Friends of the Earth Scotland Policy Briefing Paper

Wasting Away

Scotlands lost potential to recover financial and environmental value from waste

November 2009

Summary

- Despite welcome progress in recycling, large volumes of recyclable or compostable materials – around 2.3 million tonnes per year - remain in the municipal, commercial and industrial waste streams, ending up in landfill sites or waste incinerators.
- The net market value of these recyclable or compostable materials is estimated to be around £47m per year.
- The total emissions arising from disposal and replacement of these materials are around 7.8mt-CO2e[i] pa. After the carbon costs of recycling are deducted, the net additional emissions arising from our failure to recover these materials are estimated to be over 4.1mt-CO2e pa.
- At current emissions trading scheme carbon prices (£14.40 per tonne), recycling this waste would be worth £60m a year, while at a more complete social cost (the UK shadow carbon price of £51 per tonne) that value rockets to over £212m.
- Because it would save more CO2e, avoidance of this waste would have equivalently higher social values of £112m per year at the lower ETS price, and £398m per year at the UK Government's shadow price.
- If policy alternatively promoted incineration of this recyclable waste, the CO2e savings would be around 1.3m tonnes: 31% of the level achieved by recycling, and just 17% of the saving achieved if all these wastes could be avoided.

This briefing examines the costs of the unrealised potential for recovery in two ways. First it estimates the market value of the materials concerned if they were collected for recycling. Then it turns to the greenhouse gas emissions associated with the disposal and replacement of the materials – both of which have to be included in a meaningful life-cycle assessment. If we burn paper instead of recycling it, we need to consider the emissions from burning it, and the emissions from making new paper to replace it; and of course also any emissions incurred in undertaking the recycling process.

The Problem

Despite welcome progress in recycling, large volumes of recyclable or compostable materials remain in the waste stream, ending up in landfill sites or waste incinerators. This study is based on the most recent SEPA data[ii] for the weight of materials collected for recycling[iii], Scottish Government estimates of the composition of household or municipal waste[iv], and SEPA sample data on the composition of commercial and industrial waste[v].

Table 1 shows the estimated potential for additional recycling of material collected from municipal (mainly household) and commercial and industrial sources. Collection data by material is not available for commercial and industrial waste, so sector averages have been used. In all cases the available potential is assumed to be that of the best rate achieved in the EU in 2004[vi, vii].

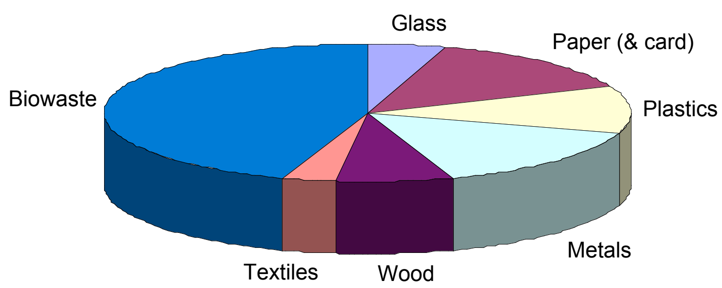
On the assumption that it would be practical to raise the overall recovery rate from that in the latest Scottish data (2007-08) to a rate equivalent to the best in Europe we calculate that around 2.3 million tonnes per year of practically recyclable or compostable materials currently ends up in landfill sites or waste incinerators. About half the potential (1.2mt) remains in municipal waste, and half (1.1mt) in commercial & industrial waste. The total volume of materials that could technically be recycled or composted may be much greater, but here we focus on the difference between Scottish performance and EU best practice, using the latter as a crude representation of the practical potential.

Table 1: Additional Potential Recovery of Recyclable or Compostable Wastes

Material	*Total recycling*	*Total disposed*	*Percentage recovered*	*Best EU rate*	*Additional potential (tonnes)*[viii]
Glass	101,930	137,029	43%	67%	58,173
Paper (& card)	254,206	360,260	41%	69%	169,776
Plastics	14,715	258,381	5%	55%	135,488
Metals	50,195	222,901	18%	85%	181,937
Wood	56,387	114,298	33%	86%	90,402
Textiles	14,618	87,793	14%	53%	39,660
Biowastes[ix]	394,416	971,064	29%	69%	547,765
Municipal (subtotal)	886,467	2,151,727			1,223,200
Commercial & Industrial	2,467,397	3,279,041	43%	62%	1,083,902

Chart 1 shows the breakdown by weight of the additional potential in the municipal waste stream.

