to have an Environmental Permit for their activities.

3.5.2 Scotland

SEPA requires operators utilising dockside storage to obtain a Waste Management Licence for their activities. SEPA considers that baled RDF has the potential to cause environmental harm and should therefore be stored in a secure environment and contained on solid surfacing with dedicated drainage.

3.5.3 Northern Ireland

The NI EA currently takes a similar approach to that of the Environment Agency in that an exemption from Waste Management Licensing is available for temporary storage of materials within port reception facilities. The exemption permits storage for a maximum of seven days as long as the amount does not exceed 20 cubic metres.

3.5.4 Ireland

Restricted and temporary storage at quaysides is permitted and requires the operator to obtain a waste permit from the relevant Local Authority. Such permits have been granted, by the relevant Local Authorities, to several ports for the acceptance and handling of waste material which facilitates the efficient shipment of waste not requiring stockpiling on the quayside.

3.6 Waste Policy

3.6.1 Introduction

In order to assess the drivers for each Nation, it is important to consider any specific requirements for residual treatment and RDF/SRF production within each country's plans and strategies. These are summarised below to aid discussion later in the report.

[21] http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/LIT_7754_a0f045.pdf

3.6.2 England

The Waste Strategy for England, 2007 sets out the Government's policies and tools to meet both EU and UK targets to make "faster progress on landfill diversion and recycling" and putting "more emphasis on waste prevention and re-use". The Government undertook a waste policy review in 2011[22] which would inform the National Waste Plan 2012, however the Nation Waste Plan is still to be published. These three documents reflect the Government's duty in regard to waste set out in The Waste (England and Wales) Regulations 2011. These will be used to meet the revised Waste Framework Directive target of 50% recycling of waste from households by 2020 and EU Landfill Directive targets in 2020.

Underpinning the Waste Strategy is the waste hierarchy which states that the "most effective environmental solution is often to reduce the generation of waste through prevention". The next most desirable approach is re-use (where products and materials can be used again, for the same or different purposes), then recovery of resources through recycling or composting, followed by energy recovery and then "only if none of the above offer an appropriate solution should waste be disposed of".

The draft Waste Management Plan for England makes reference to the importance of putting in place the right waste management infrastructure at the right time and in the right location. It refers to the Waste Framework Directive's requirements on Member States to establish an integrated and adequate network of waste disposal installations and of installations for recovery of mixed municipal waste collected from private households. The requirement includes where such collection also covers waste from other producers. Also that the Directive requires that the network shall be designed in such a way as to enable Member States to move towards the aim of self-sufficiency in waste disposal and the recovery of waste but that each Member State does not have to possess the full range of final recovery facilities.

3.6.3 Wales

"Towards Zero Waste"[23] published in 2010 is Wales' current overarching waste strategy. The strategy sets out three outcomes to be delivered, namely:

- A sustainable environment, where the impact of waste in Wales is reduced to within the Country's environmental limits by 2050. This means that waste production and management will only be at 'One Planet' levels;
- A prosperous society, with a sustainable, resource efficient economy; and
- A fair and just society, in which all citizens can achieve their full human potential and contribute to the wellbeing of Wales through actions on waste prevention, re-use and recycling.

[22] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69401/pb13540-waste-policy-review110614.pdf

[23] http://wales.gov.uk/topics/environmentcountryside/epq/waste_recycling/publication/towardszero/;jsessionid=402057C671AD4CEBB9E118497B71C358?lang=en

The long term objective of the strategy, to achieve zero waste by 2050, is ambitious – requiring the elimination of residual waste, the recycling of all waste produced and a progressive reduction in the number and/or capacity of residual waste treatment facilities from 2025 to 2050. This objective is underpinned by targets (minimum standards) for waste reduction 1.5% per annum up to 2050, 70% recycling including composting and preparing for reuse by 2025 (90% from construction and demolition), and a maximum target for energy from waste of 30% by 2025.

3.6.4 Scotland

In Scotland, the "Zero Waste Plan" (ZWP) sets out the Government's vision for achieving a zero waste society. The plan was published in 2010 and provides the overarching policy direction for Scotland. The ZWP sets out the ambition to link climate change goals, sustainable financial growth, renewable energy targets and the management of waste more closely to achieve the ambition of a zero waste society. The ZWP is considered to be Scotland's National Waste Management Plan, as required by the revised Waste Framework Directive (Directive 2008/98/EC), and sets out the national policy structure to implement the WFD in Scotland. The ZWP introduces a range of measures designed to meet and exceed the requirements of the WFD. These requirements are shown in Table 3.1 below.

Table 3.1 Scotland's Targets

Target[24]	Year	Policy
50% recycling/composting and preparing for re-use of waste from households	2013	Scottish Government target
Maximum of 1.8 M tonnes of biodegradable municipal waste to be sent to landfill	2013	Article 5(2) of the EU Landfill Directive
The preparing for re-use and the recycling of 50% by weight of waste materials such as paper, metal, plastic and glass from household waste and similar	2020	Article 11(2)a of the EU WFD
60% recycling/composting and preparing for re-use of waste from households	2020	Scottish Government target
Maximum of 1.26 M tonnes of biodegradable municipal waste to be sent to landfill	2020	Article 5(2) of the EU Landfill Directive
70% recycling and preparing for re-use of construction and demolition waste	2020	Article 11(2)b of the EU rWFD
70% recycling/composting and preparing for re-use of all waste by 2025	2025	Scottish Government target

One of the key provisions within the ZWP is the requirement for pre-treatment to remove key recyclable materials. The intention of the Plan is to ensure that Scotland does not simply move from mass landfill to mass incineration.

[24] Targets are supported by: 31/12/2013 ban on mixing source segregated materials and ban on landfilling and incineration of source segregated materials. 31/12/2015 requirement to remove dense plastics and metals from unsorted waste prior to incineration (at existing facilities; this requirement will come into effect on commencement of commissioning for new facilities). 31/12/2020 ban on biodegradable material to landfill.

Residual or unsorted waste must be treated to (i) remove any remaining recyclable materials, (ii) create a waste stream that can be used to recover energy, e.g. RDF and (iii) produce a stabilised fraction for landfill.

3.6.5 Northern Ireland

"Towards Resource Management" is the current waste management strategy for Northern Ireland. This document sets out the policy framework for the management of waste in Northern Ireland. This strategy covers the period between 2006 and 2020 and as such does not account for the requirements set out in the WFD, however the waste management strategy does highlight the need to move from "waste management towards resource management". As a result the strategy will be 'recast'. The revised strategy, "Delivering Resource Efficiency" has recently been subject to a consultation with a shift in the revised strategy "Towards Resource Efficiency". The Waste Regulation (Northern Ireland) 2011 reflects the commitment in Northern Ireland to apply the waste hierarchy as a priority in both waste management and prevention policies. It also highlights what Northern Ireland must include in the revised strategy the promotion and encouragement of closed loop recycling and measures to ensure that the EU landfill directive targets in 2020 are met.

3.6.6 Ireland

National strategy on waste management is set out within "A Resource Opportunity", published in July 2012. The strategy has a clear focus upon resource efficiency and the virtual elimination of landfilling of municipal waste. The strategy clearly states that the storage and export of waste will be strictly policed, ensuring that:

- no environmental damage arises from the storage of such materials prior to export;
- any exports taking place fully respect the requirements of the transfrontier shipment regulations, avoiding both the environmental and reputational damage which a breach of the regulations would cause; and
- exports are managed in an environmentally sound manner in the country of destination.

4. Current Market Activity

4.1 Introduction

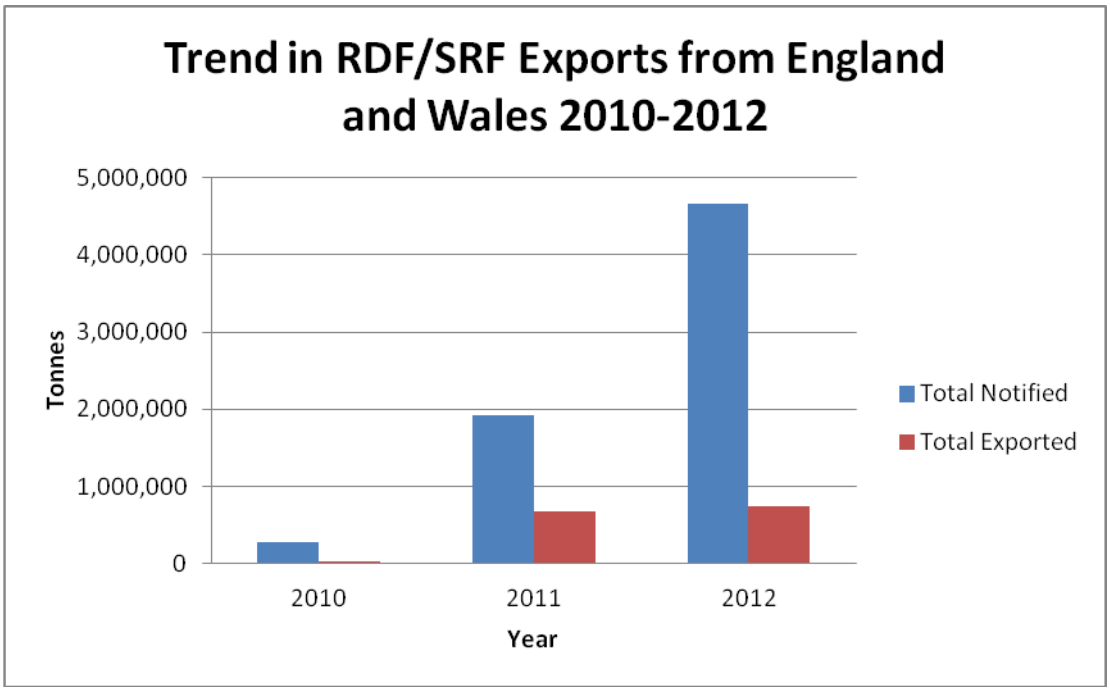
Data relating to exports was obtained from each of the Notifying Authorities. The level of detail varied considerably across the authorities, with SEPA and the Northern Ireland Environment Agency (NI EA) unable to provide more than total tonnage due to the limited number of companies involved in the practice but the Environment Agency and Ireland's NTFSO providing detailed information on current trades including notifiers, ports used for exports and receiving countries. This data has been used to provide analysis of trends over the last few years in exports of waste from the different countries of the UK and Ireland to a number of European countries.

