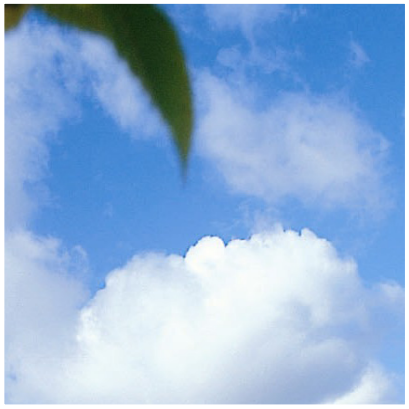
Dublin Waste To Energy

Waste Market Assessment

August 2014



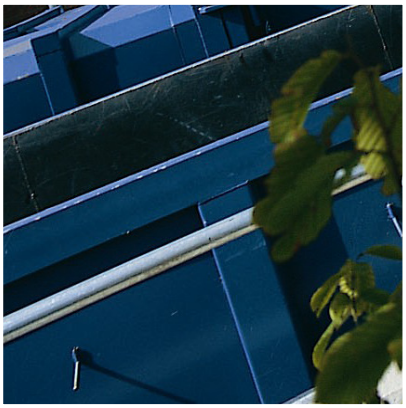



TABLE OF CONTENTS

1 INTRODUCTION

This report was prepared for Dublin City Council (DCC) on behalf of the four Dublin Local Authorities and details the European and National waste policy requirements that highlight the need for the implementation of this project. The report also shows the residual waste available for treatment in the Dublin Waste to Energy (WtE) facility based on the quantities of various waste types generated, recycled, recovered and landfilled in Ireland and municipal waste predictions for 2020-2025.

This report should be read in conjunction with the EPA National Waste Report 2012 published in 2014 (www.epa.ie).

1.1 BACKGROUND – DUBLIN WASTE TO ENERGY (DWTE) FACILITY

Planning consent to construct the DWTE facility was obtained from An Bord Pleanála in November 2007. The EPA subsequently issued a Waste Licence for the facility in December 2008. Both of these consents allow the facility to accept up to 600,000 tonnes of non-hazardous municipal and industrial wastes. Both of these consents were underpinned by EU, national and regional waste policy as clearly set out in the legally adopted Waste Management Plan for the Dublin Region 2005 – 2010 dated 11th November 2005.

It should be noted that contractually the Dublin WtE facility's design capacity is 550,000 tonnes per annum (which has been used for the purposes of this report).

2 WASTE POLICY

2.1 CONTEXT

Irish Waste Policy is firmly grounded in EU Waste Policy in particular the EU Directive on Waste (2008/98/EC) (the Waste Framework Directive) and the EU Landfill Directive (1999/31/EC). The Waste Framework Directive requires Ireland to prepare Waste Management Plans which outline objectives and means to ensure waste is treated as a resource in accordance with the EU Waste Hierarchy prioritising prevention, reuse and recycling in advance of energy recovery and final disposal.

The EU Landfill Directive requires the progressive diversion of biodegradable waste in particular away from landfill towards more superior recycling and recovery options. These two directives together with the EU Packaging Directive were the targets of Ireland's first Waste Management Policy "Changing Our Ways" in 1998. In addition to Directives, there are now also Roadmaps and Action Programmes that further define EU waste and environmental policy. These latter guidance documents had a considerable impact on the new "*Waste Management Policy in Ireland – A Resource Opportunity*" published in July 2012.

2.2 EUROPEAN WASTE POLICY

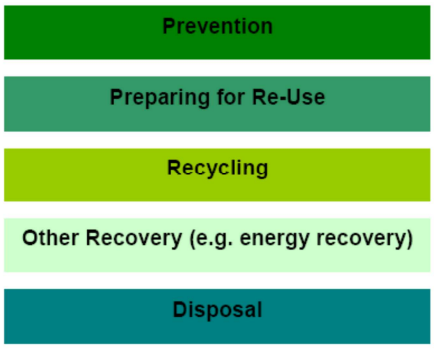
In recent years, European waste policy has been directed increasingly towards 'resource efficiency' as part of the Europe 2020 strategy to "*deliver smart, sustainable and inclusive growth*". A resource-efficient Europe is one of seven Flagship Initiatives to achieve the 2020 Strategy centred on generating growth and job creation. In late 2011, the EU Commission published a Roadmap to a Resource Efficient Europe. By 2020 the EU want waste totally '*managed as a resource'* with '*landfill virtually eliminated and high quality recycling ensured'*.

The EU Landfill Directive (1999/31/EC), the EU Waste Incineration Directive (2000/76/EC) and the Renewable Energy Directive (2001/77/EC) outline European Policy in terms of waste management and the generation of renewable energy. The Landfill Directive reinforces the Waste Hierarchy and sets targets to progressively reduce the quantity of biodegradable waste landfilled. The Waste Incineration Directive (WID) was developed to protect human health by limiting negative effects on the environment from incineration of waste.

The Renewable Energy Directive obligates EU Member States to set national targets for the amount of electricity supplied by renewable sources by 2010. This Directive considers thermal treatment with energy recovery as renewable energy.

2.2.1 Waste Framework Directive

The EU Waste Framework Directive specifies the priority order for waste management as follows:



The recitals to the 2008 Directive set the context in which the obligations under the 2008 Directive (and consequently the waste hierarchy) must be understood. They clearly show that the recycling of materials is preferred over recovery, including energy recovery, as it is likely that the recycling of source-segregated wastes will conserve natural resources.

The recitals also emphasise that one of the principal purposes of the 2008 Directive is to introduce an approach that takes into account the whole life-cycle of products and materials, not just the waste phase, and the reduction of the environmental impact of waste management, thereby strengthening the economic value of waste. In order to ensure that waste retains a high economic value, it is important to guarantee the quality of that waste through source separation**.**

The Waste Framework Directive also sets out the following key requirements;

- In accordance with the Directive WtE is now clearly defined as a recovery activity (where certain energy recovery thresholds are met) whereas mechanical processing activities (eg MBT) are categorised as pre-processing activities and sit outside of the hierarchy,
- Principles of Self-sufficiency & Proximity are now enshrined within the European regulatory framework,
- The Directive sets a 2020 target to achieve a 50% Municipal Waste Recovery Rate and 70% Construction and Demolition Recovery Rate.

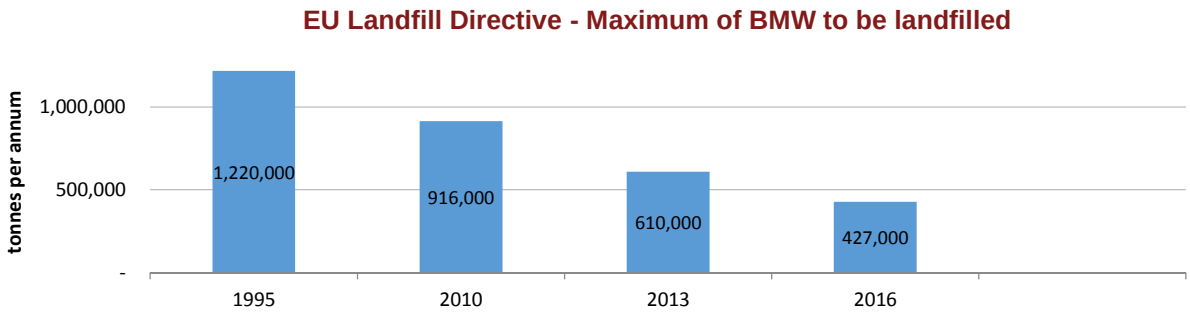
Ireland has implemented the Waste Framework Directive 2008 through the European Communities (Waste Directive) Regulations 2011 (SI 126/2011).

2.2.2 Landfill Directive

Issued in 1999 the Landfill Directive (1999/31/EC) was a milestone in EU waste policy. It made a decisive shift from landfill towards the EU's new waste hierarchy, which prioritises waste prevention, followed by re-use, recycling and recovery and seeks to avoid landfilling wherever feasible. On that basis, the EU Landfill Directive (1999/31/EC) requires the progressive diversion of biodegradable waste from landfill towards more superior recycling and recovery options. It also sets targets for progressively reducing the amount of biodegradable municipal waste landfilled. Ireland was given a four-year derogation in meeting these targets due to its heavy dependence on landfill and lack of alternative waste management infrastructure.

- 2013 target: Biodegradable municipal waste going to landfills must be reduced to 50% of the total quantity (by weight) of biodegradable municipal waste produced in 1995 (<610,000t in the case of Ireland)

- 2016 target: Biodegradable municipal waste going to landfills must be reduced to 35% of the total quantity (by weight) of biodegradable municipal waste produced in 1995 (427,000t in the case of Ireland). It should be noted that the EPA have acknowledged that this target remains at risk.



2.2.3 Industrial Emissions Directive (2010/75/EC)

In order to take further steps to reduce emissions from industrial production processes, the Commission adopted its proposal for an Industrial Emissions Directive (IED). This proposal was a recast of 7 existing pieces of legislation (including the Waste Incineration Directive) and its aim is to achieve significant benefits to the environment and human health by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques. The IED entered into force on 6 January 2011.

The IED is the successor of the IPPC Directive and in essence, it is about minimising pollution from various industrial sources throughout the European Union. The IED is based on several principles, namely (1) an integrated approach, (2) best available techniques, (3) flexibility, (4) inspections and (5) public participation. The IED was transposed into Irish Law by the following Regulations;

- European Union (Industrial Emissions) Regulations 2013 S.I. 138 of 2013
- Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013 S.I. 137 of 2013
- European Union (Waste Incineration Plants & Waste Co-incineration Plants) Regulations 2013 SI. 148 of 2013
- European Union (Large Combustion Plants) Regulations 2012 S.I. 566 of 2012
- European Union (Installations and Activities using Organic Solvents) Regulations 2012. S.I. 565 of 2012

It should be noted that the licence for the Dublin WtE facility has been categorised as an Industrial Emissions (IE) activity and licence (W0232-01) has been amended by the EPA to reflect this classification.

2.2.4 Renewable Energy Directive

In addition to the above, the Renewable Energy Directive (2001/77/EC) obliges EU Member States to set national indicative targets for the amount of gross electricity consumption to be supplied from renewable sources by 2010. Because thermal treatment of municipal waste with energy recovery is considered a renewable energy source, this Directive provides an additional incentive to divert waste from landfill.

2.2.5 7th Environment Action Programme

The 7th Environment Action Programme (EAP) incorporates the fundamentals of recent EU initiatives such as Resource Efficiency Roadmap, the 2020 Biodiversity Strategy and the Low Carbon Economy Roadmap and further prioritises low carbon growth, resource efficiency and innovation. It has been formally adopted by the European Parliament and Council and will be guiding the implementation of environment policy for Member States until 2020.

The Programme focuses on the importance of treating waste as a resource with increased prevention, re-use and recycling and also on the importance of phasing out damaging methods of waste management such as landfilling.

By 2020 the European Union (and Member States) will ensure a progression towards a resource efficient circular economy through the implementation of market-based instruments, the producer responsibility scheme and the following actions:

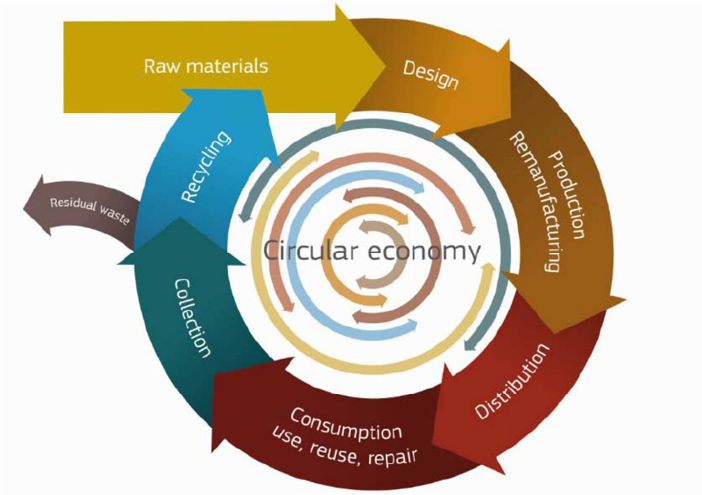
- Waste is safely managed as a resource to prevent harm to health and the environment
- Absolute waste generation and waste generated per capita are in decline
- Landfilling is limited to residual (i.e. non-recyclable and non-recoverable) waste
- Energy Recovery is limited to non-recyclable materials

2.2.6 Towards a Circular Economy: A Zero Waste Programme for Europe

In July 2014, the European Commission published “Towards a Circular Economy: A Zero Waste Programme for Europe” in which it stated its commitment;

- to reduce waste generation,
- to recycle waste into a substantial source of raw materials for the Union, to recover energy only from non-recyclable materials and
- to eliminate landfilling.

An ambitious waste policy is expected to drive this commitment with respect to global markets and to encourage EU companies to be more innovative and competitive in the provision of waste management services and offer new market opportunities to EU exporters. Market value needs to be attributed to materials such as plastics, glass, metals, paper, wood, rubber and other recyclables so that they may re-enter the economy as secondary raw materials at competitive prices.