Chart 1: Additional potential recovery of municipal waste



We can assume that this material (potential additional recovery) is presently disposed of in line with national averages for waste disposal in the sector (ie for municipal waste 97.1% to landfill and 2.9% to incineration, and for commercial and industrial 94.1 and 5.9% respectively). This implies that around 100,000 tonnes is incinerated and 2.2 million tonnes dumped in landfill sites.

Lost value of recyclable materials

Values have been calculated using conservative figures for June 2009[x]. A weighted average of these figures has been applied to the potential recovery from commercial and industrial waste. The costs of collection, but not recycling, are included in the figures per tonne, which are shown in Table 2. As a result both wood and biowastes currently have negative financial market values. Excluding these materials some £56m of value is being lost each year. Across all the materials considered the net loss is £47m per year. Of course the market value of the material collected is not the only reason for collection for recycling, so this does not imply that we should avoid recycling wood and biowastes.

These figures offer only a snapshot, and in particular, do not predict what market prices would be if all the material wasted were collected for recycling. Depending on how quickly such a goal were achieved it could depress market values, or lead to new market development and higher prices.

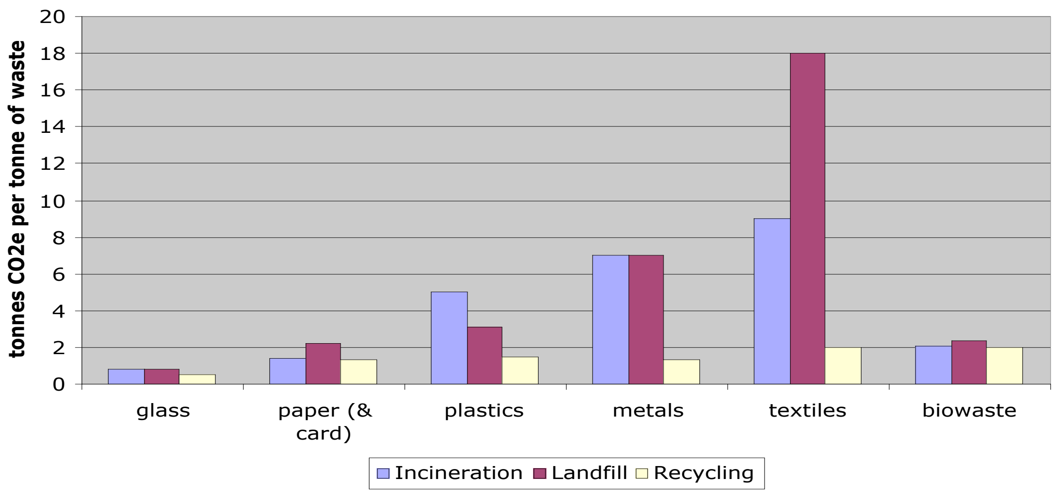
Table 2: Net lost value of recoverable material in Scotland

Market value	*Additional potential*	*Value per tonne (£)*	*Lost value (£)*
Glass	58,173	13	756,243
Paper (& card)	169,776	22	3,735,065
Plastics	135,488	90	12,193,906
Metals	181,937	109	19,831,097
Wood	90,402	-14	-1,265,630
Textiles	39,660	175	6,940,473
Biowastes	547,765	-14	-7,668,717
Total municipal potential	1,223,200		34,522,437
Total C&I potential	1,083,902	11.79	12,779,199
Total	2,307,102		47,301,636

The Climate Change Costs

Table 3 presents a summary of the analysis of the greenhouse gas emissions associated with this materials flow. The factors applied to each material are shown in Chart 2. They were derived from research for WRAP and figures from Okopol[xi]. They are therefore also based on UK and EU averages, rather than specifically Scottish ones. However, the range of these factors between materials is large, and probably much more significant than any variation that might be found if specific Scottish data were available. For instance, disposal of textiles to landfill, because of high methane emissions generates 18 tonnes of CO2e for each tonne dumped. At the other extreme glass results in 0.84 tonnes of CO2e, per tonne dumped, primarily from the energy use required to replace the glass from new raw materials. The offsetting CO2 costs of recycling per tonne range from 0.53-2.00.

Chart 2: Relative CO2 cost of disposal and recyclin



The total emissions arising from disposal and replacement, shown in Table 3, are over 7.8mt-CO2e. After the carbon costs of recycling have been deducted, the net additional emissions arising from our failure to recycle are estimated to be over 4.1mt-CO2e. It should be noted that not all of these emissions arise within Scotland, as the emissions associated with replacement or recycling may occur in other countries, even beyond the UK. Indeed as much as 90% of the emissions may be associated with the replacement of the materials and only about 10% with the direct emissions for waste disposal.