4.2 England and Wales

4.2.1 Trend in Tonnage Notified and Exported

According to Agency data, a total of 680,631 tonnes of waste was exported from England and Wales in 2011 (against a notified tonnage of 1,915,975 tonnes). The amount that was actually exported in 2012 was similar at 739,535 tonnes but the notified amount was much greater at 4,658,115 tonnes. The increase from 34,733 tonnes in 2010 shows the increasing popularity of this waste management route in recent years. No exports were recorded from Wales in 2011 with 38,500 tonnes notified for shipment in 2012 of which only 3,740 tonnes was actually exported.

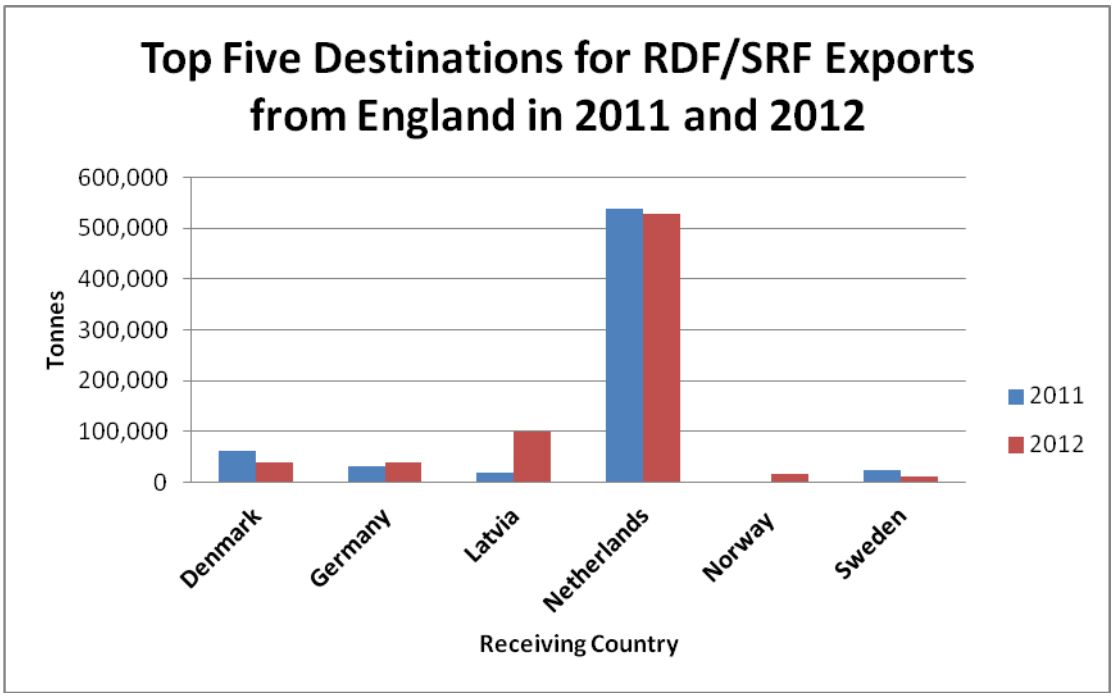
Figure 4.1 Trend in RDF/SRF Exports from England and Wales 2010-2012



4.2.2 Receiving Countries

The top five countries receiving exports from England in 2011 were Denmark, Germany, Latvia, the Netherlands and Sweden. In 2012, Sweden was replaced by Norway as the fifth highest receiver of waste exports as shown in Figure 4.2 below.

Figure 4.2 Top Five Destinations for RDF/SRF Exports from England in 2011 and 2012



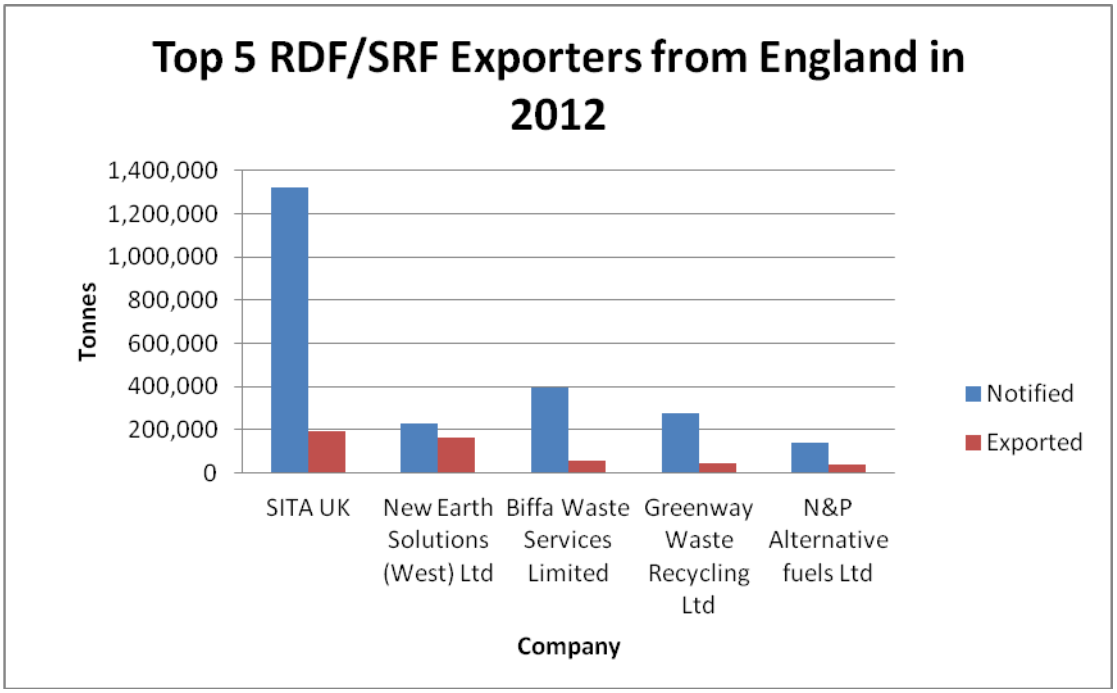
No RDF/SRF was exported from Welsh ports in 2011 but in 2012 exports were received by Sweden and Ireland.

Figure 4.3 Destinations for RDF/SRF Export from Wales in 2012

4.2.3 Exporting Companies

22 Companies notified the Authority of their intention to export RDF/SRF from England in 2012 19 of these completed at least one shipment. The companies exporting the largest tonnage are shown in Figure 4.4.

Figure 4.4 Top 5 RDF/SRF Exporters from England in 2012

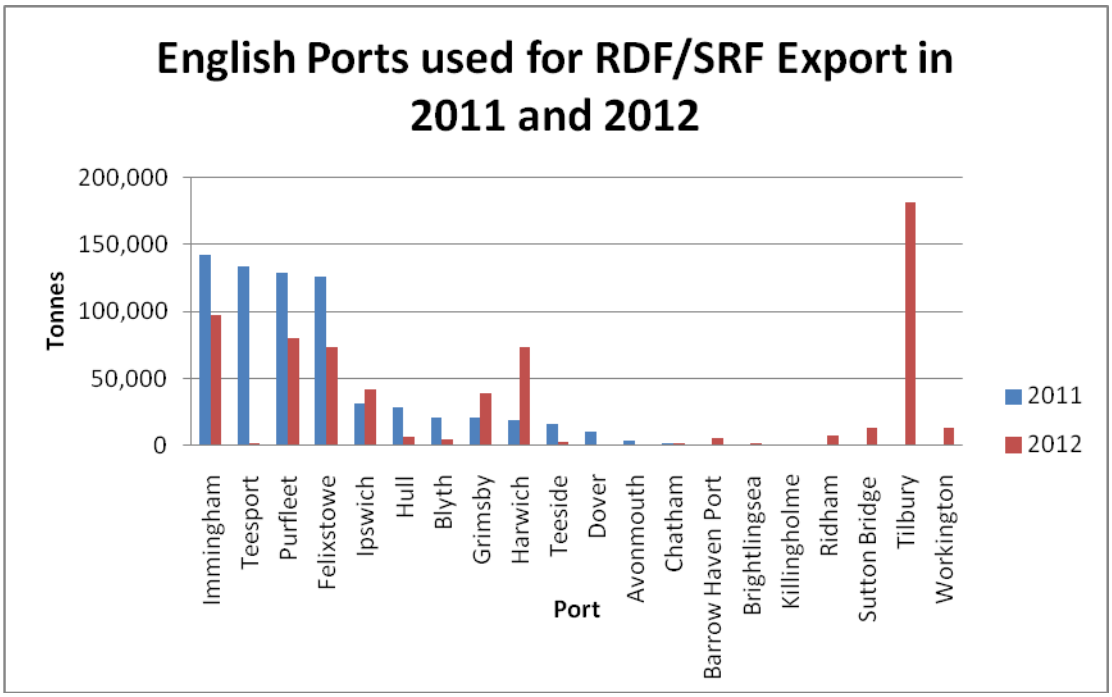


Only 3 Companies are listed as exporting material from Wales. These are N&P Alternative Fuels, Environmental Practical Solutions Ltd and Stobart Biomass Limited.

