July 2009

Cyfeillion y Ddaear Cymru

Friends of the Earth Cymru

Response to

"Towards Zero Waste– One Wales: One Planet"

Prepared by Public Interest Consultants

The consultation report asks whether we support the strategy's 'zero waste' approach with a long-term aim of zero waste and 'one Wales: one planet' by 2050, and a medium-term aim of 70% recycling across all sectors by 2025.

This response concludes that the proposed Welsh Waste Strategy, and particularly the 70% headline municipal waste recycling target, is moving in the right direction, but as it currently stands it will not deliver the necessary contribution to the "One Wales: One Planet" goal.

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"Driven by the ideology of infinite growth, the (global) corporations act as if they must expand or die, and in multiplying they have made thrift into a liability and waste into a virtue. Their growth depends upon converting ever-greater portions of the earth into throw-away societies-ever-greater unusable waste produced with each ton of increasingly scarce mineral resources, ever-greater consumption of non-disposable and non-returnable packaging, ever-greater consumption of energy, and ever-more heat in our water and our air. In short, ever more ecological imbalance."

RICHARD BARNET & RONALD MULLER A Reporter at Large - Global Reach, *New Yorker,* 9th December 1974 (from [1])

Summary:

The consultation report asks whether we support the strategy's 'zero waste' approach with a long-term aim of zero waste and 'one Wales: one planet' by 2050 and a medium-term aim of 70% recycling across all sectors by 2025?

Whilst relatively progressive in relation to the targets currently set in England the strategy does not offer "Zero Waste". Zero waste means zero residual waste and not simply no waste to landfill.

A 'one Wales: one planet' target is commendable and necessary but 2050 is far too long a wait given the current environmental and social imperatives. We no longer have time to prevaricate and delay. Bold and urgent action is necessary now and the target should be brought forward to no later than 2030.

Similarly a "medium term aim of 70% recycling" will not deliver the change that is now imperative if we are to make an adequate national contribution in reducing serious social and environmental damage from climate change. The seriousness of our predicament now justifies implementing the measures necessary to deliver a 70% recycling target by 2015; with 80% by 2020. These targets must be combined with the waste reduction necessary to achieve the one Wales; one planet target by 2025.

The headline 70% target is not a real recycling target in any case – it is proposed to include use of incinerator ash (an option that was recently rejected in England) together with other previously excluded wastes such as from beach cleaning. At best incinerator ash is down-cycling of materials. As it is now recognised that much incinerator bottom ash is likely to be hazardous waste it would support the dangerous spreading of toxic material into the environment. The real recycling target - just 63% - is hidden in the supporting "future Directions" papers.

The strategy acknowledges that "massive" levels of waste reduction are needed to achieve zero waste and the 'one Wales: one planet' target but then fails to address the waste reduction challenge in any meaningful way. Suggestions that waste should be 'stabilised' through to 2020 when a paltry 1% waste reduction target would bite are irrelevant in the face of the obvious need for much larger reductions – and are already out of date given the 7% fall in waste arisings that have been

recorded since 2004/5[1]. The consultation documents are wrong to suggest that waste is currently growing.

This strategy would have been good had it been proposed fifteen years ago. Today it is clear that it does not even approach what is urgently needed and other areas of Europe - along with St. Arvans in Wales – already comfortably exceed the targets that are proposed as aims for 2025.

It is deeply compromised by promoting incineration. Incinerators lock us into an eternal present of waste generation and disposal. The capital investment they embody and their relentless hunger for feedstock places a very real cap on minimisation, reuse and recycling of waste for at least a generation. They provide an easy option for waste that stifles innovation, imagination and incentives. They effectively kill off the possibility of transforming waste management from its current obsession with cheap disposal to the genuinely worthwhile goal of high added-value resource utilization [2].

The Stern report says the scientific evidence for climate change is now "*overwhelming*" and that "*climate change presents very serious global risks*" which demand "*an urgent global response*". The simple conclusion is that "*the benefits of strong, early action considerably outweigh the costs*." This strategy does not offer the 'strong early action' that is needed and should be redrafted to reflect the real scale of the challenges that our society must meet.