In order to boost the economic, social and environmental benefits achieved through improved waste management and to guide Europe towards a circular economy, the Commission proposes to:

- Boost reuse and recycling of municipal waste to a minimum of 70% by 2030;
- Increase the recycling rate for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025;
- Ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by 2030 ;
- Further promote the development of markets for high quality secondary raw materials, including through evaluating the added value of end-of-waste criteria for specific materials; and
- Clarify the calculation method for recycled materials in order to ensure a high recycling quality level would be avoided in 2030.

2.3 NATIONAL LEGISLATION AND POLICY

Prior to 1996 and the Waste Management Act of that year there was a national policy vacuum on waste management. A growing number of EU policies were being approved at European level but there was no national mechanism to put them in place in Ireland. The Waste Management Act 1996 and subsequent regulations allowed for the transposition of EU waste policy into Irish Law. This included the requirement under the EU Waste Framework Directive to put in place a series of Waste Management Plans to cover all of the administrative areas in the country. The subsequent Government policy of October 1998 '*Changing Our Ways'* underpinned the earlier Act and showed a preference for '*regional waste management planning*' on the basis that there was insufficient economy of scale within individual counties to take a fully integrated approach to the safe management of waste.

2.3.1 Changing Our Ways (1998)

Waste management policy since 1998 has been determined in accordance with the Policy Statement '*Changing Our Ways'* issued by the then Minister for the Environment and Local Government in

September 1998. In Section 5.3 of this Government Policy Statement the regionalisation of waste management strategy between neighbouring local authorities is strongly encouraged 'for *the development of integrated and innovative waste management solutions*'. The Policy further states '*while landfill disposal of residues will always be required, mass burn waste to energy is effective in diverting over 70% of municipal waste away from landfill and if properly controlled has a considerably lower environmental impact than landfill*'.

2.3.2 Preventing and Recycling Waste: Delivering Change (2002)

In March 2002 a Policy Statement '*Preventing and Recycling Waste: Delivering Change*' was primarily focused on waste prevention and recycling. It restates '*that the emphasis must be given to the widest practicable realisation of waste prevention, minimisation, reuse, materials recycling and biological treatment, before energy recovery through thermal treatment and final disposal in landfill*'. This Policy Statement also builds on the commitment in '*Changing Our Ways*' to gradually introduce use related charges on waste management.

2.3.3 Taking Stock and Moving Forward (2004)

In April 2004, the Government issued a further Policy Statement for Waste Management '*Taking Stock and Moving Forward*'. This Statement outlined progress to date on the implementation of the Regional Waste Management Plans. While progress was noted in the Dublin Area, the other regions were minded to '*to give early consideration to how they envisaged accelerating progress towards meeting the objectives of their waste management plans in relation to thermal treatment*'. There was particular concern at diminishing landfill capacity in most regions. It was of course recognised that '*thermal treatment with energy recovery has a role to play as only one element in the integrated approach to waste management'*.

The cornerstone of Irish waste policy is waste prevention and recycling followed by residuals management. In line with such policy a Waste Prevention Team has been set up in the Environmental Protection Agency. The roll out of the kerbside collection (green bin) in our cities and towns in accordance with the regional plans in a three to four year rolling programme was unprecedented in Western Europe even in the Netherlands, Germany or Denmark. These initiatives together with the '*Race Against Waste*' public awareness campaign have been central to Ireland's success where we now recycle 40% of our municipal waste.

2.3.4 National Strategy on Biodegradable Waste (2006)

In April 2006 the National Strategy on Biodegradable Waste was published. This Strategy stated that '*thermal treatment with energy recovery in accordance with the internationally accepted waste management hierarchy is a key element of Irish waste management policy*'. The 10 waste management plans for the regions/counties of Ireland recognised the integrated policy role of thermal treatment and facilities have been proposed by local authorities for the treatment of residual waste within 6 of the regions. This method provides a robust technology for dealing with mixed residual waste and forms a necessary element in the integrated waste management plans of the 6 regions, similar to models from other EU countries such as Germany, Belgium, Holland, Austria and Denmark. In the strategy, two broad options are shown as currently available for residual waste treatment – Thermal Treatment and Mechanical Biological Treatment (MBT). It is further stated that neither system should be seen as '*an alternative to the separate collection and recycling policies set out in this strategy*'.

The strategy further stated '*even allowing for the achievement of the very ambitious prevention, recycling and biological treatment targets for biodegradable municipal waste (BMW), the estimated total amounts of residual BMW generated varies from 950,221 tonnes to 1,276,307 tonnes per annum nationally over the period 2010 to 2016*'. As mechanical biological treatment (MBT) is a pre-treatment method for either landfill or incineration and since the organic material recovered by MBT '*typically emerges as a low quality material – 'stabilised biowaste' – that has limited applications*', and '*Some recyclable materials are recovered from the MBT process, but the majority of the residue is usually sent to energy recovery, or to landfill*' - thermal treatment with energy recovery is recognised in the strategy as the preferred treatment system for residual biowaste post recycling.

Furthermore, since the National Biodegradable Waste Strategy favours 3-bin source separation of BMW this does not sit well with MBT which caters mostly for non-source separated waste. The use of the three bins – green bin for dry recyclables, brown bin for the wet fraction (BMW) and the black bin for residual waste – is an internationally accepted method to maximise recycling all across the developed world. It is premised on the fact that the resource value in waste deteriorates as waste is mixed once discarded and a system of separate bins, which does not allow this mixing to occur, is the optimum approach for maximum resource, reuse and recovery. The Environmental Education Programmes pursued by the four Dublin authorities and actively promoted by the Environmental Awareness Officers over the past 8-10 years and the Government backed '*Race against Waste*' Awareness Campaign draws attention to the need to prevent and minimise waste together with maximising its resource value through source separation recycling (viz. by means of the green and brown separate bins for dry and wet recyclables respectively).

2.3.5 National Development Plan (2007-2013) 'Transforming Ireland – a Better Quality of Life for All

In the National Development Plan (NDP) 2007-2013 '*Transforming Ireland – a Better Quality of Life for All*' there is a specific reference to thermal treatment in the context of reducing '*our reliance on landfill as a method of waste disposal*'. The NDP goes on '*in line with National Policy on the integrated approach to waste management thermal treatment with energy recovery will be preferred option for dealing with residual waste after achieving ambitious targets in respect of waste prevention, recycling and recovery… in the case of the Dublin Region, the relevant authorities are proceeding by way of a public private partnership for which the necessary statutory approvals are being sought*'. The NDP specifically lists thermal treatment under '*Central Government Investment Priorities*' wherein it is stated that under the Waste Management Sub-Programme some €750 million will be invested in dealing with the problem of legacy landfills and supporting the recycling and recovery effort.

2.3.6 National Climate Change Strategy (2007-2012)

The strategy seeks to reduce Ireland's greenhouse gas emissions by over 17 million tonnes of Carbon Dioxide equivalent in the period 2008 to 2012. A range of measures in various parts of the economy is identified which will reduce our carbon footprint in the years ahead. Chapter 9, which deals with waste management, speaks of the '*priority given to the diversion of waste from landfill*'. Under the heading Residual Treatment '*this is meant to mean thermal treatment with energy recovery or by way of mechanical biological treatment*'. The clear policy preference of using thermal treatment with energy recovery as the preferred option for residual waste is very obvious from the following paragraph in the Strategy.

While substantial volumes of municipal waste will be diverted from landfill as a result of high levels of recycling and biological treatment, significant quantities of residual waste will remain. To maximise the recovery of useful material and energy from residual waste, the National Strategy on Biodegradable Waste identifies thermal treatment with energy recovery as the preferred option in most waste management plans adopted by local authorities. The National Strategy on Biodegradable Waste also recognised, particularly in the shorter term prior to the development of adequate thermal treatment capacity, a potential role for mechanical biological treatment (MBT).

The document goes on to state '*in accordance with the methodology developed by the Inter-Governmental Panel on Climate Change (IPCC), the CO2 emissions resulting from the combustion of biodegradable waste are considered to be carbon neutral and are not counted for the purposes of Kyoto obligations*'.

The IPCC Fourth Assessment Report (2007), Chapter 10, Waste Management, assesses emission trends, policies and long-term considerations of waste management and climate. On review of incineration and other thermal processes for waste to energy the report indicates that '*Incineration reduces the mass of waste and can offset fossil fuel use; in addition, GHG emissions are avoided, except for the small contribution from fossil C*'. The report also acknowledges that '*Waste incinerators have been extensively used for more than 20 years with increasingly stringent emission standards*' and '*Thermal processes can efficiently exploit the energy value of post-consumer waste*'.

'In addition, the generation of heat and electricity in thermal treatment plants reduces the need to produce this energy from fossil fuels and will therefore replace CO2 emissions from these sources. By exploiting an indigenous energy source, the waste to energy plants make a contribution to national security of energy supply. In the current process of revising the Waste Framework Directive (2006/12/EC), mechanisms are being considered which would encourage waste to energy plants to increase efficiency to a level comparable to conventional power plants, thereby allowing the energy content within waste to be transformed into electricity and heat for beneficial use in accordance with Best Available Techniques (BAT). The Government supports this approach in the context of the waste hierarchy which will minimise climate impacts through the sustainable management of waste'.

2.3.7 Waste Management Policy in Ireland – A Resource Opportunity' (2012)

The National waste policy document 'Waste Management Policy in Ireland – A Resource Opportunity' published in July 2012 seeks to

- maximise the resource value in waste,
- 'to ensure a sufficiency of waste management infrastructure within the State to manage municipal waste',
- consolidate waste management regions from 10 to 3,
- ensure new Waste Management Plans to be in place by early 2014,
- ensure sufficient waste management infrastructure is available within the State to manage municipal waste,
- retain side by side competition in the household market until 2016 when a review by the Competition Authority will be undertaken,
- enhance the waste collection permitting system, and
- eliminate the use of landfill by 2020

The policy document seeks 'the virtual elimination of landfilling of municipal waste'. It also seeks 'to ensure a sufficiency of waste management infrastructure within the State to manage municipal waste'. That should prevent the export of residual waste for recovery if the necessary recovery infrastructure is provided in Ireland in accordance with the regional waste management plans.

In terms of future regulation of waste, the Policy states that there will be 'a *strengthened permitting system…supportive of a resource efficient and sustainable approach*'. In terms of regulation the Policy states that '*the Department of the Environment, Community and Local Government and the EPA will monitor how compliance with the waste hierarchy is achieved through implementation of the new regional waste management plans…The Competition Authority is being requested by the Government to maintain oversight of household waste collection markets as the retention of the current market structure combined with a strengthened regulatory regime, will need to be subject to close monitoring*'.

As for export of waste, the policy states that the storage and export of waste material "*will be strictly policed to ensure no environmental damage arises from the storage of such materials prior to export*", that exports would avoid environmental and reputational damage and ensure that waste is treated in the country of destination to the standards specified. This is a reference to the increased level of residual waste exports (including SRF and RDF type materials) from Ireland in 2011 and 2012 due to lack of adequate recovery infrastructure nationally and also the lack of private sector finance. There is also the recent discovery of large quantities of illegally stored municipal waste on farms surrounding the Dublin Region reported in the media.

In terms of Waste Recovery, the policy clearly states '*Ireland requires an adequate network of quality waste treatment facilities…with the ultimate goal of virtually eliminating landfill*'.

2.3.8 Regional Waste Management Plan Update

In accordance with the policy document 'A Resource Opportunity – Waste Management Policy in Ireland' the consolidation of the previous 10 waste management regions to 3 has been completed (see Table 1 for composition).

Draft waste management plans for the three new regions are expected to be published for public consultation Q4 2014.

Table 1. Details of waste management planning regions

Region	Constituent Local Authorities	Lead Authority
Connacht-Ulster	Cavan, Donegal, Galway City, Galway County, Leitrim, Mayo, Monaghan, Roscommon, Sligo	Mayo County Council
Eastern-Midlands	Dublin City, Dun Laoghaire-Rathdown, Fingal, Kildare, Laois, Longford, Louth, Meath, Offaly, South Dublin, Wicklow, Westmeath	Dublin City Council
Southern	Carlow, Clare, Cork City, Cork County, Kerry, Kilkenny, Limerick, Tipperary, Waterford, Wexford	Tipperary-Limerick Consortium

2.3.9 Regulation of Household Waste Collection

A discussion paper was published by the Department of Environment, Community and Local Government (DECLG) in November 2013. A public consultation process was also undertaken on the environmental regulation of household waste collection to inform the detailed development of the new regulatory framework to strengthen the regulation of household waste collection.

2.3.10 Producer Responsibility Initiative (PRI) Review

On 4 July 2014, the final report of the review of the Producer Responsibility Initiative (PRI) model was published in Ireland. The report provides a detailed analysis of the process whereby producers take responsibility for the products they place on the market at their end of life. The key finding is that the implementation of the producer responsibility model in Ireland has been a successful endeavour and majority of our domestic and European waste targets have been met.