4.2.4 Ports Used for Shipments

Concern was raised by Regulators over the capability of some ports to handle RDF/SRF exports. According to the Agency data, the number of ports in England used for the export of this waste increased from 13 in 2011 to 18 in 2012. In 2011, there were two ports in England intended for use to export a total of 55k tonnes of waste, but nothing was actually shipped. These were Garston and Newhaven. Similarly in 2012, shipments were notified from Newcastle, Newhaven, Portsmouth, Hartlepool and Barking but the shipments were not completed.

Figure 4.5 English Ports used for RDF/SRF Export in 2011 and 2012



The same Agency data shows that Welsh ports exported no waste in 2011, but then started to export waste in 2012. Four ports (Pembroke, Swansea, Holyhead and Cardiff) had intended exports, but waste was only actually exported from Pembroke (524 tonnes of SRF bound for Ireland) and Cardiff (2,691 tonnes RDF bound for Sweden).

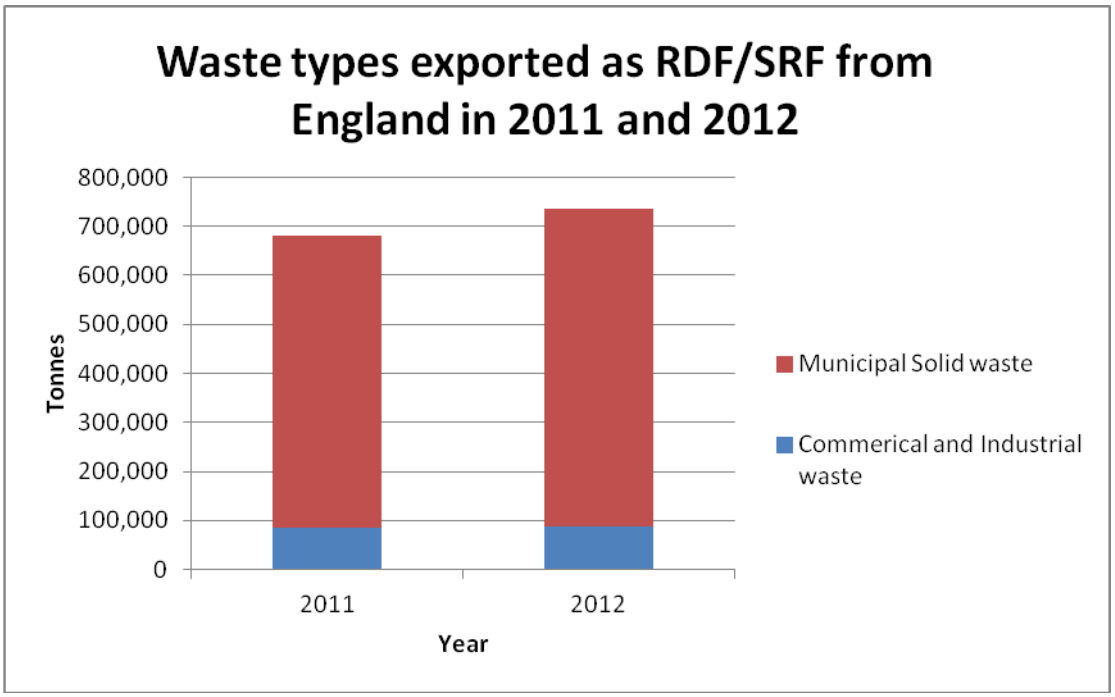
4.2.5 Waste Source

It is not wholly clear from the data provided whether the source of the RDF or SRF is from a MSW or C&I source. Where the waste is notified under Y46, then it has household waste origins but when notified under 19 12 12 and 19 12 10, it is only possible to determine the source from the waste description. Many refer to waste from municipal sources but where this was not clear it has been assumed that SRF is from C&I sources and RDF is from MSW sources. Using these assumptions shows the following:

- RDF made up 96.6% of the total quantity of waste exported from England in 2011 (of which 23.5% was described as End of Life Material from a MRF), while SRF made up the remaining 3.24%. In 2012 RDF dropped to 90.7% of RDF/SRF exports (only 3.6% being End of Life from a MRF) and SRF increased to 9.3%.

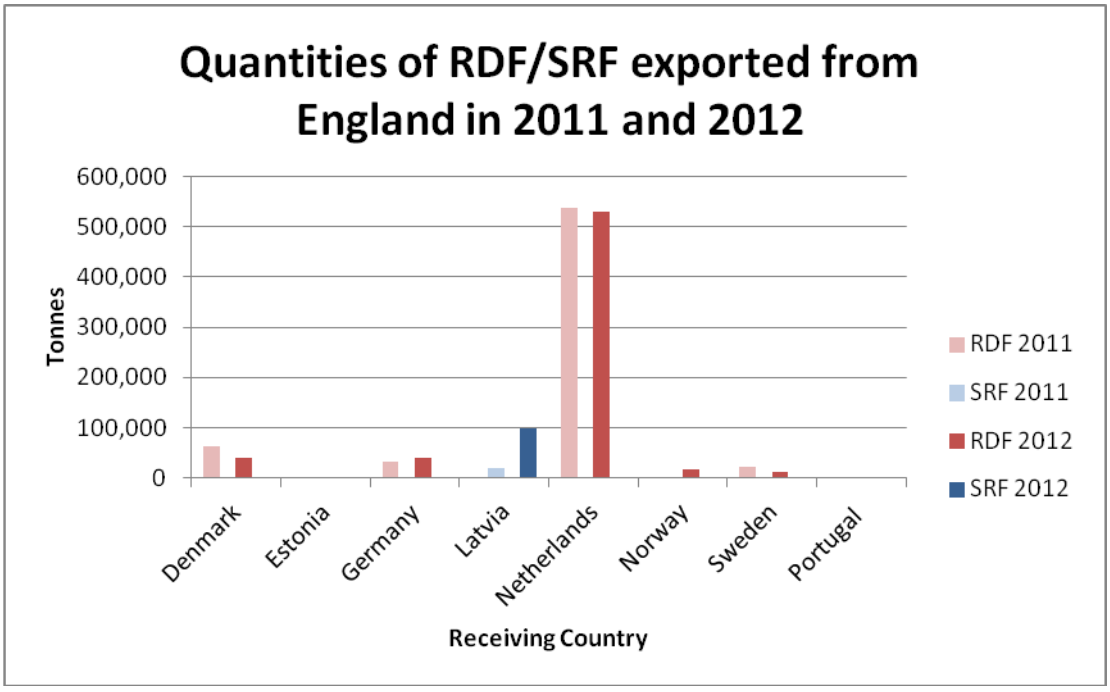
- In 2011, 12.6% of the total RDF/SRF exported from England and Wales could be classified as commercial and Industrial (C&I) waste, with the remaining 87.4% municipal solid waste (MSW). In 2012, the amount C&I waste exported was similar at 13.4% of the total as shown in Figure 4.6 below.

Figure 4.6 Waste Types exported as RDF/SRF from England in 2011 and 2012



The estimated quantities of commercial and industrial waste and municipal waste sent to each country of destination are shown in Figure 4.7 below. These show SRF was exported to only two countries, Estonia (1,600 tonnes) and Latvia, where it is known the market is at cement kilns.

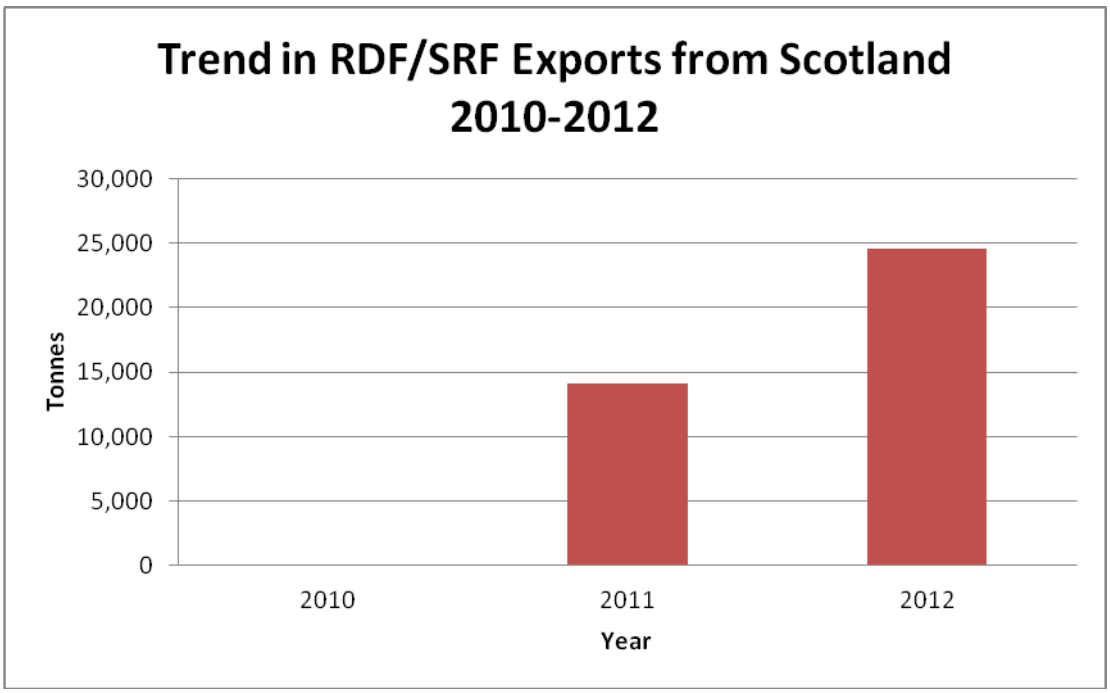
Figure 4.7 Quantities of RDF/SRF waste exported from England in 2011 and 2012



4.3 Scotland

Until September 2012, only 2,000 tonnes of RDF/SRF was exported from Scotland compared to 11,000 tonnes in 2011. However, in the last 3 months of the year RDF/SRF exports increased significantly giving a total of almost 25,000 tonnes for 2012. This was against 111,000 tonnes notified for the same period. This growth shows the increase in popularity of RDF/SRF exports and is likely to be linked to an increased demand from countries using the waste as a source of heating in winter months.