The proposed Welsh Waste Strategy, and particularly the 70% headline municipal waste recycling target, is moving in the right direction but as it currently stands it will not deliver the necessary contribution to the "*One Wales: One Planet*" goal. Far greater emphasis is needed on waste reduction with targets being set. For many reasons, including the lack of flexibility in a time of great change, incineration should be excluded as an option. The inclusion of incineration and ash recycling seriously risks undermining the progressive recycling targets and the levels of waste reduction that are necessary. This is not a true "Zero Waste" strategy whilst incineration is included as an option. The Strategy is not consistent with the requirements in Wales (but not now in England) to demonstrate the 'Best Practicable Environmental Option' or comply with the 'proximity principle'.

[1] http://www.statswales.wales.gov.uk/tableviewer/document.aspx?FileId=1644

Targets:

The targets proposed in the Welsh Assembly Government consultation are:

TARGET FOR EACH INDIVIDUAL LOCAL AUTHORITY:	TARGETS FOR EACH TARGET YEAR				
	09-10	12-13	15-16	19-20	24-25
Minimum levels of reuse and recycling / AD (or composting) for municipal waste	40%	52%	58%	64%	70%
Minimum levels of AD (or composting if currently committed to this technology) of source separated food waste from kitchens as part of the combined recycling/ composting target for municipal waste above.	-	12% (statutory)	14% (indicative)	16% (indicative)	16% (indicative)
Maximum level of energy from waste (net) for municipal waste	-	-	42%	36%	30%
Maximum level of landfill for municipal waste	-	-	-	10%	5%
Maximum level of residual household waste per inhabitant per annum	-	295kg	258kg	210kg	150kg

The targets, and current performance, for other waste streams are:

PROPOSED TARGETS IN WELSH WASTE STRATEGY

Waste stream	Current performance	2015/16	2019/20	2024/25
Municipal	32%	58%	64%	70%
Commercial	37%*	60%	71%	77%
Industrial	59%*	63%	67%	70%
Construction/ demolition	85%**	na	90%	na

* Figures from Environment Agency survey of commercial and industrial waste in Wales 2007, due to be published shortly; ** 2005/06 figures

England's 2007 waste strategy set a target for just 50% recycling or composting by 2020. While both Wales and Scotland are well ahead of England in terms of ambition neither go far enough. Parts of Europe, including in Flanders and Germany are already achieving recycling rates of more than 70%. There is no reason not to adopt targets of 70% by 2015 and 80%, which the 2007 review by Eunomia Consultants [3] confirmed would be the most cost effective option, by 2020. The current global imperatives, particularly climate change, demand that challenging targets be set if the risks of future damage with unacceptably high social and environmental costs are to be reduced to tolerable levels.

The recycling rates proposed for Wales should be brought forward from 2025 and linked with statutory waste reduction targets.

Zero Waste:

The Assembly's long-term aim is to create a "*zero-waste*" society - defined as one that "*produces no waste in the long term by designing products and services that*

reduce or reuse waste as far as possible". WAG is mistaken, however, in suggesting that "Zero waste" means simply zero waste to landfill - not that this would be delivered by a strategy which includes incineration and which invariably relies on landfill for a significant proportion of the residues. Rather "Zero Waste" means zero residual waste.

The Zero Waste approach concurs with the philosophy that *''Nature does not produce waste. In nature, the waste of one organism or process becomes the food for another*''. i.e. Wastes should be regarded as a resource and sustainable development solutions should be sought in terms of their reuse and recycling. [4]. The principles are summarised by the Zero Waste International Alliance:

> *Zero Waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use.*
>
> *Zero Waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.*
>
> *Implementing Zero Waste will eliminate all discharges to land, water or air that may be a threat to planetary, human, animal or plant health. (Zero Waste International Alliance, 2004)*

The challenge facing WAG, industry and the public in Wales is to redefine the relationship of technological society to the environment and to re-invent the use of materials. To address this challenge a more holistic approach will be required than the current piecemeal consideration of technological options.

Waste Reduction – the weakest link:

Whilst dramatic change is both urgent and essential there is no doubt that it will be extremely challenging. WAG proposes that this should take until 2050. This is not good enough. Applying a target to 2050 is certainly beyond the term of office - and in most cases the lifespan - of current politicians. It is therefore a largely meaningless date save that it implies (an unacceptable) political acknowledgement that Wales will remain unsustainable for at least a further four decades through a time of global crisis when the science clearly shows us that early and dramatic action is urgently required. This is not a morally defensible approach to policy and much greater emphasis should be placed on earlier achievement of the target which is necessary if Wales is to be sustainable and equitable. Without a detailed plan to deliver the challenging targets necessary - and political endorsement at the highest levels for the profound changes that are required - any long-term targets represent little more than environmental rhetoric.