The report contains approximately 170 recommendations, some of which include;

- A mandate for the Producer Responsibility Organisations (PRO's) to collaborate with one another or the EPA with a view to launching cross stream education and awareness initiatives,
- Establishment of a dedicated PRI enforcement unit in line with the roll-out of new local authority enforcement structures. The unit would be set up to facilitate the concentration of specialised expertise at national and regional levels, enabling the coordination of PRI enforcement activities and the tackling of transboundary illegal activities.
- PROs to develop proposals for encouraging waste prevention and reuse in line with EU, national and regional policies and programmes.
- The State to investigate the possibility of instructing the PROs to direct waste to be processed in Ireland using only national waste infrastructure.
- Reducing administrative costs by limiting duplication in terms of systems and data, and facilitating data sharing.
- The development of a centralised electronic registration system for obligated producers.
- The report identified other waste streams which might be suitable for development as PRI's.

A consultation process on this final report will run until mid-September and work is underway through two dedicated working groups on implementing the recommendations specifically on the development and introduction of full PRIs for ELVs and tyres. It is expected that these new structures will be in place in early 2015.

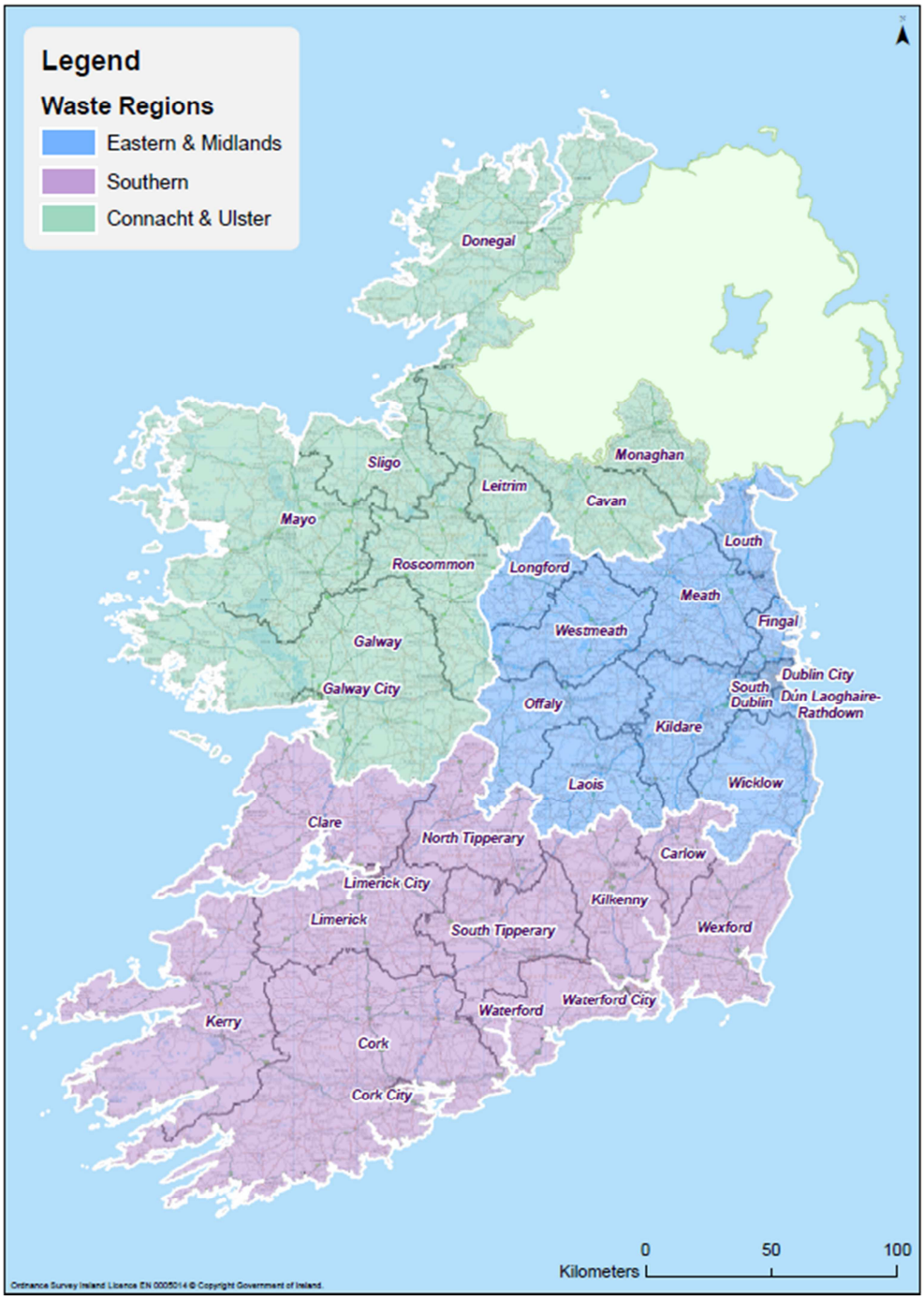


Figure 1 Waste Management Regions

2.3.11 National Waste Prevention Programme

The EPA published *'Towards a Resource Efficient Ireland: A National Strategy to 2020'* incorporating Ireland's National Waste Prevention Programme was published in July 2014.

The structure of the programme is shown in the diagram below, along with linkages to other relevant EPA activities. In particular, the publication of national waste statistics supports the successful implementation of the National Waste Prevention Programme by providing trends and information on waste generation and management and also context on the quantities and types of waste arising in the State. It informs the effective management and prevention of waste on a national and regional basis and enables the prioritisation of efforts to target the prevention, recycling and management of waste streams.

The objective of the programme is to implement EU and national policy on resource efficiency to break the link between economic growth and environmental impact with the EPA document identifying the following key objectives:

- Reduce wasteful consumption of material, water and energy resources by changing behaviours in businesses, households and the public sector;
- Enhance competiveness and reduce business costs by delivering programmes that stimulate resource efficiency and the circular economy;
- Support sustainable growth and employment in the green economy - including re-use enterprises;
- Minimise generation of hazardous wastes through efficient practices and use of safer alternatives;
- Manage hazardous substances in products through efficient regulation;
- Inform and influence evidence-based decision-making by compiling and publishing high quality data on waste.

3 MUNICIPAL WASTE

3.1 MSW GENERATION

The EPA National Waste Report 2012 estimates approximately 2.69 million tonnes of Municipal Solid Waste (MSW) was generated in Ireland in 2012 which follows the continuing downward trend since the peak in 2007, despite consistent population growth. Of this approximately 1.02 million tonnes were consigned to landfill.

The following table provides a breakdown of municipal waste generated, landfilled and recovered nationally in 2012.

Table 2: Municipal Waste Generated, Landfilled and Recovered, 2012

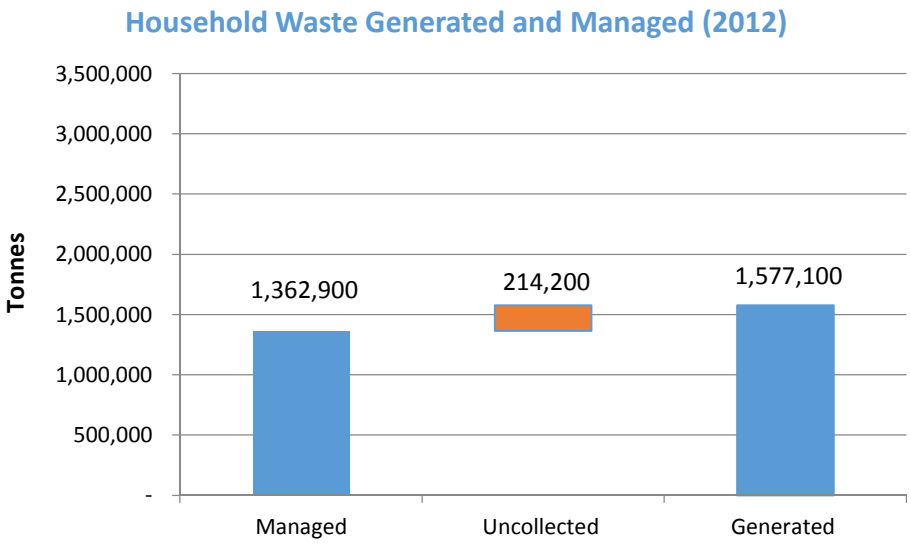
Material	Quantity Generated (t)	Quantity Managed	Quantity Disposed to Landfill (t)	National Landfill Disposal Rate (%)	Quantity Recovered (t)	National Recovery Rate (%)
Household	1,577,100	1,362,900	589,863	43	773,037	57
Non-household Municipal Waste*	1,115,437	1,115,437	437,714	39	677,723	61
Municipal Waste	**2,692,537**	**2,478,337**	**1,027,577**	**41%**	**1,462,218**	**59%**

Source: EPA National Waste Report 2012

*Non-household municipal is commercial and industrial non-process waste that is similar to household waste, street sweepings

It should be noted that municipal waste ***managed*** encompasses municipal waste that is collected, brought directly to waste facilities and home composted; whereas municipal waste ***generated*** also includes the uncollected household waste estimate.

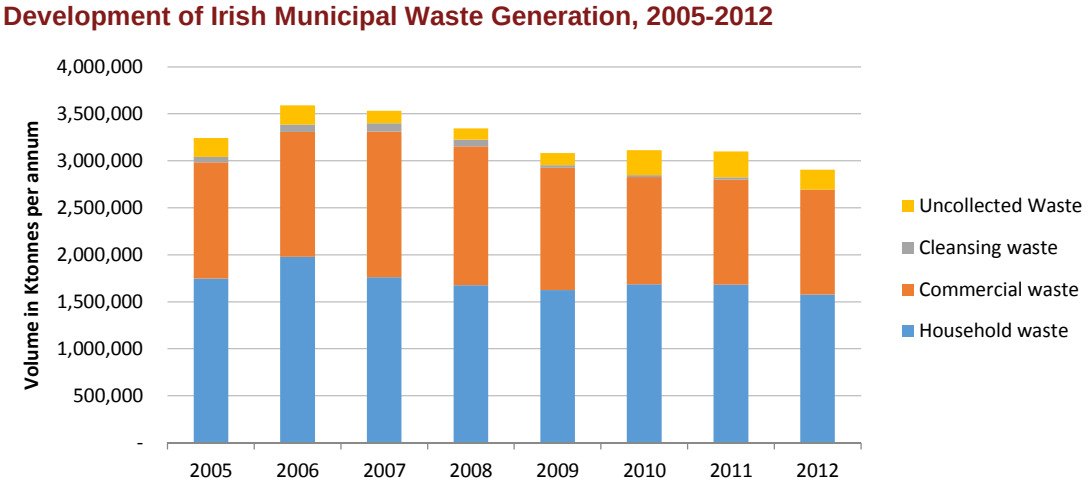
The EPA calculated the volume of uncollected waste by subtracting waste volumes for the above from the amount of waste generated by households but not collected by kerbside systems. It is estimated that approximately 214,200 tonnes of household waste generated in 2012 or 8% was neither collected nor managed.



The quantity of household waste generated has steadily decreased since its peak in 2006 at 1,978,716 tonnes with the exception of a slight increase between 2009 and 2010. However it should be noted that the quantity of household waste managed fell by 5% in the same period (2009-2010) despite a rise in population.

The quantity of commercial waste generated peaked in 2007 at 1,549,075 and has showed consistent decline since then (with a sharp decline noted between 2007 and 2008). The quantity of commercial waste managed in 2011 decreased by 2% compared to 2010.

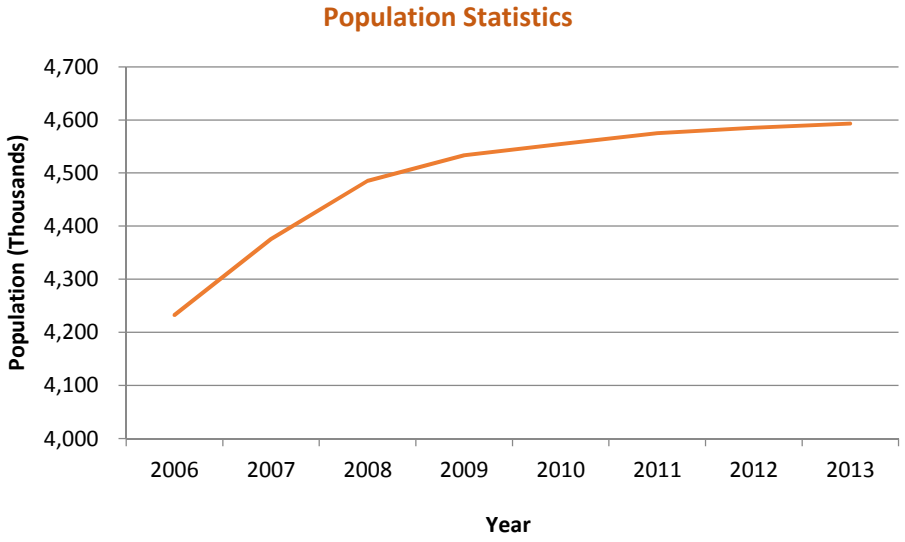
These trends in municipal waste generation are presented in further detail in the graph below.