Figure 4.8 Trend in RDF/SRF Exports from Scotland 2010-2012



SEPA was unable to provide details of the companies involved in exports but from a review of company websites indicates that Wm Tracey, Dow Waste Management and New Earth Solutions are all exporting RDF/SRF from Scotland.

SEPA also advised that their records indicated approximately 2,000 tonnes of RDF/SRF transported to England with a final destination outside of the UK, presumably RDF/SRF exported via English ports.

From public register it is known that there are currently Waste Management Licences for RDF/SRF storage at 3 Scottish docks: 2 for Grangemouth in the east and 1 for Clyde Port in the west.

The most popular destinations are known by AMEC to be the Netherlands and Sweden.

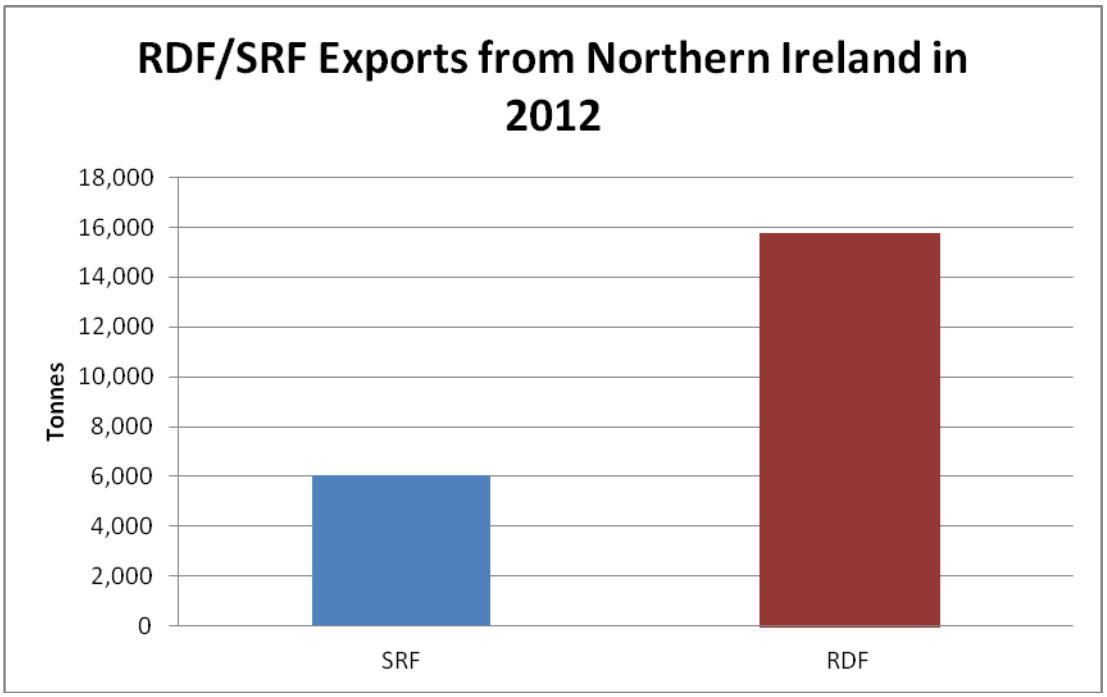
4.4 Northern Ireland

As with SEPA, limited data was provided by NI EA. This indicated two main export routes as shown in Figure 4.9 below.

Figure 4.9 Destinations for RDF/SRF Exports from Northern Ireland in 2012

The split of SRF and RDF was clear with exports to Ireland being SRF and those to the Netherlands being RDF as shown in Figure 4.10 below.

Figure 4.10 RDF/SRF Exports from Northern Ireland in 2012



NI EA also reported additional notifications including SRF to Latvia although this has not materialised.

4.5 Ireland

4.5.1 Trend in RDF/SRF Exported

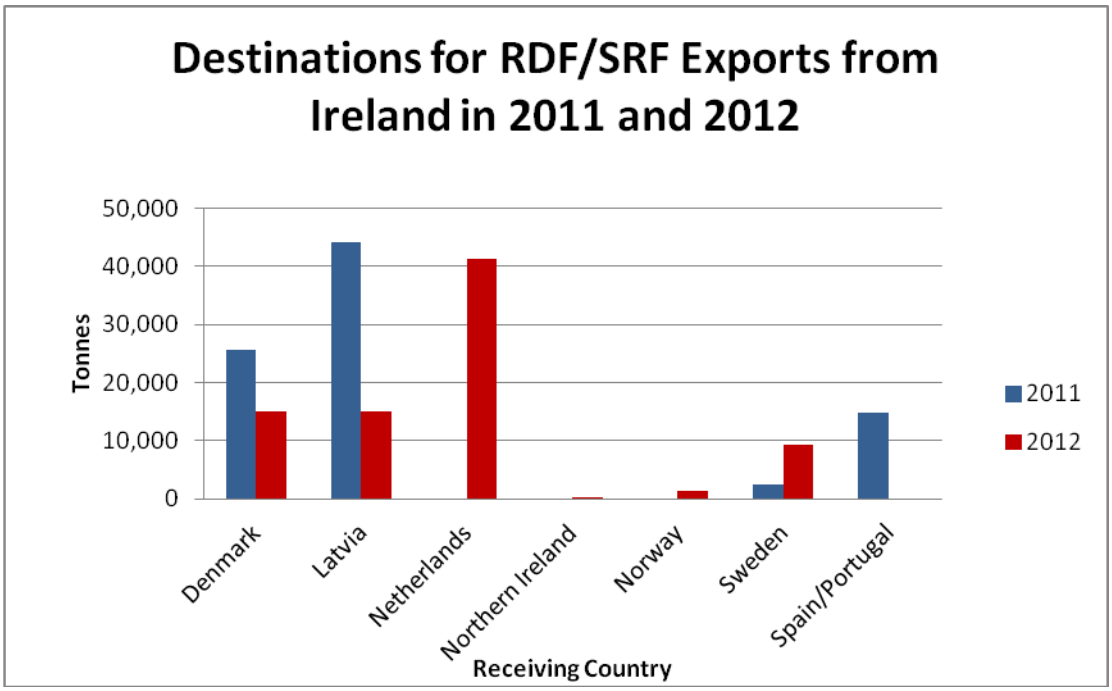
As mentioned earlier, there is no requirement for waste operators to produce RDF/SRF in preparation for shipment so waste data for 20 03 01, 19 12 12 and 19 12 10 along with Y46 were considered. During the stakeholder meeting the NTFSO indicated that the amount actual shipped is around 50% of the amount notified, attributing the difference to contracts falling through, operators keeping their options open, price changes and also operational constraints; for example if a movement fails to occur within the specified 24 hour period then a new notification is required. Data trends are shown in Figure 4.11 below.

Figure 4.11 Trend in RDF/SRF/MSW Exports from Ireland 2010-2012

4.5.2 Receiving Countries

As with England, the top receiving country for RDF in 2012 was the Netherlands. This differed from 2011 which saw the RDF/SRF export market dominated by SRF export to Latvia and Denmark as shown in Figure 4.12 below.

Figure 4.12 Destinations for RDF/SRF Exports from Ireland 2011 and 2012



4.5.3 Exporting Companies

6 Companies were listed as exporters for 2012 as shown in Figure 4.13 below.

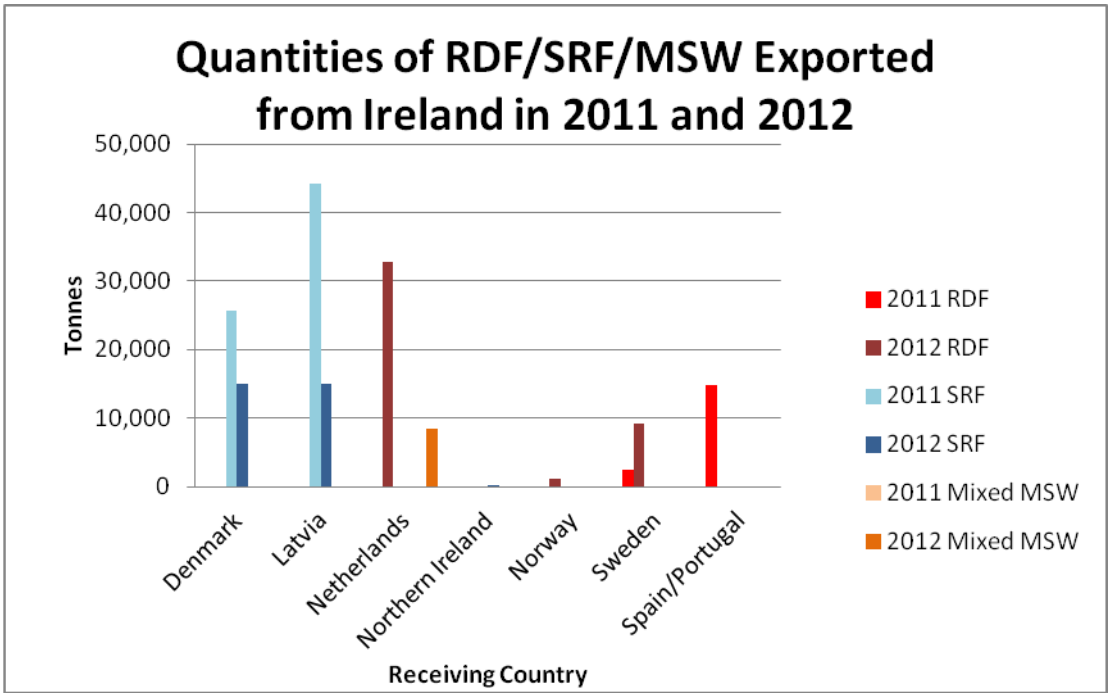
Figure 4.13 Companies Exporting RDF/SRF from Ireland in 2012

4.5.4 Waste Sources

The majority (95%) of waste notified from Ireland in 2012 was classified as Mixed Municipal Waste (20 03 01 or 19 12 10) or Y46 (household) with the exception of around 5,000 tonnes classified as SRF Y18 (19 12 10). All exports to Latvia, which accepts waste within its cement kilns, were classified as SRF Y46 meaning that it also has a MSW source.