It also should be noted that these figures highlight the value of waste avoidance. While improved recycling of this waste would save 4.1mt-CO2e, waste reduction or avoidance measures could save almost twice as much CO2e (the entire CO2e cost of disposal). Not all these waste streams may be suitable for avoidance, but clearly, in line with the EU waste hierarchy, avoidance should be prioritised.

Table 3: CO2-equivalent emissions associated with materials not recovered

Material	*Additional recovery potential (t)*	*CO2e cost of disposal (t)*	*CO2e cost of recycling (t)*	*Net CO2e (t)*
Glass	58,173	48,865	30,831	18,033
Paper (& card)	169,776	369,512	220,708	148,803
Plastics	135,488	427,584	203,232	224,352
Metals	181,937	1,278,988	245,615	1,033,374
Wood	90,402	n/a	n/a	n/a
Textiles	39,660	703,379	79,320	624,059
Biowastes	547,765	1,282,093	1,084,576	197,518
Municipal (subtotal)	1,223,200	4,110,421	1,864,281	2,246,139
Commercial & Industrial	1,083,902	3,704,029	1,787,081	1,916,948
Total	2,307,102	7,814,450	3,651,362	4,163,087

It is possible to translate these CO2e figures into financial costs. Such a process is loaded with embedded assumptions, and the figures currently used for such a conversion almost certainly remain too low due to the failure to fully consider the impacts of high-impact, low probability outcomes beyond tipping points in the climate system, and due to the systematic undervaluing of impacts on poorer countries that arises in cost-benefit techniques.

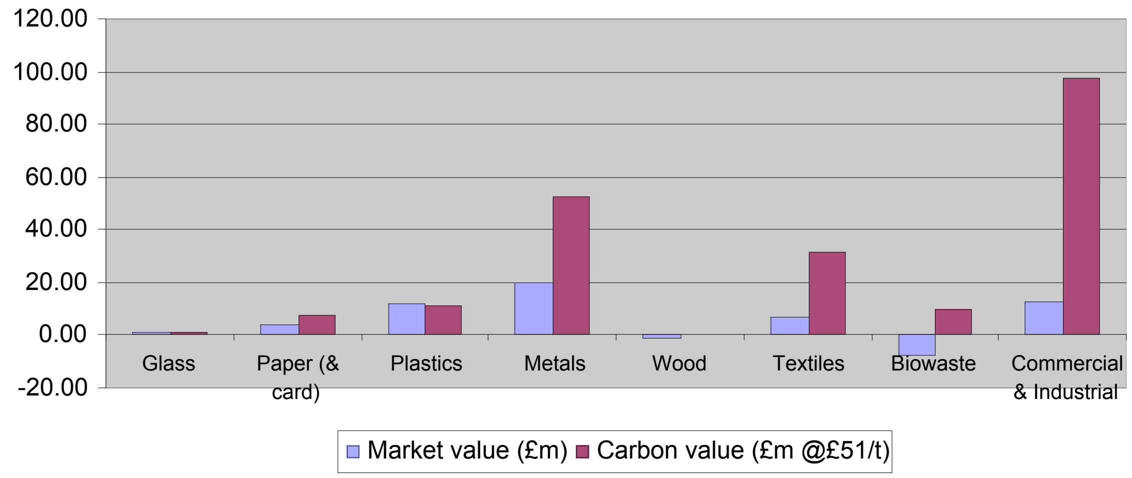
However for illustration we adopt the figures used by the UK Government for shadow pricing in the non-traded sector (which currently includes waste management) (£51 per tonne CO2e); and the current market price of emissions within the European emissions trading scheme (ETS) (£14.40 per tonne CO2e).

Table 4 shows the values arising from the application of these carbon prices to the CO2 savings arising from either recycling or prevention of the recyclable waste currently disposed of in Scotland. It can be seen that in all cases these values significantly outweigh the market values of the materials, and at the higher carbon prices, amount to very significant sums. However these are not cash amounts that could be recovered, merely estimates of the overall cost to society of the greenhouse gas emissions involved. Chart 3 shows both the market values and carbon values of the failure to recycle to full potential.

Table 4 Value of potential greenhouse gas savings				
		CO2 value (£m) at £14.4/tonne		CO2 value (£m) at £51/tonne
Material	*Recycling*	*Prevention*	*Recycling*	*Prevention*
Glass	0.26	0.70	0.92	2.49
Paper (& card)	2.14	5.32	7.59	18.85
Plastics	3.23	6.16	11.44	21.81
Metals	14.88	18.42	52.70	65.23
Wood	n/a	n/a	n/a	n/a
Textiles	8.99	10.13	31.83	35.87
Biowaste	2.84	18.46	10.07	65.39
Total municipal potential	32.34	59.19	114.55	209.63
Total C&I potential	27.60	53.34	97.76	188.91
Total	59.95	112.53	212.32	398.54

Even at current depressed ETS values, recycling this waste would be worth £60m a year, while at a more complete social cost (the UK shadow price) that value rockets to over £212m. Avoidance, because it saves more CO2e, has equivalently higher social values of £112m per year at the lower ETS price, and over £398m per year at the UK Government's shadow price.