*Commercial waste, in the context of the 2012 EPA report, is a term used to describe the non-household fraction of municipal waste, which is produced by commercial premises such as shops, offices and restaurants, as well as municipal premises such as schools, hospitals etc. It also includes non-process industrial waste arising from factory canteens, offices etc.

The generation of MSW has showed a steady decline since its peak in 2007 and this is despite steady increases in population growth (see CSO population statistics below), however key economic

indicators should also be taken into consideration such as GNP and personal consumption, both of which have shown steady decline within the same period due to the impact of the economic downturn.



Source: CSO

3.2 MSW PROJECTIONS

The Economic and Social Research Institute (ESRI) has developed a Sustainable Development Model for Ireland (ISus) that forecasts national environmental emissions and resource use up to 2030, having regard to economic and social developments.

It is a simulation model that combines historical data and behavioural equations to predict future trends in environmental emissions. The current version of the model (v0.8) uses historical data for the period 1990–2010 to calibrate the model and estimate relationships, while projections are generated for the period 2011–2030. The latest version of this model (v08 dated June 2013) has been used for the purposes of this report.

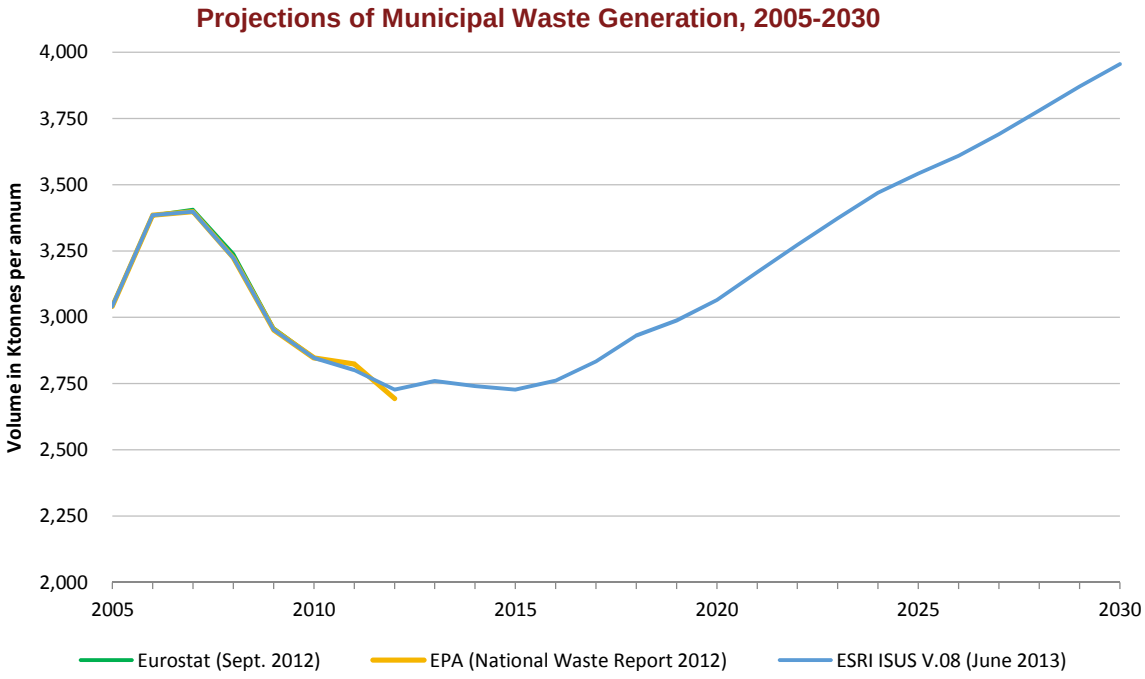
The table below presents the ESRI's projected annualised growth rates from 2010 to 2030 (while also presenting observed data from 2001-2009).

Table 3: ESRI Annualised Growth Rates

	2010	2001-2008	2008-09	2010-2015	2015-2020	2020-2025	2025-2030
Tonnes		***Observed***		***Projected***			
				Annualised change			
MSW	2,846	3.3%	-8.4%	-0.9%	2.4%	2.9%	2.2%

Source: ESRI ISus V.08 (June 2013)

The ESRI projections have been graphed against MSW generation from 2005 to 2012 from the EPA National Waste Reports as well as those of Eurostat.



3.2.1 Municipal Waste Projections 2020

Article 11 of the Waste Framework Directive sets a 2020 target to achieve a 50% Municipal Waste Recycling Rate and this obligation has been passed into Irish law by the transposing Regulations;

> *by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight*

Using the ESRI's growth projections it is anticipated that 2,944,110 tonnes of MSW will be generated in 2020 (an increase of 251,573 tonnes on actual 2012 levels). The Compound Annual Growth Rate (CAGR) from 2012 to 2020 using the ESRI projections is 1.47%.

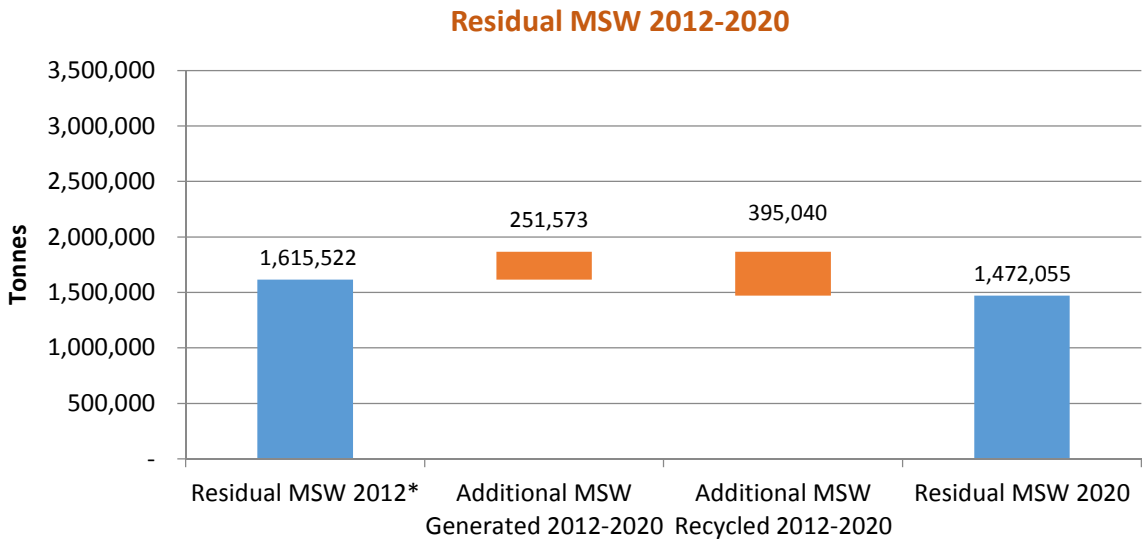
Applying a recycling target of 50% to the 2020 projection (in accordance with the requirements of the Waste Framework Directive) leaves 1,532,678 tonnes of residual MSW being available for treatment nationally.

3.2.2 Municipal Waste Projections 2030

To guide Europe towards a circular economy, the European Commission has set a 2030 target to achieve a 70% Municipal Waste Recycling Rate.

Using the ESRI's growth projections it is anticipated that 3,903,918 tonnes of MSW will be generated in 2030 (an increase of 1,211,381 tonnes on actual 2012 levels). The Compound Annual Growth Rate (CAGR) from 2012 to 2030 using the ESRI projections is 2.09%.

Applying a recycling target of 70% to the 2030 projection leaves 1,171,175 tonnes of residual MSW being available for treatment nationally.



* Excludes Incineration/Energy Recovery (17%) and other recovery (2%)

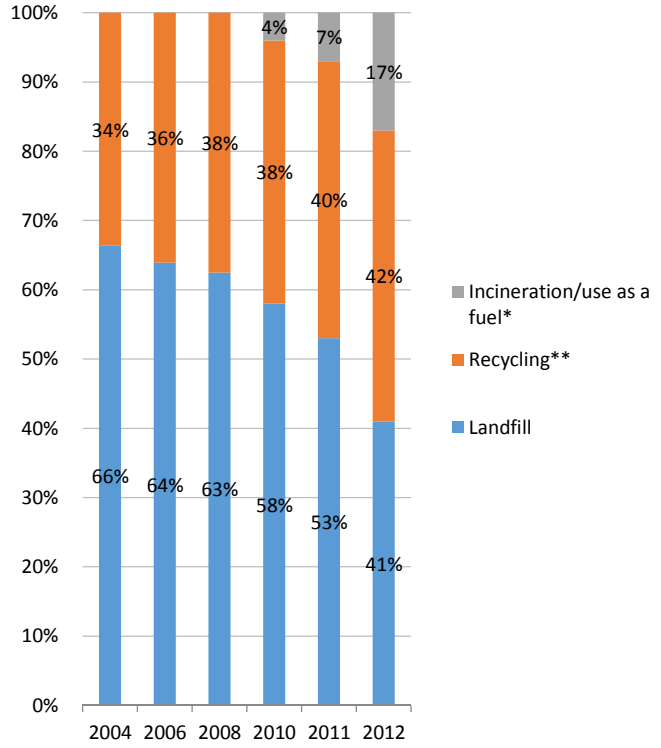
3.3 MSW MANAGEMENT

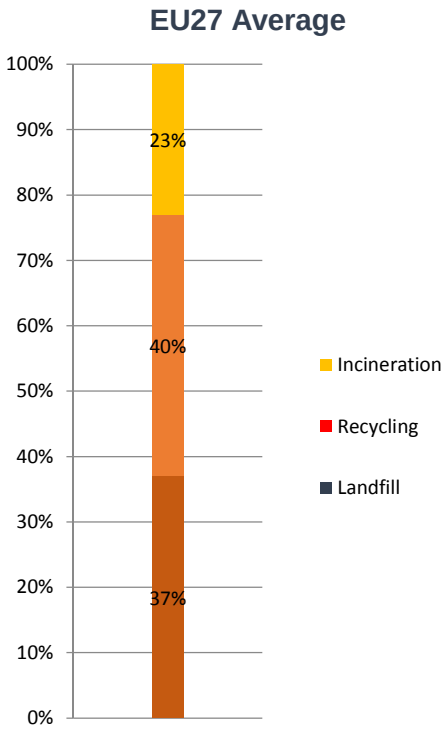
The quantity of MSW managed in 2012 (2,478,337 tonnes) represented a 3% reduction on that managed in 2011 (2,546,577 tonnes). Rates for disposal, recycling and incineration of managed MSW are presented graphically below for 2012 (being the most up-to-date national dataset) as well as a number of previous years in order to present on overview of trends over time.

The quantity of MSW recovered in 2012 increased by 12% from 2011 figures (from 47% to 59%) with landfill decreasing by a corresponding value (note the recovery values are calculated as a percentage of the total waste *managed*).

From the graph below it can be seen that as a country we remain reliant on landfill of MSW, landfilling some 41% of total MSW generated in 2012. While the landfill disposal rate is higher than the EU27 Average (sourced from 2011 Eurostat figures), the recycling rate is on par with the European average indicating that alternatives to landfill, such as the Dublin WtE facility, are now required to bring us in line with the EU27.

Management of Municipal Waste (MSW), 2004 - 2012





* Exported for incineration (2010. Incinerated in Ireland (2011 & 2012)

** 2012 recycling figure includes 2% 'other recovery' given in EPA 2012 Report

4 INDUSTRIAL WASTES

It should also be noted that the Dublin WtE facility can accept up to 100,000 tonnes of commercial/industrial wastes and there are 58 European Waste Catalogue (EWC) codes for this waste stream specified within the Waste Licence. All of the codes are non-hazardous. The Licence contains a stipulation that a maximum of 10,000 tonnes can be accepted per waste code. The codes are from different industrial manufacturing sectors including food processing, wood and paper, pharmaceutical, textile and printing.

In the Industrial Manufacturing sector, a total of 2,903,127 tonnes of waste was generated in 2008 and reported by the EPA (NWR 2008) (last EPA dataset which reported separate industrial waste arisings). 39% of this waste was recovered in 2008 with 61% sent for disposal. 59,000 tonnes was sent abroad for disposal – this is thought to be all hazardous wastes. 140,000 tonnes was exported for recovery – again a large portion of this is probably hazardous wastes. The remaining waste sent for disposal in Ireland amounted to 1,711,907 tonnes. All of this waste is not suitable for treatment at the plant. Reviewing Table 26 of the report it is estimated that 314,000 tonnes of industrial waste could be treated at the facility (this includes material which is currently sent to landfill and material sent for reuse as a fuel).

Therefore while the analysis in this report is primarily focused on the residual MSW fraction of the waste stream, an additional 100,000 tonnes of industrial waste is also available within the market.

5 MUNICIPAL WASTE TREATMENT

The EPA has stated "*The increases in the landfill levy, particularly since 2008, are playing a role in diverting municipal waste from disposal to landfill. In addition, the number of landfills accepting municipal waste for disposal is continuing to decrease (54% of total municipal waste disposed in 2012 was accepted at three landfills) as is the remaining licensed landfill disposal capacity. There is approximately 17.3 Mt of remaining consented capacity for landfills and, of this, approximately 1.6 Mt is operational. This equates to approximately two years landfill capacity based on the 2012 fill rate. Alternative treatment options must be developed as operational landfills continue to decline.* (EPA National Waste Report 2012).