Figure 4.14 indicates the split between RDF and SRF shipped from Ireland as described within the NTFSO database.

Figure 4.14 Quantities of RDF/SRF/MSW Exported from Ireland in 2011 and 2012



4.5.5 Waste Imports

Ireland also reported a small amount of SRF import from Wales in 2012. This was 500 tonnes reported by Wales as having been exported from Pembroke Docks.

4.6 Commentary/Summary

As expected, the data highlights the increase in RDF/SRF exports across the five countries in recent years. Of note from England's data, is the variation between notified tonnage and actual shipments, and the much smaller increase in shipments between 2011 and 2012 compared to the previous year. It could be assumed that this was a result of increased domestic availability, although evidence on a smaller scale in Ireland showed no decrease in RDF/SRF

exports when domestic plant capacity became available in 2012. Other influences such as changes in landfill availability, charging and general economics will all have played their role.

The Netherlands was by far the largest receiver of exported RDF with Sweden, Denmark and Germany the next most popular. The popularity of Denmark is surprising given that the country has an incineration tax and limited capacity to receive imports and was another question for Stakeholders. Although a much smaller market, SRF exports to Latvia and Estonia also increased between 2011 and 2012. Again this trend is discussed further in the next section.

There are a number of European Countries which do not accept imports. From stakeholder discussions it was reported for example that Italy is self-sufficient with no appetite for export or import, as is Belgium which has sufficient fuel for its energy producing plants. Imports to Spain, Portugal and France were also reported as limited, again due to lower available capacity within their facilities.

In terms of companies involved in exports, the data shows an increase in the number of companies involved, particularly in Wales and Scotland where exports were negligible or limited in 2011. The majority of shipments are in the order of 2,500 tonnes which typically represents a full boat load of bales, with very few shipping smaller amounts but some exporters (most of which are listed for both 2011 and 2012) have shipped larger/multiple loads, perhaps showing an increased confidence in the market place.

The number of ports used for RDF/SRF shipments is significant and includes a number of smaller ports which will have lower levels of traffic. Interestingly the most popular ports in 2011: Immingham, Teesport, Purfleet and Felixstowe were not the most popular in 2012 where the largest exports of RDF/SRF were from Tilbury Docks in the south of England.

In terms of understanding the source of the material within shipments, the data is not clear. Notification requires input of the EWC code, the Y code and a description of the waste but these contradict each other in some entries, perhaps highlighting the lack of a code for SRF and C&I wastes. From the descriptions there are four popular entries – RDF, SRF, mixed municipal waste and waste generated as rejects from MRF activities. The first and last generally tie in with EWC 19 12 12 and 19 12 10. The use of Y46 is commonly used against all four, with Y18 (waste from industrial processes) less so, but a scan of company data appears to show Y46 entries from companies who claim to only deal with C&I waste. This would suggest that some clarity from the competent authorities over descriptions might be useful.

5. Stakeholder Engagement

5.1 Introduction

In order to understand the drivers behind the current export practice and its potential future, extensive discussion was undertaken with stakeholders throughout the supply chain:

- Regulators;
- RDF/SRF Producers;
- Exporters (including Brokers);
- Importers (including Brokers);
- Receiving Facilities.

A list of all consultees is provided in Appendix C. Discussions were held by phone and face to face where possible with questions posed on current practice, the effectiveness of regulation, views on future practice. Rather than report these discussions by stakeholder & country, this section records the responses to the questions posed initially by CIWM/AMEC and also relevant topics of discussion (themes) that were raised during individual interviews.

5.2 Why is RDF/SRF Export Prevalent?

As shown in Section 3, the export of RDF has become prevalent particularly from England, Scotland and Ireland. The same cannot be said for Northern Ireland and Wales.

Across the stakeholders consulted, the main reason stated for RDF export is financial, driven by the increasing cost of landfill (tax) in the UK and Ireland. It appears to have become the cheapest option for waste disposal rather than being considered a step up the waste hierarchy. It is relatively easy to produce RDF and relatively easy to export once the requirements of TFS are understood. The lack of alternatives to landfill within the UK was stated as a secondary consideration but all stakeholders said they would use local facilities if available and the costs were comparable. It was noted by several that gate fees at UK & Irish EfW facilities seem to track the increased cost of landfill rather than becoming a more competitive option as landfill tax rates increase. This view was expressed more strongly by the smaller contractors, some of whom felt that if 2020 Landfill Directive BMW targets had been met by their Nation, then landfilling should not be financially restricted further since it is pushing up the cost of all other local options. A number of larger companies did however state that their customers were requesting or stipulating more environmentally acceptable routes than landfill for their waste, termed “affordable diversion”, particularly in Scotland where the requirements of the Zero Waste Plan are becoming familiar.

SRF production and export has the same driver as RDF export in that it is financially driven but its production is becoming more about producing a quality fuel with a market value, rather than finding a waste disposal/recovery route. However, the availability of suitable plants is limited and highly dependent on the construction industry’s

requirement for cement, with only a few cement kilns and power plants in Europe accepting SRF. This demand for waste fuel has fallen in 2012 from 2011 and has resulted in a "gate fee" being paid to some plants rather than being a purchased item in lieu of more expensive fossil fuels. Those that do accept SRF are working towards accepting more SRF as a blend for fossil fuels. For example, according to its website, Cemex has a plan to use 35% alternative fuels in its European plants by 2015. However, AMEC understands that they are already using between 70% and 100% alternative fuels in their UK facilities and that they plan to use 35% alternative fuels in all facilities worldwide. Discussions with regulators and the review of export/import data shows a much smaller volume of SRF being exported than used domestically. The main receivers of SRF exports are in Ireland, Latvia and to a lesser extent Estonia. Interestingly, as shown in Section 4.5, SRF is being exported from Wales to Ireland while lower grade RDF is being exported from Ireland in a much larger volume (500 tonnes versus 43,000 tonnes).

5.3 RDF/SRF Quality

The quality of RDF for export, as mentioned previously, is the subject of great regulatory debate and concern at the moment, prompting regulators to issue the statements discussed in Section 3. Most RDF producers stated that they undertook the minimum level of treatment to allow their waste to be legally exported and would export residual waste if this were permitted. Indeed, according to the data and discussions held in Ireland, the largest portion of "RDF" exported is now EWC 20 03 01 (mixed municipal waste).

Discussions with RDF receiving plants in mainland Europe indicated that they had no preference for a high quality input and that RDF was a small proportion of an input that was largely mixed domestic waste. They stressed that over-processed RDF could cause problems at the plants, particularly pelletised waste that was too small to feed into the furnace by mechanical grab, and "fluffy" or "dusty" waste that got caught in the extraction systems. A couple of receiving plants commented on the amount of valuable resource remaining within the imported waste stream and that they saw no reason why this should not be removed at source. They have no requirement for this and would prefer a purely residual waste stream with relatively high moisture content and a calorific value of around 10 MJ/kg. The majority of their contracts in the UK and Ireland were from household/MSW sources. There is increasing research into the recovery of valuable resource post processing at these facilities. It was suggested that there is a quantity of precious metals (platinum and gold) within the bottom ash which is not currently recoverable through the use of magnets (which extracts other metals).

SRF quality is key to its use within cement kilns and power stations. There are two types of SRF acceptable to these plants, these being SRF calciner grade and SRF mainburner grade. The calciner grade requires preheating prior to use and is of lower grade that SRF mainburner which has a specific size, a lower moisture content and lower metals & halogen content that is in excess of the CEN standards. The majority of SRF appears to be prepared to mainburner grade and commands a higher price in the market. The base material for this is mainly rejects from MRF's and C&I streams with low biodegradable content. One stakeholder commented that there are only a few countries able to provide the correct quality of SRF to their industry. Two such countries are the UK and Ireland.

Interestingly, no stakeholder referred to use of the CEN standards, all stating that their specification was plant specific but of a similar or higher level than the standards.

5.4 Contract Lengths

The general view appeared to be that contract lengths were currently being determined by the TFS authorisations of 1 year or 3 years rolling. This was discussed as partly being due to inexperience in the current market with many new to the practice (as shown by the rise in exports in the past 12 months). Those companies more familiar with exporting materials had 3-5 year arrangements in place and some receiving plants stated that they were now signing contracts for UK supply for up to 10 years. Unknown changes in regulation and tax were named as reasons to only commit to 3-5 years. The majority of receiving plants are new or have a remaining operational lifespan of at least another 20 years and will offer contracts for whatever contract length is acceptable to their customers. They would consider legislative changes as "force majeure" within the contracts so they do not see these as a barrier to long-term trade.