Chart 3: Costs of failure to recycle to full potential



The impact of waste disposal routes

It is appropriate to ask whether a shift from landfill to incineration for the residual waste would offer any reduction in net greenhouse gas emissions for these material flows. The relative factors sourced for these estimates take account of average levels of energy recovery from incinerated waste, and thus typically suggest a reduction in emissions in comparison to landfill, reductions which are largest for biodegradable wastes that contribute to methane emissions from landfill[xii].

Using these figures a shift to incineration for this recyclable waste would produce CO2e savings of around 1.3m tonnes: 31% of the level achieved by recycling, and just 17% of the saving achieved if all these wastes could be avoided. In greenhouse gas terms it would therefore be highly undesirable to shift these recyclable materials to incineration rather than recycling or reduction.

Analysis and Policy Implications

The calculations set out here provide only a crude estimate of the financial and carbon costs of Scotland's failure to achieve maximum recycling rates. However there are some clear deductions to be made from the foregoing.

The EU waste hierarchy is a valid and critical policy tool. It should be actively implemented and supported with priority given to waste reduction, reuse and recycling. In consequence measures to reduce waste volumes such as variable domestic waste charging should be considered, alongside the implementation of powers provided by the Climate Change Scotland Act 2009 to support reduction and recycling.

To implement the waste hierarchy effectively, diversion of recyclable waste from landfill to incineration should receive no support. Instead, the overall cap on the capacity of energy from waste facilities in Scotland should be significantly tightened, and extended to cover commercial and industrial wastes. Otherwise it seems unlikely that increased incineration of recyclable wastes will to be avoided.

The policies of the Scottish Government and SEPA to prevent landfill or incineration of recyclable wastes should be strengthened. In particular the disposal of mixed or unsorted wastes to landfill or incineration should be banned, as is the practice in Flanders, where it has helped deliver 70% recycling rates. In addition, the 'thermal treatment guidelines' developed by SEPA should be reformulated to ensure that thermal treatment of recyclable waste is not permitted under any circumstances.

Policies to further increase recycling rates for municipal, commercial and industrial waste would bring significant financial and environmental benefits. However, much greater priority should be given to waste reduction, which has massively greater net social benefits.

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i Greenhouse gas impacts are expressed throughout this briefing in tonnes of carbon dioxide equivalent (CO2e), which takes account of the different global warming potential of gases such as methane as well as CO2.

ii Scottish Environment Protection Agency, 2009. Waste Data Digest 9, Online Excel Tables.

iii The materials data considered in this report has been aggregated so as to make best use of Scottish data. All paper, mixed paper and card is aggregated, as are iron and steel and aluminium (because of the predominance of the mixed categories in the Scottish recycling data). Where possible the categories have been weighted according to the share of different materials.

iv http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Waste-1/wastestrategy/zero-waste-think-tank/meetings/muncipal-waste

v Scottish Environment Protection Agency, Business waste data report 2006

vi Based on the Prognos European Atlas of Secondary Raw Material. http://www.pius-info.de/files/prognos.pdf

vii Using 2004 figures is a conservative assumption which offsets the inclusion of energy recovery in some of the reported rates.

viii The additional potential is calculated by adding current recycling and disposal, and multiplying by the difference between the current and best recovery rates.

ix Biowastes are basically kitchen (food) and garden (green) wastes.

x Cited by Friends of the Earth Europe, sourced from materials week and the website letsrecycle.com: http://www.foeeurope.org/publications/2009/FoEE_gone_to_waste_Oct09.pdf

xi Waste and Resources Action Programme (2006), Environmental benefits of recycling – an

international review of life cycle comparisons for key materials in the UK recycling sector,

Banbury: WRAP,

http://www.wrap.org.uk/downloads/Recycling_LCA_Report_Executive_Summary_Sept_2006

.f6589efe.2839.pdf; Ökopol (2008), Climate protection potentials of EU recycling targets, Hamburg: Ökopol

http://www.eeb.org/publication/documents/RecyclingClimateChangePotentials.pdf Neither source identifies any credible studies providing the relevant factors for wood.

xii It is not clear whether the source figures account for energy recovered from landfill gas.