5.1 LANDFILL DISPOSAL CAPACITY

In the 2012 National Waste Report, the EPA reported that the number of active landfills accepting municipal waste for disposal at the end of the reporting year was 13 (EPA 2012). The report was published in August 2014 and in the interim period the number of active landfills has decreased further to 7 landfills being active at the end of 2013. The EPA is aware of the lag in reporting on waste management data and infrastructure in the 2011 report warned *'that the remaining capacity estimates must be treated with caution as they are affected by numerous factors'* and concluded '*the number of landfills is expected to continue to decline with 5 of the current 15 active MSW disposal sites expected to close in the next 3 years*'. A status review of the active landfills as reported (by the EPA) has been carried out to provide an update on the active disposal capacity and this is shown in Table 3 below.

Table 3 shows that the number of active landfills nationally by mid 2014 has dropped to 5 facilities. Data from the EPA shows that at the end of 2012 the quantity of MSW sent to landfill dropped to 1.02 million tonnes, a 24% decrease on the quantity landfilled in 2011 (1.34 million tonnes). This is expected to reduce further in 2013.

Table 4 Municipal Waste Landfills Operating in 2014

EPA Licence No	Landfill	Status
W0067-02	Rathroeen	Active
W0201-03	Drehid Facility	Active
W0020-02	Scotch Corner	Active
W0025-03	Powerstown	Active
W0165-02	Ballynagran	Active

The movement of municipal waste away from landfill to preferred environmental treatments such as recycling, biological treatment and energy recovery has long been a policy objective in Ireland. However Ireland has been slow to implement this objective, as shown in Table 5, and still remains overly reliant on landfill.

The landfill levy was first introduced in Ireland in 2002 to drive municipal waste away from landfill but was largely ineffective in the period 2002 to the end of 2009. Table 5 below shows that from 2005 to 2009 the rate of disposal only decreased from 66% to 61% over the 5 year period. For the 3

years from 2009 to end of 2011 the disposal rate has decreased from 61% to 53% which is a greater drop over a shorter period.

The decrease has been due to a combination of factors, the most influential being the increased (and more effective) landfill levy. The levy stood at €25 in 2009, but following increases between 2010 and 2013 is now at €75 per tonne. The levy is effectively pricing landfilling out of the market and has forced operators to look at alternative and better solutions (from an environmental perspective) for treating municipal waste.

Table 5 MSW to Landfill and Corresponding Landfill Levy

Year	MSW to Landfill (M t)[1]	% MSW Landfilled	Landfill Levy (Per tonne)
2005	1.8	66%	€15
2006	2.0	64%	€15
2007	2.0	64%	€15
2008	1.9	63%	€20
2009	1.7	61%	€25
2010	1.5	58%	€30
2011	1.3	53%	€50
2012	1.02	41%	€65
2013	Not available	Not available	€75

It is predicted that municipal waste tonnages will grow into the future with approximately 4 million tonnes forecast by 2030 (refer to Section 3.2 above). Against this backdrop, the need to develop alternative end destination treatments[2] remains fundamental if Ireland is to move away from landfill over the long-term. The construction of additional MT capacity, such as Mechanical Biological Treatment (MBT), is not the solution required as these technologies remain dependent on next step end destination sites such as landfill or incineration facilities.

5.1.1 Biodegradable Municipal Waste (BMW)

Biodegradable Municipal Waste (BMW) refers to the biodegradable component of municipal waste (not including biostabilised waste).

In 2012 it was estimated that there was 1,871,001 tonnes of BMW in *managed* MSW (approximately 69% of MSW generated and 70% of MSW managed) (see the table below for further details).

[1] Source: EPA National Waste Reports, www.epa.ie

[2] An end destination treatment is a treatment which is a defined tier on the waste management hierarchy and transforms the waste it is treating. Examples of end destinations include paper mills, composting facilities, waste to energy facilities and landfill. Intermediate facilities, such as mechanical facilities, which compact, bales, shred, mix, blend waste are not considered to be end destination treatment facilities.

Table 6 BMW Content % in Municipal Waste

Waste Type	Quantity Managed (Tonnes)	BMW Content %**	BMW Content (Tonnes)
Household	1,557,100	65%	1,012,115
Non-Household Municipal*	1,115,437	77%	858,886
		Total	**1,871,001**

*Non-household municipal is commercial and industrial non-process waste that is similar to household waste, street sweepings
**BMW Content % from EPA 2011 Report, no BMW % given in EPA 2012 Report

In order to assist Ireland's obligations under the Landfill Directive (1999/31/EC), the EPA inserted new conditions into operational MSW landfill licences limiting the acceptance of BMW and requiring the determination of the biodegradable content of MSW sent to landfill.

The overall amount of BMW in MSW landfilled nationally in 2012 as reported by landfill operators to the EPA was 589,259 tonnes (which equates to 54% BMW in MSW).

Table 7 Targets of BMW Quantity to be Landfilled

Target Year	Maximum Quantity to be landfilled (t, rounded)
2010	916,000
2013	610,000
2016	427,000

Current Position	Quantity of Biodegradable Waste Landfilled (t)
2012	589,259

Distance to Second EU Landfill Directive Target (July 2013) (t)
20,741 below target
Distance to Third EU Landfill Directive Target (July 2016) (t)
162,259 in excess of target

Source EPA National Waste Report 2012

Source separated collections of biodegradable waste in themselves will not ensure that Ireland meets the diversion targets set out in the EU Landfill Directive. For example, the residual bin from a three bin household collection service can contain up to 47% biodegradables (by weight).

The increasing landfill levy and the economic down-turn contributed in significant ways to Ireland's achievement of the first EU Landfill Directive diversion target (July 2010) through decreases in MSW generation and the quantity of residual waste consigned to landfill. However in order to ensure compliance with future targets as the population continues to grow and the economy recovers, efforts must be made in waste prevention and recovery and the development of necessary supporting infrastructure. The ESRI are now predicting 3% growth in GDP in 2015 which is higher than previously estimated.

5.2 ALTERNATIVES TO LANDFILL

In this report we consider the alternatives to landfill to include final treatment options only, therefore the production of Solid Recovered Fuel (SRF) and Refuse Derived Fuel (RDF), outputs of the mechanical treatment process, are not included as this is considered a pre-treatment option which still requires final treatment in a cement kiln or WtE facility.

Waste to Energy/Incineration	A waste to energy facility produces energy (electricity and heat) from the incineration of waste. Incinerators can reduce the volume of waste by approximately 90%, producing bottom ash and fly ash which require further treatment and/or disposal
Cement Kilns	Cement kilns can process RDF as well as other selected waste types in the cement production process. The acceptance of waste fuels can realise cost savings to the cement industry. They are not considered a long term reliable solution for the management of MSW as they may alter their fuel depending on financial, technical and operational considerations.
Biological Treatment	Waste companies use mechanical separation techniques to process residual municipal waste. This typically produces refuse derived fuel (RDF) organic screenings/ residual fines and other residues. In most cases the biological treatment of Organic screenings/ residual fines is outsourced to a third party or landfilled. Note that after mechanical separation the RDF or Solid Recovered Fuel (SRF) requires further treatment (landfill, cement kiln, waste to energy plant).
Export	The export of residual wastes, in the form of RDF or SRF, is on the rise as operators within the Irish market take advantage of low cost gate fees on offer in Central and Northern Europe. However such practice does not address the principles of self-sufficiency and proximity and therefore is not in accordance with Irish Waste Policy especially when sufficient waste to energy capacity exists in Ireland.

5.2.1 Incineration

Only one WtE facility is currently in operation (Indaver's facility in Carranstown, Co Meath). The facility has planning permission for 220,000 tonnes per annum (tpa) and a waste licence for 200,000 tpa (currently awaiting a decision on review for 10% increase in capacity).

The facility commenced waste activities commenced in August 2011 and during that reporting year accepted 42,129.20 tonnes of waste for recovery (sourced from 2011 facility AER). The facility accepted a total of 206,126 tonnes during 2012 (sourced from 2012 facility AER) and a total of 220,348 tonnes during 2013 (sourced from 2013 facility AER) therefore indicating that the facility is currently oversubscribed.

5.2.2 Cement Kilns

The Irish Cement market has dwindled by 80% of production from around 5 Million tonnes to 1 Million tonnes in recent years according to market sources. Previously there was significant hope that this industry might treat a range of problematic wastes as alternate fuels (such as Meat and Bone Meal, waste tyres and RDF). Clearly while these fuels can realise energy savings for the cement industry, some can also have quality implications for the final product and usually are limited as a result of their chemical properties and modified burning requirements. For example, the IEA Task 36 group has noted that chlorine content may determine the quantity of RDF that can be used in cement.

There are currently 3 facilities permitted and capable of receiving RDF/SRF in Ireland (excluding Indaver's facility which is discussed separately under 'Incineration'). These are Lagan Cement Ltd who commenced receipt of SRF following trials in 2009, Irish Cement Ltd who commenced trials for SRF in 2011 and Quinn Cement Ltd who received permission to accept SRF in 2012 (and may accept from 2014).

Lagan Cement located in Kinnegad, Co.Meath has the necessary consents to accept 95,000 tonnes of alternative fuel such as Meat and Bone Meat; household, commercial and industrial wastes.

Irish Cement (Platin) located in Duleek, Co.Meath also has the necessary statutory consents to accept 120,000 tonnes of alternatives fuels such as SRF, Meat and Bone Meal (MBM) and waste tyres.

In July 2012, Quinn Cement located in Cavan received consent from the EPA to accept 127,875 tonnes of SRF material per annum. Conditional planning permission to displace and supplement 55% of the coal used at the existing facility with SRF and the associated works was granted by Cavan County Council on the 17th of December 2009.

From the above it is clear that existing consented capacity at these cement kilns is for a variety of waste types. Total consented capacity is 342,875 tonnes however only a portion of this is relevant to the MSW stream.

In 2012, it is estimated that the Irish Cement industry used almost 121,214 tonnes of RDF compared with about 72,000 tonnes in 2011 (see Table 5 below). This is mainly due to additional licensed capacity which came on stream at the Irish Cement, Platin facility. The likelihood is that the cement industry will continue to use this order of RDF tonnage until the economy recovers and the cement industry ramps up again.

Table 6: Waste Recovered in Cement Kilns

Waste Recovered in Cement Kilns				
Waste Description	**2009***	**2010***	**2011****	**2012**
Quantity of RDF / SRF recovered at cement kilns	36,642	45,948	71,732	121,214
Other non-municipal wastes	-	-	7,293	-
Total	**36,642**	**45,948**	**79,025**	**121,214**
***From EPA's National Waste Report**				
****Complete data for 2011 not available.**				

It is assumed (based on market knowledge) that only two cement kilns accepted SRF/RDF for treatment in 2012 (Irish Cement & Lagan Cement).

These facilities have reported that the data on waste accepted for recovery is commercially sensitive, however some data is available from the AERs of companies who report sending waste to Lagan and Irish Cement.

5.2.3 Biological Treatment

A national capacity for biological treatment of 412,700 tonnes was given in the 2012 RX3 Market Report on Irish Compost Production and Use. A figure of 550,000 tonnes of biological treatment capacity is quoted in Table 5.1 in the EPA's document Ireland's Environment – An Assessment, which was provided by the IWMA. A more recent SLR report commissioned by the IWMA estimates that there would be 418,400 tonnes of biological treatment capacity at the end of 2011. It should be noted that several of the facilities mentioned in that report are exclusively dedicated to the treatment of green waste or sludges etc. and therefore not currently available to be used for treatment of MSW. Also facilities in general tend to be licensed for higher quantities than they actually treat as in some cases other material is imported to be used as an amendment e.g. woodchip is used in composting to provide carbon and allow aeration to occur.

A clearer indication of the actual capacity is presented in Table 7 overleaf. Under the Animal By-product Regulations, only facilities that have formal approval from the Department of Agriculture, Fisheries & Food (DAFF), can treat waste that may contain animal by-products such as MSW or organic fines fractions from mechanical sorting of MSW.

This table indicates that there are about 273,800 tonnes of approved capacity for biological treatment of products such as source-separated material and/or organic fines obtained from the tromelling of MSW itself. However, not all of these facilities are operating to full capacity. At present it is estimated that the majority of this capacity is dedicated to source-separated waste and that less than 15% of the capacity was used to treat the organic fines that came from a variety of mechanical processes at different waste sites.

It is also clear that lending institutions are unlikely to finance developments that rely on disposal of organic fines given the risk that may be involved in handling this material over a long-period of time. The relative cost, odour treatment and space requirements of a new investment in such a facility on an existing site would also rule out many existing MRF locations. However landfill locations could be considered if no energy from waste options existed. The addition of processing and logistics costs for

treatment of organic fines are likely to keep this particular treatment option on the higher cost side for companies which control lower volumes.

A total of 156,212 tonnes of waste was treated by composting/anaerobic digestion in 2012 (EPA, 2012). This figure relates to composting of brown bin type waste and is already contributing to the recycling rates reported. The EPA has not provided a figure for organic fines extracted from residual waste and sent for biological treatment in 2012. However, a total of 31,797 tonnes of organic fines were extracted from residual waste and sent to for bio-treatment in 2011.