5.5 Cost Levels

Evidence gathered on costs were still comparable with those recorded by Tolvik in their UK Waste Exports Report in 2011. The average "all in" cost for shipment and recovery to Netherlands and mainland Europe from UK/Ireland was found to be €80-100 roughly broken down as follows:

- Baling & Wrapping - €5-10 per tonne
- On-land Transport (up to around 40 miles) - €10 per tonne
- Administration & Port Costs – €5-10 per tonne
- Sea Transportation Costs - €0-15 per tonne
- Gate Fee - €40-60 per tonne

The cost of preparing residual waste into RDF was reported as being a further €15-20 per tonne.

The mode of transport and amount of material in transit also has a bearing on the transportation costs. Smaller baled consignments using shipping containers and curtainsiders can take advantage of "back-loads" where the transport has already been paid for by the company importing material/goods to the UK and Ireland so it is essentially empty and free on the return leg. Transporters of larger consignments charter or own freight carriers that can accommodate 2,500 to 2,700 tonnes of individual bales. These ships can also have come to the UK and Ireland carrying raw materials and are potentially returning empty. Where a company is undertaking regular shipments it can be more efficient and cost effective to arrange a dedicated ship.

The location of the receiving plant is also relevant. Those located close to the docks can collect containers that have been loaded directly onto the ship without an accompanying vehicle for transfer to the plant. Some ports were reported to be more set up to receiving baled RDF/SRF than others, with exporters stating that the facilities are improving as tonnage through these ports increases. Road transport to Germany remains a popular and cost effective transportation method also due to the location of the plants. The main receiving plants at the moment are those accessed via the River Rhine which can only be navigated by certain container ships.

5.6 How long does the process take?

Stakeholders reported an average of 3 months from notifying the relevant authority through application for the TFS authorisation to actual shipment date. The key time limiting steps from longest to shortest time required in the process are:

- Arranging the financial bond;
- Accumulating enough waste at one location to make a shipment viable;
- Receiving authorisation from the relevant authority;
- Arranging the transport;
- Agreeing the contract with the receiving plant.

5.7 Why is portside storage required?

Portside storage allows for the collection of RDF prepared for storage from various sources in order to make up a full shipment of 2,500 – 2,700 tonnes. It appears to be more commonly used by waste management companies with lower quantities, who may take a while to accumulate sufficient material. A maximum of 3 months portside storage is permitted by the Environment Agency and SEPA (although there are currently different approaches to licensing) but this is not a long period of time considering the length of time required to obtain a TFS authorisation. The alternative, such as that adopted by the largest exporter from Ireland, is to wrap the RDF at individual customer's premises and bring it together at the port only for the purpose of loading.

There are operational issues that affect the requirement for dockside storage. They include:

- time limitations on loading within the TFS authorisation (ranging from 1-5 days across the 5 Nations);
- bad weather at sea or port; or
- other complications with docking and loading the ship.

It is not always possible to complete the loading process within the time period allowed and where this is exceeded, a new authorisation is required. This is reported to lead to either a volume of material being left on the dockside or double notification being required, which would partly explain why the amount of waste authorised is greater than that actually shipped.

A few stakeholders also mentioned seasonal requirements for RDF in some countries, particularly Sweden although this was dismissed by the Swedish stakeholders involved in this study. It was reported by others that Sweden requires greater imports of waste during the winter months (September to March) due to their use of the material to generate heat. This can lead to the stockpiling of bales during summer months or for storage requirements where operational problems caused by our winter weather have affected shipments.

One regulator said that they had been asked to extend a 3 month storage limit to 9 months but that this had been refused. This was mainly due to the potential for degradation of the RDF within the bale and resulting environmental impacts.

5.8 Is RDF/SRF export just for the big companies?

AMEC found no evidence that nationally-operating waste management companies with large tonnages were the only companies involved in exports. This is not reflected in the list of companies provided by the Environment Agency and NTFSO. The majority of notified and actual shipments reflect a full boat load of material however the range of companies listed includes small local operators as well as the larger companies that operate nationally. AMEC spoke to a range of exporters and brokers during this study and all considered that exporting was achievable "once you got the hang of it".

5.9 Does the current regulatory system work?

There have been a number of press articles in the past 12 months reporting problems with RDF storage at docksides and on farmland under the guise of agricultural material[25]. The approach from the regulators has been to issue guidance as provided in section 3 of this report, however each regulator has focussed on a specific area i.e. the EA and SEPA on Portside Storage (different approaches), the EPA on the pre-treatment level required for 20 03 01 to become 19 12 12 and 19 12 10, but with no clear combined guidance. It was reported that this has lead to a degree of "waste tourism" where waste is being transported around the UK in particular, but also between Northern Ireland and Ireland to a port of least resistance/regulation. Most stakeholders considered that the regulators did a good job and acknowledged that all parties were still learning, with the regulators slightly ahead of the exporters reflecting the infancy of this practice.

The key areas of concern raised by stakeholders are outlined in the sections below.

5.9.1 Portside Storage

The issues most frequently raised by stakeholders were the quality of facilities used for portside storage and the time period that RDF is held. A number of the ports are reported as being highly efficient, organised and able to offer undercover secure storage. Other ports, especially the smaller ports with smaller volumes of commercial traffic, are less capable in this regard. The issues arise when the content of the RDF bales become exposed, which can be a combination of poor compaction, poor wrapping, poor handling and the length of time since wrapping. The inclusion of poorly compacted biodegradable waste can potentially lead to effluent and gas being produced which swells the bale and makes the wrapping liable to splitting or liable to destruction by vermin. A potential fire risk also exists. Stakeholders suggested that six layers of wrapping was advised by regulators, but no documented evidence of this could be found.

[25] http://www.letsrecycle.com/news/latest-news/waste-management/agency-alarm-at-rdf-disguised-as-hay-bales

5.9.2 Loading periods within TFS Authorisations

There appears to be different approaches to loading periods across the 5 Nations leading to a requirement to over notify the amount of waste being shipped. All 5 countries require 3 days pre-notification of the shipment, but then the NTFSO provides 24 hours for transfer of material from source to port while the Environment Agency provides 3 days for loading and SEPA up to 5 days for loading.

5.9.3 The "point of notification" within TFS Authorisations

Despite guidance from NTFSO, Ireland and Annex IC issued by DG Environment, stakeholders referred to no clear guidance on whether the documented point of notification should be the point of generation or the port. One regulator advised that they would prefer this to be clarified across the 5 countries, as the point of generation/baling, with the port used a transit point. They considered this would limit the accumulation of bales at the dockside.

5.9.4 Inspection and Control

One regulator felt that there was insufficient control at the dockside in that they were unable to open individual bales to check the quality. This resulted in the quality checks being done at the receiving port or receiving plant. A different regulator said that they regularly undertake bale inspections and will stop a shipment if they suspect the RDF/SRF is not as required. They would however prefer to pass their concerns back to the local enforcement teams to ensure the process generating the material was sufficiently capable.

Regulation at receiving ports also appears to be inconsistent. The TFSOs at German ports are reported as being the strictest on inspection and control with a number of loads being impounded prior to extensive checks. There are also reported to differences in approach across the different ports/TFSO boundaries. These are primarily quality checks against the contract documentation but some export stakeholders reported receiving queries that showed a basic lack of knowledge about the process such as the difference between gross and net calorific value.

Interestingly, no-one knew of a load being returned to the UK for non-compliance with the contract.

5.10 Energy from Waste Prevents Recycling

AMEC found no evidence from stakeholder discussions that the use of EfW prevents recycling. The majority of EU Countries with high levels of energy recovery also have high levels of recycling which has, in part, led to available capacity within the plants. The furnaces within these plants can accept a range of waste streams and are sufficiently sized to allow blending of materials with different characteristics. As noted above, receiving plants reported no requirement for recyclables to be present within the waste stream and one suggested that, given the major investment already made in Europe in thermal treatment, the UK and Ireland should perhaps focus on extraction of high value recyclates which would have lower capital investment (and may be more acceptable to the funders in the current economic climate) and lead to smaller exports to Europe.

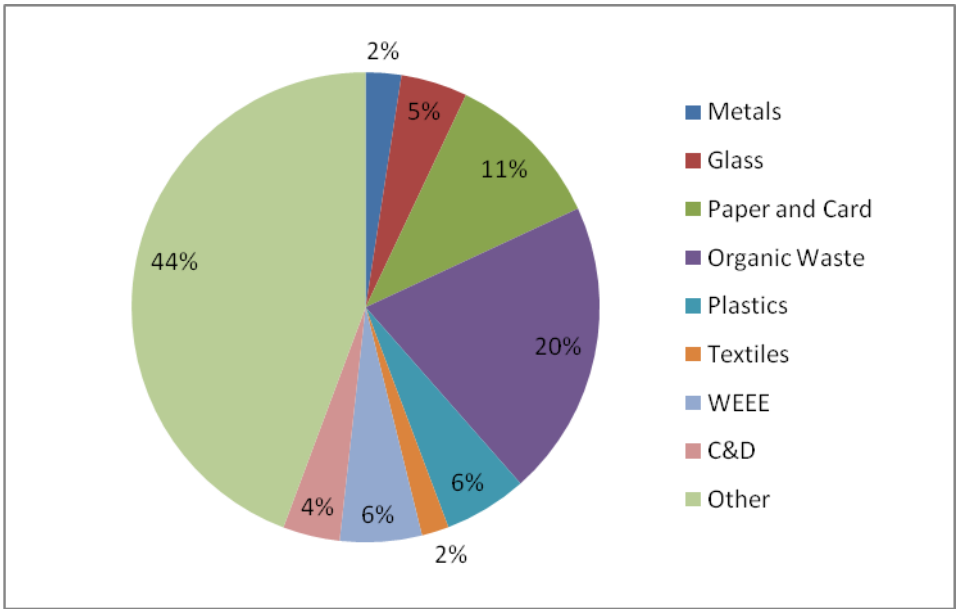
5.11 Why is capacity not available in the UK and Ireland?