Table 7: Biological Waste Treatment Facilities approved by DAFF

Facilities with ABP Approval*	Operational Capacity 2012 (Estimate) tonnes**
Kilmainhamwood Compost	40,000
Envirogrind Ltd	10,000
Milltown Composting Facility	24,500
Waddock Composting	7,000
O'Toole Composting	15,000
Galway City Council	9,500
Athchursail Arann Teoranta	500
Johnstown Recycling Ltd.	2,500
De Brún Iasc Teo	15,000
Ballybeg Composting Facility Ltd.	45,000
McGill Environmental Systems (Irl) Ltd.	20,800
Enrich Environmental	20,000
Drehid Composting Facility	24,000
Bruscar Bhearna Teo, Barna Waste* **	40,000
Total	**273,800**
***List of facilities taken from the DAFF Website**	
****Estimated operational capacity taken from the market report on Irish Organic Waste Management and Compost Use published by Rx3 under the Department of Environment, Community & Local Government and updated with market intelligence**	
***** New facility**	

5.2.4 Exports

The export of residual wastes, in the form of RDF or SRF, is on the rise as operators within the Irish market take advantage of low cost gate fees which are currently on offer from plant operators in Central and Northern Europe. In 2012, the latest year for which data is available, almost 118,320 of RDF/SRF type material was exported. More recently it has been reported[3] than unprocessed residual waste is being exported from Ireland to Europe for treatment due to a lack of national capacity. It is anticipated that the quantity of exported residual waste exported will continue to rise for this same reason.

[3] http://www.irishtimes.com/news/cork-ships-household-waste-for-incineration-1.552388

Article 16 of the Waste Framework Directive addresses the principles of self-sufficiency and proximity. It states that Member States will '*establish an integrated and adequate network of waste disposal installations and of installations for the recovery of mixed municipal waste collected from private households…to enable the Community to become self-sufficient in waste disposal as well as in the recovery of waste'*. The Directive also provides for Member States '*to move towards that aim (self-sufficiency) individually'*.

The intention from the Government in the transposing Regulations is clear; the aim for the State is to become self-sufficient for the disposal and recovery of residual municipal wastes. This intention was further emphasised by the Government's latest waste policy document, A Resource Opportunity (June 2012), which states '*in keeping with the proximity and self-sufficiency principles, a key objective…will be to ensure a sufficiency of waste management infrastructure within the State to manage municipal waste'*. The current rise in residual exports highlights the lack of waste treatment infrastructure and the need to develop end destination treatment solutions.

5.2.4.1 Notified Waste Exports

There is anecdotal evidence of significant quantities of residual municipal solid waste being shipped abroad in 2012 with a likelihood of much greater volumes in the future. Some market players are estimating this may even rise to some hundreds of thousands of tonnes.

Recent figures from the National Transfrontier Shipment (TFS) Office indicate a dramatic increase in the Notifications (applications for consent to export material) for the period 2012 – 2013. Organisations applying for Notifications have to provide evidence of a contract with the organisation abroad intending to accept the waste and pay the fee to the National TFS Office upfront, so this can be considered an indication of serious intent to export the material. While the table below refers to RDF, in reality, it is thought that the Quantity Notified includes non-processed municipal solid waste as well as RDF.

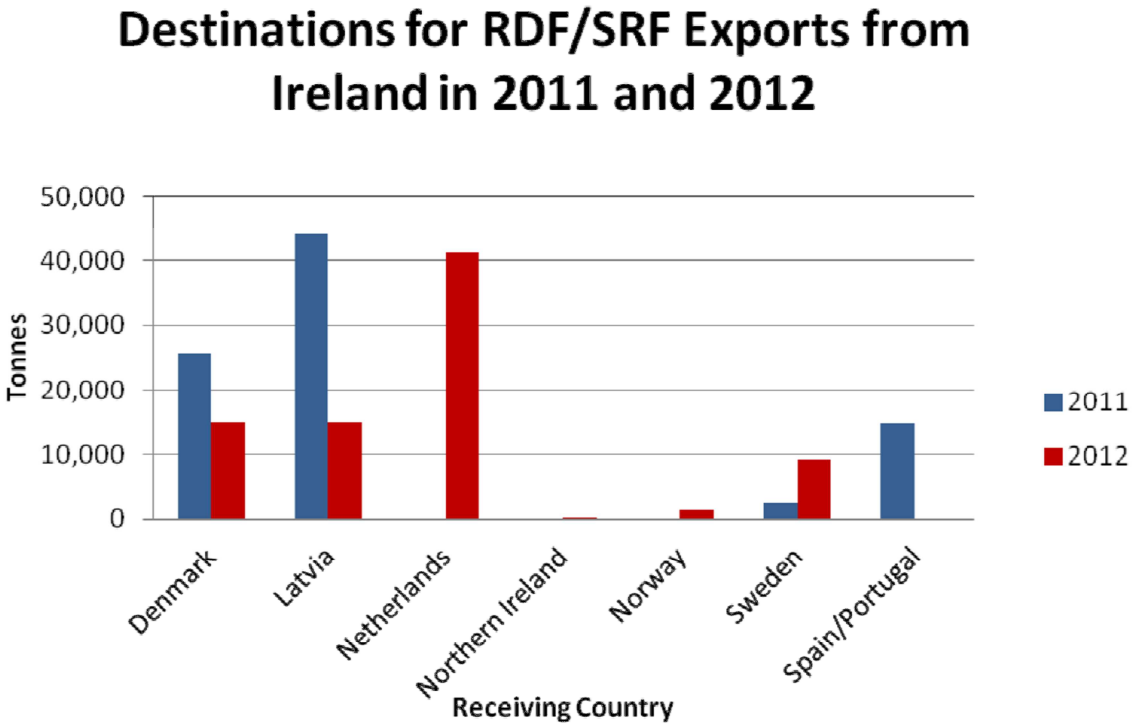
Table 8: RDF/SRF Waste Notifications & Quantities Exported in Tonnes

RDF SHIPMENTS for Energy Recovery (By year of notification)		
Shipments of Refuse Derived Fuel [RDF] Notified to NTFSO For EXPORT (EWC Code [19 12 10])		
Year	**Quantity Notified**	**Quantity Accepted**
2009 - 2010	40,480.00	29,541.07
2010 - 2011	75,740.00	51,602.27
2011 - 2012	71,000.00	51,713.37
2012 - 2013 (until 11/10/2012)	320,333.00	51,431.63
2013-2014	-	>300,000*
Total to date [since 2009]	**507,553.00**	**184,288.34**
Quantity Notified is the amount under contract that could/might be moved		
Quantity Accepted is the actual quantity moved		
2012 - 2013 Notified amounts include some notifications that are not yet finalised/consented		

*This includes processed (in the form of SRF/RDF) and unprocessed residual MSW

For a notification in a certain year, the movements can take place within a specified period. E.g. Notification approved in April 2009 - Movements can take place between April 2009 and April 2010.

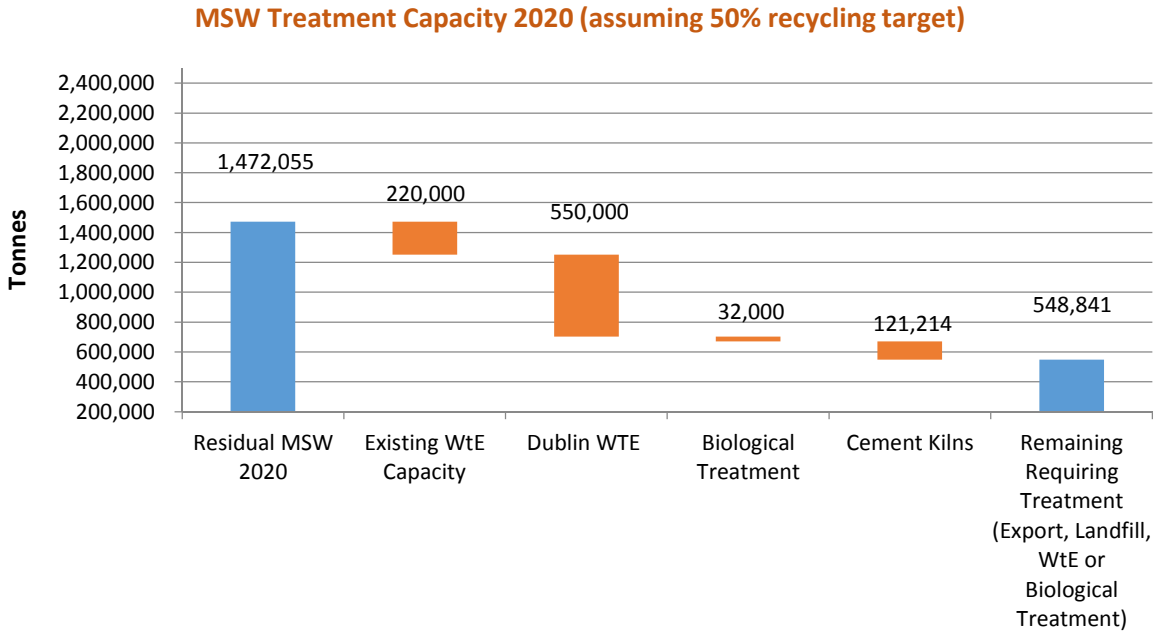
The top receiving country for RDF in 2012 was the Netherlands (as reported in the CIWM Technical Report - Research into SRF and RDF Exports to Other EU Countries (July 2012). This differed from 2011 which saw the RDF/SRF export market dominated by SRF export to Latvia and Denmark.



Source: CIWM Technical Report - Research into SRF and RDF Exports to Other EU Countries (July 2013)

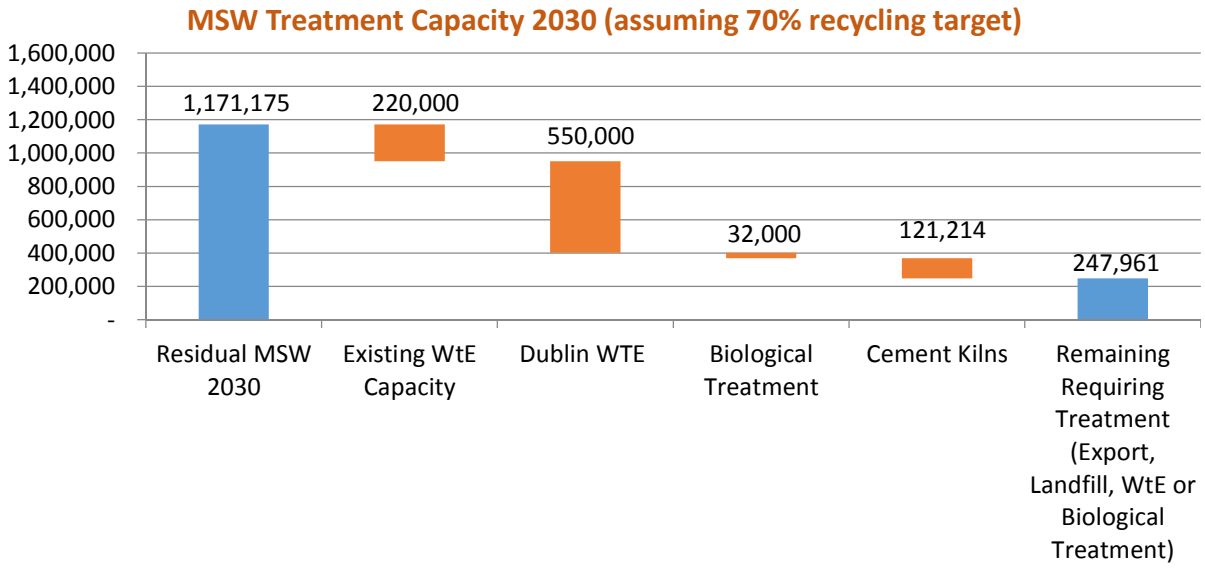
5.2.5 Summary of Alternative Treatment

The figure below presents long term projections of treatment capacities for residual MSW (2020). The 2020 scenario below assumes a 50% recycling rate is achieved (40% in 2012) resulting in 1,472,055 of rMSW being available for treatment. Indaver's facility at Carranstown is assumed to be at full extended capacity (220ktpa) and the Dublin WtE facility at full contractual capacity (550ktpa). Biological treatment and cement kiln capacity are retained at 2012 levels.



An increase in recycling rates from 40% in 2012 to 50% in 2020 will be challenging. Achieving the 50% recycling target will result in an additional 395,040 tonnes of MSW being recycled in 2020 above reported 2012 recycling levels.

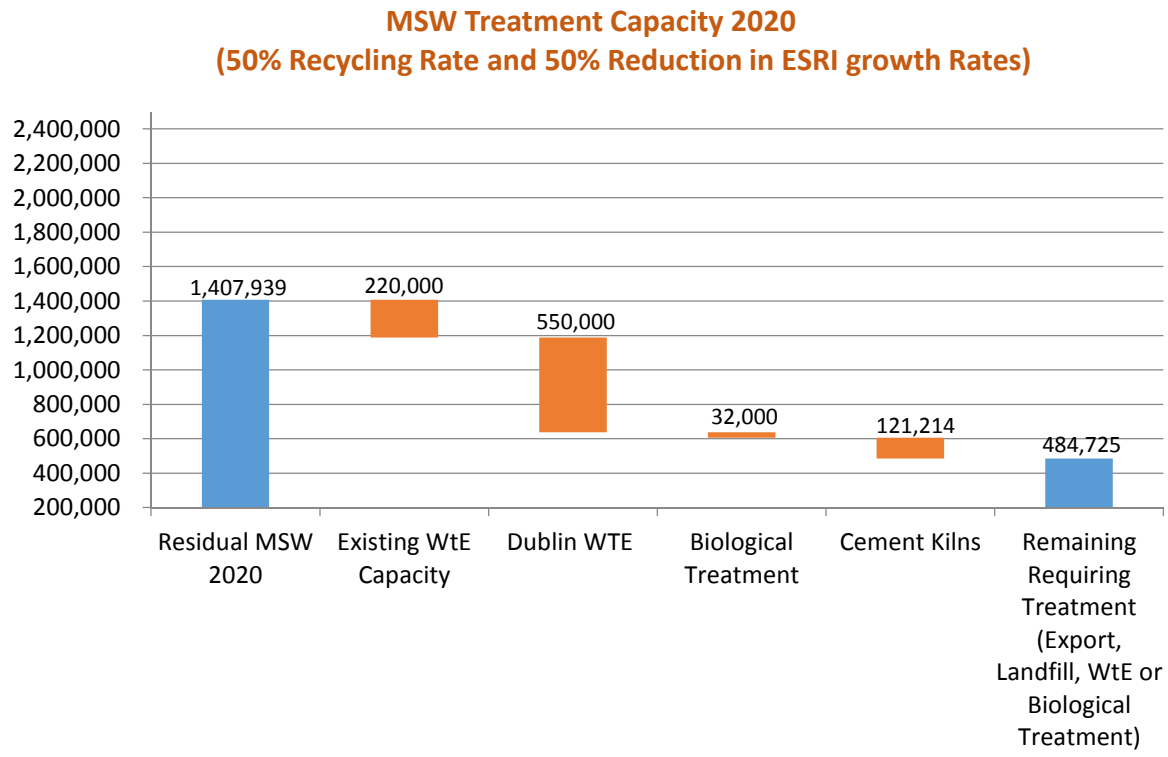
The figure below presents long term projections of treatment capacities for residual MSW (2030). The 2030 scenario below assumes a 70% recycling rate is achieved (40% in 2012) resulting in 1,171,175 of rMSW being available for treatment. Indaver's facility at Carranstown is assumed to be at full extended capacity (220ktpa) and the Dublin WtE facility at full contractual capacity (550ktpa). Biological treatment and cement kiln capacity are retained at 2012 levels.



An increase in recycling rates from 40% in 2012 to 70% in 2030 will be challenging. Achieving the 70% recycling target will result in an additional 1,655,727 tonnes of MSW being recycled in 2030 above reported 2012 recycling levels.

5.2.5.1 Sensitivity Analysis (2020)

A sensitivity analysis has been prepared for the MSW projections for 2020 which assumes growth rates are 50% of the ESRI base case assumption as set out above while achieving a 50% recycling rate. This sensitivity analysis indicates that 2,815,877 tonnes of MSW will be generated in 2020 (an increase of 123,340 tonnes on actual 2012 levels) and that 1,407,939 tonnes of rMSW will be available for treatment. This analysis assumes Indaver's facility at Carranstown is at full extended capacity (220ktpa) and the Dublin WtE facility at full contractual capacity (550ktpa). Biological treatment and cement kiln capacity are retained at 2012 levels which results in 484,725 tonnes then being available for further treatment and/or export.



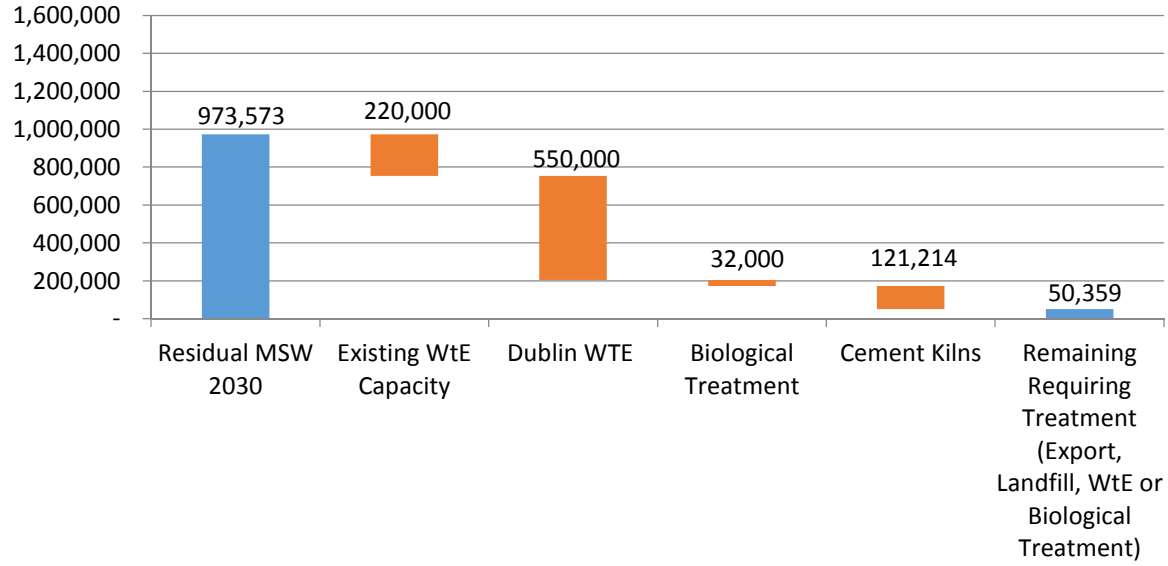
An increase in recycling rates from 40% in 2012 to 50% in 2020 will be challenging. Achieving the 50% recycling target will result in an additional 330,924 tonnes of MSW being recycled in 2020 (on 50% base case growth assumption) above reported 2012 recycling levels.

5.2.5.2 Sensitivity Analysis (2030)

A sensitivity analysis has been prepared for the MSW projections for 2030 which assumes growth rates are 50% of the ESRI base case assumption as set out above while achieving a 70% recycling rate. This sensitivity analysis indicates that 3,245,244 tonnes of MSW will be generated in 2030 (an increase of 552,707 tonnes on actual 2012 levels) and that 973,573 tonnes of rMSW will be available for treatment. This analysis assumes Indaver's facility at Carranstown is at full extended capacity

(220ktpa) and the Dublin WtE facility at full contractual capacity (550ktpa). Biological treatment and cement kiln capacity are retained at 2012 levels which results in 50,359 tonnes then being available for further treatment and/or export.

MSW Treatment Capacity 2030
(70% Recycling Rate and 50% Reduction in ESRI growth Rates)



An increase in recycling rates from 40% in 2012 to 70% in 2030 will be challenging. Achieving the 70% recycling target will result in an additional 1,194,656 tonnes of MSW being recycled in 2030 (on 50% base case growth assumption) above reported 2012 recycling levels.

Both the 2020 and 2030 scenarios outlined above indicate that there is sufficient waste available in the market to accommodate the contractual capacity of the Dublin WtE facility. There is also sufficient waste available within the market to accommodate expansion of individual market segments.

6 COMPETITIVE LANDSCAPE

6.1 COLLECTION MARKET

In terms of the current market structure, this is best described in the Regulatory Impact Assessment (RIA) conducted by the Department of Environment, Community & Local Government in July 2012 (http://www.environ.ie/en/PublicationsDocuments/FileDownLoad,30784,en.pdf). The RIA recognises that the household waste collection market is split into three main categories: the largest six collectors; some 10-15 medium sized firms; and, 35 smaller firms. There is a further category of person who transports waste directly to the landfills and it is noted from the EPA's Waste Report that there are also a significant number of householders who may dispose of their wastes illegally through backyard burning, fly-tipping or other means.

The major collectors identified by the RIA are listed as follows:

Table 10 Major Waste Collectors

Company	Households
Greyhound	220,000
Panda	135,000
AES	95,000
Country Clean	80,000
Greenstar	75,000
Oxigen	70,000

The RIA indicated that the Top 4 companies enjoy 44% of the entire household waste collection market. This along with the total number of market players indicates a market that is very fragmented though reportedly maturing through consolidation.

6.2 WASTE TREATMENT MARKET

The larger private sector companies collecting from households also collect commercial and industrial (C&I) wastes and construction and demolition (C&D) or skip wastes, often using the combined feedstock to supply their own processing capacity or disposal facilities. One of the major failings identified by the OECD (Ireland - Environmental Performance Review 2010) is that those waste collectors "*that control their own waste therefore have an incentive to direct it to their own waste disposal sites in order to maximise revenue, regardless of national efficiency concerns or environmental targets*". The EPA has recently tried to correct the landfill aspect of national targets by bringing a focussed effort in stopping biodegradable waste from entering landfill through its licensing arrangements (Municipal Solid Waste: Pre-treatment & Residuals Management - An EPA Technical Guidance document).

The major waste treatment market players are as follows:

- Indaver
- Panda
- Greyhound
- AES
- Oxigen
- Thorntons
- Greenstar*

* It should be noted that the future development of Greenstar, the largest waste management company in Ireland, is uncertain as it has been sold to US private equity company Careberus by a receiver.

Apart from Indaver, which operates waste to energy plant with 200,000 tonnes of capacity (awaiting approval for 10% capacity increase), the rest of these companies control between 10-20% of the market each, trade with and compete against each other and offer a variety of services within the market. These other companies effectively act as processing brokers preparing batches of wastes for trading into different markets including dry recyclable waste which is traded as a commodity and then those wastes which attract higher tolls for treatment such as RDF, source-separated biowaste, organic fines from MSW pre-treatment and material for disposal to landfill.

Forfás, the Irish state agency, commented in its 2010 update on the waste market that regulatory certainty is required in the waste industry to stabilise the cost base and that there were significant deficits in terms of waste infrastructure. It identified a need to balance environmental and economic goals and promoted the idea of not stifling any WtE infrastructure by placing a levy on this form of recovery. Clearly the sector has been prevented from making significant investment in infrastructure without regulatory certainty. As a result, the production of low quality RDF has evolved as a method of cost avoidance for the Irish waste sector as the landfill tax has increased. Since this production method requires only modest investment, it can usually be justified in a short payback scenario for a larger company.

However, the recent new national policy direction in July 2012 has taken account of the potential surge of exports in RDF or other resources and has clearly outlined that Ireland needs to manage its own waste going forward.

The policy highlighted Ireland's ambition to:

- recover added value in terms of energy and jobs from its own waste resources;
- promote proximity principle by treating wastes locally;
- be self-sufficient;
- fully enforce the plans to ensure implementation.

When the waste plans are revised the likelihood is that waste companies will be ordered to comply with these plans to meet national targets so that the whole country is effectively aligned with waste policy.

7 THE WASTE MARKET IN IRELAND – PRICING

7.1 BACKGROUND - PRICING

The basic option for MSW treatment is along the lines of the following value-chain where material is collected from households or commercial premises and brought to a central materials recovery facility (MRF). There some material is recovered and the waste is prepared for further treatment.

At the moment, the costs of collection are reported to be from €200-400 per household, with the highest prices reported in affluent suburbs of Dublin City. This roughly equates to charges of €150-300 per tonne per household. The nett processing charge after recouping any resource value would appear to be in the range of €120-140 per tonne currently.

The general costs of collection to the waste companies are of the order of €5-8 per bin lift. 2-bin collections are prevalent with recyclables collected every second week and residuals every week. If bin presentation and participation is at 70%, each for an average household, then bins are presented 39 times a year (€195-312).

Clearly, there are immediate opportunities with mixed dry recyclable waste for it to be separated into fractions for trading. Some waste companies are now accepting glass in commingled recyclable collections and this is proving costly to manage. There will continue to be debates about whether separate collection of glass can be justified over mixed collections followed by separation –as the glass mix also can effect the quality of recyclable paper/card.

Commingled C&I waste is much cleaner than household waste (partly due to commercial obligations to separate food waste but also because limited amounts of organic waste produced in this stream). The charges per tonne tend to be lower for this stream and are reported to be between €120-180. The costs of processing this cleaner material are reported to be €50-80/tonne.