The general attitude to EfW in the UK and Ireland is that it is a waste treatment technique rather than a source of alternative energy. The facilities that are operating are generally at capacity having been required by funders to have full feedstock available and are under contract for the long term (up to 25 years) prior to construction. They are typically operated by the private sector receiving MSW streams. There are a few facilities developed with excess capacity for C&I or merchant inputs and even fewer developed on a purely merchant basis. In comparison the receiving plants on the continent are largely built, owned and operated by the public sector, but also intentionally built to deliver highly efficient outputs as part of an integrated energy network. The drivers for building large plants stem from high efficiency requirements for energy in the form of Combined Heat and Power (CHP): electricity, heat and steam. They are considered as energy plants rather than waste treatment/disposal facilities and are located alongside energy users such as refineries, large scale manufacturers and/or urban development's with district heating.

5.12 Is RDF/SRF a Renewable Fuel?

The composition of waste is continuing to change as waste prevention and recycling initiatives improve. For the UK and Ireland to achieve a 70% recycling rate as proposed in Scotland and Wales, countries will need to extract around 75% of available glass, metals, plastic, organics, textiles and paper & card. This will leave a residual waste with a composition similar to that shown below which, due to the high level of extraction across all materials, is actually similar to its current composition.

Figure 5.1 Typical Composition of RDF



The Department of Energy and Climate Change (DECC) provides guidance so that plant operators can determine the level of funding supports (in the form of Renewable Obligation Credits (ROCs)) they can receive under the

Renewables Obligation (RO)[26]. Using the guidance to calculate the amount of renewables that are eligible for ROC support indicates that around 50% of this material is considered renewable with a further 30% considered fossil (plastics). This concurs with the general support assumption used by DECC for EfW with CHP as a 50% support level unless shown otherwise by analysis.

5.13 Should SRF/RDF be a fuel rather than a Waste?

According to Article 6 (1) and (2) of the Waste Framework Directive 2008/98/EC, certain specified waste shall cease to be waste when it has undergone a recovery (including recycling) operation and complies with specific criteria:

- A market or demand exists,
- There are technical requirements, legislation and standards,
- The material is commonly used for a specific purpose,
- There are no adverse environmental or health impacts.

There have been requests from the waste industry to consider reclassifying RDF and/or SRF as a fuel rather than a waste (the link provided is one example[27]) with a variety of reasons put forward in support of this which include:

- Recognition as a fuel would make RDF/SRF a commodity and give it a value;
- Receiving plants would not be subject to waste related controls, namely the Waste Incineration Directive and require an environmental permit to operate.

It would be unfair to consider both SRF and RDF in the same context since the composition is completely different. SRF is prepared to a specification and could therefore satisfy the WFD's criteria in this regard whereas there is no current standard for RDF. However, both would satisfy the WFD's criteria in that a market or demand exists for both, and both RDF and SRF are commonly used for energy recovery.

No stakeholder questioned for this project thought that the present classification presented a problem to SRF/RDF exports. One stakeholder suggested that both should remain a waste for as long as the receiving facilities require flue gas treatment systems to deal with the by-products. This would link to the fourth WFD criteria and would appear to be a sensible statement given that flue gas treatment is currently required at receiving plants to reduce the environmental impact from emissions generated by both RDF and SRF energy recovery processes.

[26] http://chpqa.decc.gov.uk/

[27] http://www.shanks.co.uk/blog/government-s-attitude-to-srf-is-a-wasted-opportunity-to-secure-energy

6. Future Market Activity Assessment

The general view of stakeholders was that export of RDF will continue until there is an economic domestic alternative outlet. With increasing landfill tax levels making the export of RDF the next best alternative, it is not surprising that this route has become popular across the UK and Ireland. This is exacerbated by a lack of domestic alternatives and high gate fees at the relatively few operating energy recovery facilities.

The market for SRF use is slightly more positive with more contracts becoming available for domestic supply and export. Heidelberg Cement[28] report that worldwide cement production is likely to rise from 2.77 billion tonnes in 2007 to 3.4 billion tonnes in 2015 and this will have a positive effect on the demand for alternative fuels. Unfortunately a large proportion of this requirement will be in the rest of the world (e.g. India) rather than in Europe which has its own regulatory issues.

The available capacity at the receiving plants in Europe is not in short supply and unlikely to become so over the next 5 to 10 years. Many European plants have a further 20 year lifespan and new facilities are still being built to provide alternative energy sources. Stakeholders were asked for their views on the demand for this capacity from eastern European Countries who are also looking at energy recovery to achieve Landfill Directive requirements in 2020. The stakeholders from receiving plants considered that there would not be an issue given that the main EU Countries will all export less, as recycling levels continue to rise in their Countries, so capacity will continue to be available to accept waste from across Europe. Some eastern European Countries, where labour is cheaper, are also thought likely to develop their own facilities in advance of 2020. Contracts are currently available at the main European plants beyond 2020 with terms included for regulatory change, so the opportunities exist to continue exporting RDF/SRF from the UK and Ireland if desired.

Comparison of the UK/Ireland requirements (as defined in Section 2 of the report in relation to the current availability of capacity in UK/Ireland and Europe) indicates that sufficient domestic supply will not be available to treat the residual fraction of waste (as RDF/SRF) if targets are met until 2025 as shown in Table 6.1 below:

[28] http://www.globalcement.com/news/itemlist/tag/Alternative%20Fuels

Table 6.1 Assessment of Domestic Capacity Requirement

	England	Wales	Scotland	Northern Ireland	Ireland
Potential RDF/SRF Production (Mte) (60% of Residual) assuming targets to 2025 are met.	**21.77**	**1.52**	**1.12**	**0.67**	**1.01**
Current Domestic Operating Facilities (Mte)	**7.3**	**0.26**	**0.15**	**0.31**	**0.2**
Domestic Facilities Under Construction (Mte)	**3.25**	**0.35**	**0.09**		
Current Under Capacity (Mte)	**11.22**	**0.91**	**0.88**	**0.36**	**0.81**
Domestic Facilities with Planning Consent (Mte)	7.04	0.28	0.7	0.12	0.6
Under capacity if all facilities with planning are built (Mte)	**4.18**	**0.63**	**0.18**	**0.24**	**0.21**

Note: The capacity listed includes acceptance of SRF at Cement Kilns as 100% alternative fuel and assumes that all plants accepting MSW type feedstocks can accept RDF.

In general terms, all five countries will not have sufficient capacity in place to meet future requirements even when all facilities currently with planning permission are built. This scenario is highly unlikely to happen given that many are proactive planning applications in advance of Local Authority procurement exercises where only one bidder in each will be successful in securing a long term waste supply contract which will allow the facility to be built. At present, there is a further 4.97 million tonnes capacity proposed which has not yet been formally registered through the planning system across the UK/Ireland, but even with this in place, there is still insufficient domestic capacity to treat residual waste as RDF/SRF once targets for recycling to 2025 have been met[29].

[29] Assuming no waste growth from 2011/12 data

7. Effect of Export on the UK/Irish Market

7.1 Introduction

Many stakeholders made reference to the loss of resource currently brought about by RDF/SRF export practice. In this section, the size of the "loss" is considered against each 5 country's policies for Renewable Energy use and the collective financial loss.

7.2 UK

The UK proposes to have 15% of its energy consumption from renewable sources by 2020. This equates to around 234TWh. Supporting this proposal, each country has its own targets as discussed below.

7.2.1 England

The amount of waste exported from England as RDF in 2012 was 637,114 tonnes. Assuming a net average electrical potential of 0.6 MWh per tonne (RDF with a CV around 10 MJ/kg) provides an estimate of 382,268 MWh of potential electrical energy exported. In heat terms, assuming a thermal capacity of 1.2 MWh per tonne, this would estimate a loss of potential heat source from England of 764,537 MWh.

In the hypothetical situation that no further domestic capacity is built other than that currently operating and that under construction, then there is the potential for 11.22 Million tonnes to be exported as RDF/SRF equating to around 6.73 TWh of electricity or 13.46 TWh of heat. These calculations are the two extremes with plants either operating in electricity only or heat only output. The reality is somewhere in between depending on the gearing/balance of the CHP plants between electricity and heat generation.

In terms of contribution towards the UK 15% renewable target, RDF/SRF managed domestically in England could contribute between 2.8 and 5.6% depending on output type.

7.2.2 Wales

Wales, as part of the UK, also has proposals to have 15% of its energy consumption from renewable sources by 2020.

The amount of waste exported from Wales as RDF in 2012 was 3,739 tonnes. Assuming a similar electrical capacity within RDF of 0.6 MWh per tonne, Wales is currently exporting around 2,242 MWh of potential electrical energy. In heat terms, assuming a thermal capacity of 1.2 MWh per tonne, this would estimate a loss of potential heat resource from England of 4,484 MWh.

In the hypothetical situation that no further domestic capacity is built other than that currently operating and that under construction, then there is the potential for 0.91 Million tonnes to be exported as RDF/SRF equating to

around 0.5 TWh of electricity or 1 TWh of heat. As above, these calculations are the two extremes with plants either operating in electricity only or heat only output. The reality is somewhere in between depending on the gearing/balance of the CHP plants between electricity and heat generation.

It is known from review of Wales' waste policy and discussions with the Welsh Government that Wales intends to be self sufficient and that it has plans in place to provide the required EfW treatment capacity domestically by 2020 thereby preserving this resource within the Country.

7.2.3 Scotland

Scotland has significant medium term targets for renewable energy: 11% of all heat by 2020, and 50% of all electricity. This equates to around 35 TWh of electricity and 60.1 TWh of heat by 2020.