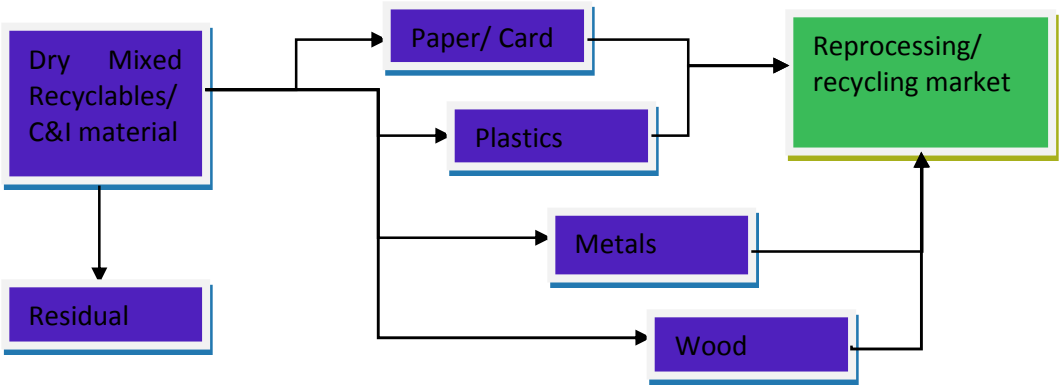
The treatment options in Ireland at present are decided by economic factors rather than being driven by environmental or legislative factors. It is envisaged that this may change after the development of a nationwide enforcement team which is promised under current policy.

That said, some material does end up being recovered since it can be the lowest price option. Clearly options for recovery abroad are now being considered due to a lack of available suitable infrastructure for treatment in Ireland. The current policy requires that Ireland is self-sufficient in terms of waste management and that waste is treated local to its centre of production in line with the proximity principle. In order for this to happen, it is necessary for the development of suitable recovery infrastructure.

7.2 TREATMENT OPTIONS

There are a variety of opportunities for waste companies to extract value from the collected waste. In many cases, the material will be dispatched to a Materials Recovery Facility (MRF) where the reyclables will be sorted into spearate streams for trading (paper/card, plastics, glass, metals, wood etc). these will then be traded by quality into the reprocessing market.

It is worth noting that there are limited opportuntiies in Ireland for material to be fully recovered or recycled and this activity usually happens elsewhere. (There are some notable exceptions e.g. Shabra).



7.2.1 MBT/SRF/RDF

For residual waste, the general method of treatment – if not directly shipped to landfill or incineration is to extract any potential recoverable material. This is normally effected using a trommel-screen to separate the wet organic fraction (Organic Fines) from the dryer oversize fraction. Magnets may also be used to recover ferrous materials or electromagnets for non-ferrous metals. In a further separation of the oversize some valuable recyclate may be gathered or alternatively, a higher quality RDF can be made with the aim of reducing costs of disposal.

Typically, aging MRFs have been adapted or modified to try and provide capability to make RDF and there have been anecdotally reported “quality issues” relating to moisture content and calorific value of RDF both at cement kilns in Ireland and abroad. The fact that the cement kiln production capacity in Ireland has reduced by 80% in the last 3-4 years has dented the short-term requirement for alternative fuels in this market. Equally, there may be competition for local cement kiln capacity from other fuels (which may have more reliably determinable qualities in terms of moisture, sulphur, chlorine and calorific value) such as Meat and Bone Meal and Tyres particularly as the overarching policy aims to deliver sustainable local waste treatment solutions.

It is worth noting that some waste companies were exporting RDF to countries such as Latvia, Portugal and Denmark in recent years. A milk-run type collection was organised from Ireland to collect an accumulated volume of RDF. Typical charges were estimated as follows for this activity: Processing costs of €12-15/tonne; haulage to port costs of €15/tonne; shipping costs of €22-25/tonne and gate fees from €0-10/tonne – totalling an average of €49-65/tonne. This outlet appears to have been closed off due to quality issues.

7.2.1.1 Stabilised Biowaste

In terms of residual MSW, about 35-40% can typically be trommelled out to create an organic fines stream which can be stabilised using biological treatment with composting as the normal mode in Ireland at present. However, since the material is undersize, there are issues in terms of creating aeration channels through the compost piles and it is normal for either material to be added or the piles to be turned regularly. Stabilised Biowaste does not attract a landfill levy so if the cost of treatment can compete with landfill tax charges it is considered competitive. There are some concerns over material not being stabilised or being biodried prior to disposal but it is likely that there will be greater enforcement of these treatment options at facilities going forward. The current range of charges for this service is €53-75 per tonne including transport. If the cost of collection and processing of about €20-30/tonne is added to this the fully loaded cost per tonne is in the region of €73-105.

While the final volume of waste is disposed to landfill at reduced charges (included in this treatment cost), this treatment option remains competitive. There have been odour issues in the past with the stabilised product and as a result the material hasn't been most useful as a landfill cover and in some cases needs to be inserted below the normal cover layer thus using up landfill void. If the treatment option is deemed to conflict with the rollout of brown-bins by using up potential capacity for source separated wastes or the use of landfill void space, it may incur an additional treatment levy going forward.

7.2.1.2 RDF

Some material can easily be recovered from residual waste. Although partially wet, a quantity of the waste can be shredded and baled to make a refuse derived fuel. Various operators report quantities of between 40-58% of the waste to be recoverable as RDF. If a collection and processing cost of €20-30 per tonne is allowed here also and a transport cost of circa €15/tonne to bring to a cement kiln in Ireland where a gate fee of €45-50/tonne will be charged, the overall costs of disposal per tonne of material to cement kiln is in the region of €80-95 with further price penalties if the material has a high moisture content or low CV which part of this material will have if a higher percentage (>40%) is recovered. Due to the collapse of the cement market, the treatment capacity is limited in Ireland forcing market players to seek capacity abroad.

For larger city outlets, an outlet has emerged for shipment of waste to the Netherlands where there is an over-capacity of WtE treatment. This is of particular interest where local landfill supply is limited and relatively expensive (e.g. Limerick at €60/tonne plus €75 landfill levy) to other landfill options. E.ON Delfzijl in the Netherlands and others are rumoured to be offering gate fees of €50/tonne to Irish waste providers. With haulage, stevedoring and other shipping costs estimated to be in the region of €35/tonne, then processing, shipping and treatment options are competitive with local landfill prices. There is anecdotal evidence of over 100,000 tonnes being shipped abroad this year with a high likelihood of much greater volumes in the future. Some market players are

estimating this may even rise to some hundreds of thousands of tonnes until adequate waste recovery treatment is commissioned in Ireland.

7.2.1.3 Landfill

The remainder of treated material is sent to landfill. Previously, the costs of disposal used to be very low, until the EPA introduced a measure that requires the price of landfill disposal to take into account any costs associated with operating, closing and restoring the landfill. Nowadays, gate prices vary from €35-40/tonne for the larger landfills such as Drehid or Ballynagran to €60-80/tonne at Limerick and Carlow. Additionally, the landfill levy is currently €75/tonne. Transport prices are typically €10-15/tonne to landfill.

The capital costs of all landfills are not the same for private and public companies e.g. Bord Na Mona would have had the land in its possession prior to building Drehid and while the procurement costs may have been higher they have probably saved overall on costs. The scale of this landfill would make it very competitive on price with an estimated cost price of between €20-30 excluding any margin or regulatory payments.

In Ireland, royalties are reportedly paid to some private landowners of up to €8/tonne for landfills developed on their land and this typically applies to Greenstar landfills only. In addition many landfills have regulatory payments including a nominal community charge which is related to tonnage and an environmental liability fund contribution.

Typically, capital costs at large landfills are of the order of €20-30/tonne with operating costs (fixed and variable) of the order of €10-20/tonne. There may be higher operating costs for smaller landfills. Margin will vary depending on the owner, original funding mechanism and market circumstances.

The landfill levy was increased to €75 per tonne mid-2013. The rate of the levy will be kept under review by reference to diversion rates and the consumer price index to ensure the dissuasive effect of the levy as an economic instrument is maintained.

It is likely that the landfill levy will increase the level of exports of MSW or RDF/SRF, unless local treatment options become available.

7.2.2 Incineration

7.2.2.1 Incineration in Ireland

Indaver, Carranstown is over-subscribed at present but had offered capacity at about €83 per tonne to the market in 2012 with this charge expected to have risen to €93/tonne during 2013. Transport prices are typically €10-15/tonne to Indaver's facility.

7.2.2.2 Incineration Exports

The amount of waste exported to other European countries shows that export is currently the option with the lowest marginal cost. Although limited public market information is available we believe that a reasonable price range for export is €80 – €110 (see figure below) (sourced Tolvik

2011). This includes gate fees at €60-€70 and transportation costs at €20-€40. The long term price is probably at the upper side of this bandwidth when overcapacity in western European markets disappears. It is likely that at least some of this overcapacity will disappear as the European economy recovers. Domestic treatment facilities have to undercut this price in order to be competitive.

These prices are in line with the results of a survey of the Norton Rose Group in 2011. More than 67% of the respondents expected gates fees of GBP 80 (EUR 99) or higher. 22% gate fees between GBP 60-70 (EUR: 75 – 87). Only 3% expect gate fees below GBP 50 (EUR 62).

Recent evidence (CIWM Technical Report - Research into SRF and RDF Exports to Other EU Countries (July 2013)) indicates that export costs are still comparable with those recorded by 2011.

The average "all in" cost for shipment and recovery to Netherlands and mainland Europe from UK/Ireland was found to be €80-100 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 location of the receiving plant, mode of transport and amount of material in transit all have an additional bearing on the transportation costs.

8 CONCLUSIONS

A total of **2,692,537 tonnes of MSW was generated** in 2012 with **1,027,577 being disposed to landfill** within the same year.

In 2012, the quantity of MSW which was landfilled dropped to **41%.** This is a significant reduction compared to the 2011 total **(53%)**. While the landfill disposal rate is higher than the EU27 average (37%), the recycling rate is on par with the European average indicating that alternatives to landfill, such as the Dublin WtE facility, are now required to bring us in line with the European average.

The movement of municipal waste away from landfill to preferred environmental treatments such as recycling, biological treatment and energy recovery has long been a policy objective in Ireland. The current decrease has been due to a combination of factors, the most influential being the increased (and more effective) **landfill levy which now stands at €75 per tonne.**

The treatment of the biodegradable component of the MSW is essential in order to meet the 2013 and 2016 Landfill Directive diversion obligations. The increasing landfill levy and the economic down-turn contributed in significant ways to Ireland's achievement of the first EU Landfill Directive diversion target (July 2010). However in order to ensure compliance with future targets as the population continues to grow and the economy recovers, efforts must be made in waste prevention and recovery and the development of necessary supporting infrastructure. **Ireland is currently 20,741 tonnes below the 2013 target and 162,259 tonnes in excess of the 2016 target**. The Dublin WtE facility will play a significant role in reducing the volume of BMW consigned to landfill.

Approximately **273,800 tonnes of approved capacity** is currently in existence **for biological treatment** of products such as source-separated material and/or organic fines however, not all of these facilities are operating to full capacity. It is clear that **lending institutions are unlikely to finance developments that rely on disposal of organic fines** given the risk that may be involved in handling this material over a long-period of time.

The export of residual wastes, in the form of RDF or SRF, **is on the rise** as operators within the Irish market take advantage of low cost gate fees which are currently on offer from plant operators in Central and Northern Europe. The current rise in residual exports **highlights the lack of waste treatment infrastructure and the need to develop end destination treatment solutions**.

Sensitivity analyses assuming a **50% reduction in growth rates** on the base case assumption and a **50% recycling rates** indicates that **484,725 tonnes** of rMSW will be **available for additional treatment and/or export in 2020**. This analysis assumes Indaver's facility at Carranstown is at full extended capacity (220ktpa) and the Dublin WtE facility at full contractual capacity (550ktpa). Biological treatment and cement kiln capacity are retained at 2012 levels which results in 484,725 tonnes then being available for additional treatment and/or export.

The principal price drivers for alternatives to landfill are the landfill levy and export prices. **The landfill levy currently stands at €75/tonne and is effectively pricing landfilling out of the market** and has forced operators to look at alternative and better solutions (from an environmental perspective) for treating municipal waste.

Waste operators are currently taking advantage of **low cost gate fees from plants in Central and Northern Europe.** The average "all in" **cost for shipment and recovery** to Netherlands and mainland Europe from UK/Ireland is **€80-100**. **Exports will continue until there is an economically viable domestic alternative**.

This report concludes there is **sufficient capacity within the waste market to accommodate the contractual capacity of the Dublin WtE facility.** Even with the addition of the Dublin WtE capacity into the market, a deficit in available alternatives to landfill will remain. This assessment indicates the resultant deficit will ensure that additional capacity will be available for new market entries for alternative treatment capacity. The lack of domestic alternatives to landfill and the increasing landfill levy continue to increase the level of exports, which has now become the price setting waste treatment option. The **Dublin WtE facility gate fee will need to compete with the export market** (which will only remain viable until domestic alternatives are provided) while excess capacity exists in mainland Europe.

General Notes

The following notes should be read in conjunction with the report:

1. This report contains only the available factual data for the site obtained from the sources described in the text.

2. Where data have been supplied by other sources, it has been assumed that the information is correct but no warranty is given to that effect. While reasonable care and skill has been applied in review of this data no responsibility can be accepted by RPS for inaccuracies in the data supplied.

3. This report takes into account the particular instructions and requirements of the Client. It is provided for sole use of the Client and its professional advisors. Information disclosed should be treated as being strictly private and confidential. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. No responsibility is accepted by RPS for the use of this Document, in whole or in part, for any other purpose.