Based upon Scotland's 2012 export data, Scotland exported around 25,000 tonnes of RDF/SRF. This has an energy potential of around 30,000 MWh of electricity or 60,000 MWh of heat. If the current shortfall in domestic capacity remains and all surplus material is exported as RDF/SRF with no further facilities developed then the potential losses are in the order of 0.5 TWh electrical or 1 TWh of heat. This would contribute 1.4% towards Scotland's renewable electricity target or 1.6% towards Scotland's renewable heat target.

7.2.4 Northern Ireland

Northern Ireland has committed to 40% renewable electricity and 10% renewable heat by 2020. This will equate to around 4TWh from renewable electricity and 1TWh from renewable heat sources.

Based upon Northern Ireland's 2012 export data, NI exported around 22,000 tonnes of RDF/SRF. This has an energy potential of around 13,200 MWh of electricity or 26,400 MWh of heat. Using the assumptions deployed above, if the current shortfall in domestic capacity remains and all surplus material is exported as RDF/SRF with no further facilities developed then the potential losses through export are in the order of 0.21 TWh of potential renewable electricity (5.2% of the 2020 renewable target) but 0.42 TWh of potential renewable heat (42% of the 2020 renewable target).

7.3 Ireland

Ireland has committed to 40% electricity consumption from renewables by 2020 and 12% renewable heat by 2020. Policy also refers to a requirement for around 32.7 TWh from renewables (presumably from electricity and heat) by 2020.

Applying the same methodology as described above would mean that in exporting 81,000 tonnes of RDF/SRF, Ireland is currently exporting 49,106 MWh of electricity or 96,200 MWh of heat. If the current shortfall remains in domestic capacity with no further facilities built then there is the theoretical potential for Ireland to continue to export around 0.48 TWh of potential renewable energy (1.5% of 2020 of their renewable target).

7.4 Financial Implications

As well as the potential loss of energy resource that is being exported in the form of RDF/SRF, there is also the financial loss to the UK/Irish Economy. We pay to dispose of our residual waste within EfW plants whereas we pay handsomely to purchase the fossil fuel alternative for our other energy producing plants. This project has not attempted to undertake a detailed financial analysis of the opportunities lost but a basic comparison of fossil fuel costs against EfW gate fees provides an estimate of the size of the opportunity lost as shown in Table 7.1 below.

Table 7.1 Financial Cost of RDF/SRF Export

Item	RDF	Coal
Total RDF/SRF Exported from UK/Ireland in 2012 (Tonnes)	867,801	
Average Gate Fee in Europe per Tonne	£50	
Cost of Exports (Gate Fee only) or Loss of Income from UK/Irish Economy	**£43.4 Million**	
Average Cost per Tonne		£60
Amount of Coal Purchased in UK/Ireland in 2012 (Tonnes)		50.4 Million[30]
Cost of Coal Purchase for UK in 2012		**£3.024 Billion**

On the theoretical assumption that 1 tonne of coal could be displaced by 1.5 tonnes of RDF/SRF (the reality is somewhere between 1.3 and 2 depending on the CV of the material) then the UK and Ireland could save £34.7 million per year in coal purchase costs. There would also be the avoided cost of gate fees paid to other European countries which could transfer to the UK/Irish economy (£43.4 million) assuming a similar gate fee was paid to energy recovery facilities within the UK/Ireland.

[30] http://www.ukcoal.com/why-coal/need-for-coal/world-coal-statistics and http://www.indexmundi.com/energy.aspx?country=ie&product=coal&graph=consumption

8. Discussion and Summary

The export market for RDF and SRF has grown significantly in the past two years but, as shown by the Environment Agency data, the amount of material actually shipped from England did not show a major increase in 2012 compared to between 2010 and 2011. This is more likely to be due to a reduction in waste arisings and other economic factors rather than the introduction of a domestic alternative. The other four countries have followed suit in 2012. Increases in landfill tax, designed to make other waste management options more affordable, have done just that, but the next affordable options at present exist in mainland and northern Europe. This is not something that will change overnight and the main question is whether this is an acceptable and growing waste management route for UK and Ireland's wastes or something that should be discouraged or limited in the longer term. There are as many opposed to the practice as those in favour but all recognise that a lack of competitive options in the UK and Ireland is to blame.

It seems that the lack of alternatives is not due to export practices but more to do with a lack of promotion or confidence in the domestic sector and a lack of investment and financial support. Many of the facilities in Europe with excess capacity were funded by the public sector and motivated by a desire to provide energy in the form of electricity, heat and steam for their neighbourhoods. The UK/Irish attitude is contrary to the European model where opportunities for affordable energy are welcomed by communities and significant investment is being made. By way of example, Figure 8.1 below is an advert for a plant extension in Sweden which highlights the benefit to householders from disposing of their waste and creating energy for their homes.

Figure 8.1 Example of Promotional Material for Swedish EfW

Although there is much talk of linking waste policy with energy policy, the general attitude to EfW in our five countries is that it is an alternative to landfill for waste disposal. Due to public opposition, facilities tend to be located where there is little opportunity to use the plants outputs, with the exception of connection to the National Grid, which benefitted from significant public investment in the 1930s. The same level of investment has not yet been afforded to a heat grid or individual heat networks which would be required if CHP opportunities are to be fully exploited.

EfW is not discussed at a Government level on par with other energy options such as nuclear, wind or tidal, and perhaps this is correct. The calculations within this study indicate that energy recovery from RDF/SRF could only make 1 or 2% contribution to the five country's energy targets (up to 5% in England). The availability of EfW throughout the year is however significantly more constant than other renewables, some 80+% compared to 20-30% from others. This is another subject for debate, as currently evidenced in Ireland in connection with priority dispatch[31]. EfW is however discussed separately on a regular basis by all countries alongside discussion of safeguarding domestic resources.

Further up the waste hierarchy, all five countries are working hard to extract commodities of value and reduce the amount of residual waste produced, but in some respects have forgotten that residual waste is a resource too. As evidenced in Europe, they are also working hard further up the hierarchy but acknowledge that there is an economic market for this residual waste within thermally efficient EfW facilities, which also creates local employment opportunities.

To be able to safeguard these potential fuels and for the domestic economic market to develop, operators need to be able to compete financially with the European equivalents. Most of these can offer low gate fees either due to having already paid back their initial investments or due to the level of revenues they can receive from electricity, heat and steam sales. The only domestic benefit is the reduced transport required compared to exporting to the continent, but with shipping costs currently close to zero and a large part of the UK/Ireland being closer to a port than to a domestic EfW plant, these transport costs are not significant in the overall price.

At present, the requirement to evidence and guarantee a large proportion of a plant's feedstock over the lifespan of the plant in order to obtain financial support means that very little merchant capacity is being developed. There is competition for that unsecured feedstock from the many facilities in Europe. Some companies are known to be using RDF/SRF exports as a way of controlling a larger volume of waste which gives future evidence of supply for the funding of new domestic capacity. This would mean that RDF/SRF will be a short term measure for the UK/Ireland.

Some stakeholders commented on the acceptance of trade within the EC (why we are part of it) and whether sharing of energy producing materials is just part of that European free market trade. It is then a question of applying the Proximity Principle, as required by the EU Waste Shipment Regulations at an appropriate level; Europe-wide or Nationwide.

The SRF market is slightly different in that there is an increasing trend towards a demand for high quality material for the cement kiln sector, particularly from UK and Ireland where quality standards can be achieved. It appears

[31] http://www.detini.gov.uk/consultation_on_priority_dispatch_under_the_renewable_energy_directive

that the biggest demand for such material in the future is likely to come from beyond Europe and therefore subject to different WSR controls. Again, there is a major question over implementing the self sufficiency principle or proximity principle.

As the practice of exports has become more popular so has the potential for abuse and this is something that the Regulators are controlling through increased regulation, guidance and enforcement. The market is developing at such a pace that amendments to regulatory approaches are needed on a regular basis. In order to avoid "waste tourism" the Regulators also need to work together in providing a consistent approach. This should include the consistent use of terms and descriptions for the RDF/SRF material to allow tracking and reporting across UK, Ireland and the rest of Europe.

There was much discussion with stakeholders about RDF quality standards considered by some to minimise the amount of mixed municipal waste (EWC 20 03 01) potentially being illegally exported from the UK (not permitted by the UK TFS Regulations but permitted by the Irish equivalent). A quality standard similar to the SRF CEN standard would suggest that there was "quality" or "value" within the RDF, but the RDF receiving facilities in Europe have reported no requirement for "quality" material preferring a true "residual" waste. In this regard, there should be no conflict between the export of RDF and the UK and Ireland plans for resource recovery. If an RDF standard was to be developed then it should refer either to maximum resource levels within the resulting RDF or describe pre-treatment requirements (at source or mechanical) for the production of RDF such as those described by the EPA within their current guidance.

In summary, there are a number of issues and questions arising from the study for stakeholders to consider. AMEC has identified two distinct options that could be followed through. The UK and Ireland can either:

1. Allow the practice of RDF/SRF export indefinitely as part of European free-market trading. This requires the process to continue to be subjected to rigorous scrutiny and regulatory controls to ensure the minimisation of illegal operations, or;

2. Allow the current practice to continue in the short term while working towards consistent regulation and promotion of the benefits of RDF/SRF as an alternative fuel source and creator of jobs within the UK and Ireland. To achieve this, the UK and Irish Governments will need to acknowledge the development of thermally efficient plants on a similar basis to wind farms, tidal energy and biomass and provide an appropriate level of financial support.

In either case, the UK and Ireland should continue to promote the development of infrastructure to assist with materials reduction and recovery higher up the waste hierarchy in order to minimise the amount of residual waste generated.

Appendix A
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