Current Waste growth:

The Consultation documents [5] say:

"Over the period 2006/2007, the total amount of municipal waste arising in Wales was 1.8 million tonnes, an increase from the previous year of 3 % of which just less than 1.6 million tonnes was household waste".

The evidence supporting this claim is elusive and should be clarified. It can be seen from the data published by Statistical Division of WAG [6] that there was actually a **decrease** of 3.4% for the period 2005/6 to 2006/7:

Table A1 Municipal waste arisings (a)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Household arisings (tonnes):								
Regular household collection	955,923	950,170	975,824	985,989	1,005,395	956,784	917,195	816,801
Other household sources	90,611	100,417	85,768	66,022	65,477	59,428	63,352	62,529
Bulky collections (c)	..	..	..	..	9,830	8,330	8,409	6,259
Civic amenity site	268,156	279,026	247,607	218,492	217,482	185,479	164,485	158,215
Household recycling	71,196	89,944	116,841	158,336	198,578	230,395	290,539	344,411
Household compost (b)	18,550	36,049	62,094	93,314	87,877	101,627	128,440	154,629
Total household waste	**1,404,436**	**1,455,606**	**1,488,135**	**1,522,154**	**1,584,638**	**1,542,043**	**1,572,420**	**1,542,846**
Non-household arisings (tonnes):								
Non-household sources (excl. recycling)	222,556	243,859	237,940	227,102	212,597	203,520	131,971	150,359
Non-household recycling	24,721	18,268	37,229	53,204	92,302	116,855	85,990	61,993
Non-household composting (b)	499	0	5,830	17,705	38,790	35,357	43,642	38,443
Total non-household waste	**247,776**	**262,128**	**281,000**	**298,012**	**343,689**	**355,732**	**261,604**	**250,796**
Total municipal arisings (tonnes):								
Total MSW not recycled or composted	1,537,246	1,573,472	1,547,140	1,497,606	1,510,781	1,413,541	1,285,412	1,194,165
Total MSW recycled	95,917	108,212	154,070	211,541	290,880	347,250	376,529	406,405
Total MSW composted (b)	19,049	36,049	67,924	111,020	126,666	136,983	172,083	193,072
Total municipal waste	**1,652,212**	**1,717,734**	**1,769,135**	**1,820,166**	**1,928,327**	**1,897,774**	**1,834,023**	**1,793,642**
Recycling/composting rate (b) (per cent):								
Household waste	5.1	6.2	7.9	10.4	18.1	21.5	26.6	32.3
Municipal waste	5.8	6.3	8.7	11.6	21.7	25.5	29.9	33.4
Percentage change in municipal waste since previous year (per cent)	**1.7**	**4.0**	**3.0**	**2.9**	**5.9**	**-1.6**	**-3.4**	**-2.2**

Source: WasteDataFlow

(a) Table does not include abandoned vehicle arisings.
(b) Composting figures were first reported in 2000-01
(c) Bulky waste tonnages were reported separately for the first time in 2004-05.

Furthermore the results show that there was a continued decrease with an additional reduction of 2.2% for the year to 2007/8:

"The total amount of municipal waste arising in 2007-08, excluding abandoned vehicles, was 1.79 million tonnes, down from 1.83 million tonnes in 2006-07."

Between 2004/5 and 2007/8 municipal waste arisings have reduced by 7%. This should be contrasted with the assumptions made by endorsed regional waste plans:

North Wales [7]

> *"It has been forecast that there will be an annual increase in the amount of waste generated of approximately 3% during each year between 1999 and 2013, so that by 2013 approximately 2.9 million tonnes of controlled waste will be produced in the Region."*

South West Wales [8]

> ***Waste Stream Assumption***
>
> *Municipal Solid Waste (MSW) 1.9% pa compounded to 2020*
>
> *Commercial (C) 1.9% pa compounded to 2020*

Industrial (I) -0.9% pa compounded to 2020

Construction and Demolition (C&D) No growth compounded to 2020

Agricultural (potentially controlled) -0.9% pa compounded to 2020

Agricultural (non-controlled) -0.9% pa compounded to 2020

South East Wales:

> *"Municipal Waste, (the waste produced by households and commercial waste collected by local authorities) and Commercial Waste are increasing by a little less than 3% a year, in line with the rate of increase in the UK as a whole. This means that by 2013 the amount of municipal and commercial waste produced in South East Wales will have increased from 1,349,000 tonnes a year to 1,709,000 tonnes and will make up nearly a third of all the waste produced".*

By the 1st Reviews of the Consultation Draft Regional Waste Plans the disparate assumptions with a range of 1.9% to 3% for MSW had been combined in all three regional draft plans. Incredibly the revised assumption was that municipal waste will grow at **4%**/year until 2014/15 and then at 1%/ year until 2024/25:

Municipal Solid Waste	2005/06 to 2014/15	+4% per annum	• Forecast all-Wales population change (+0.4% per annum) • Actual change in arisings of Household Waste per household & non-Household waste • Likely impact of waste reduction measures in the future
	2015/16 to 2019/20	Linear change towards +1% per annum	
	2020/21 to 2024/25	+1% per annum	

This is an important assumption as it represents a 38% increase in the waste arisings over this assumed period of growth. We strongly challenged the assumption in our response to the earlier consultation. Whilst the responses to the consultations have not yet been published, this is the assumption that is currently being used by planners as the basis for their assessment of current applications and long term needs. It is also likely – though we have to assume this as the heavily redacted versions of contracts which are in the public domain have the assumptions censored out[2] – to be the basis of the long term waste contracts which are being signed in Wales.

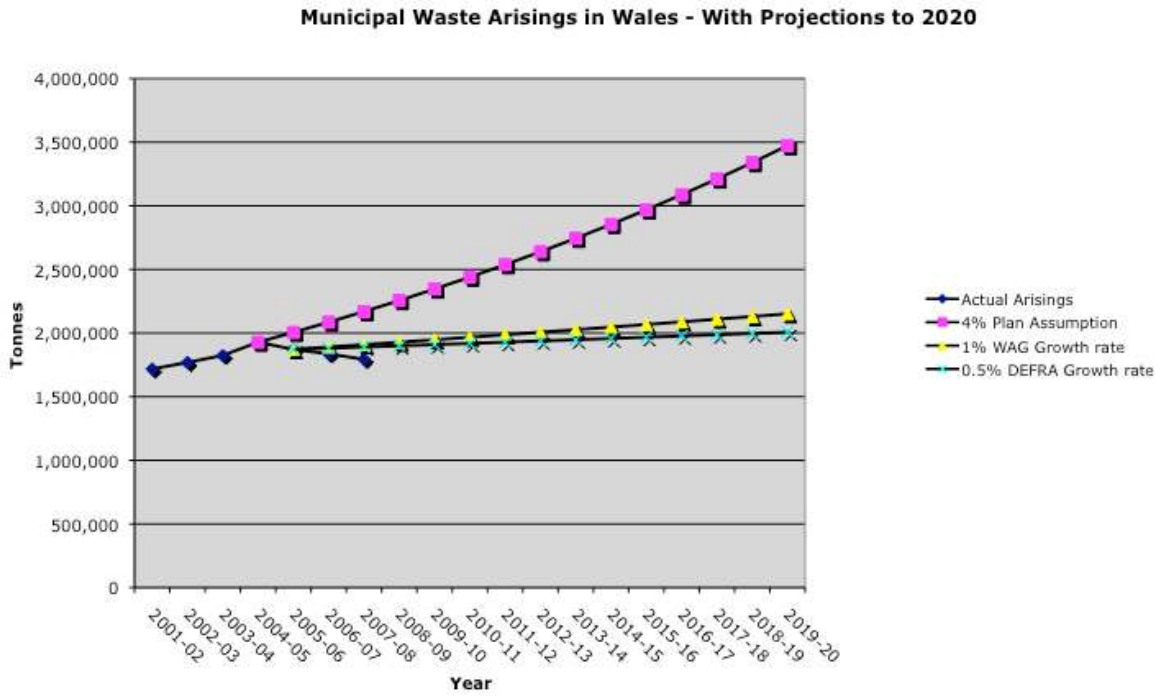
The 2007strategy paper "Future Directions For Municipal Waste Management In Wales - A Paper For Discussion" [3] said:

It is anticipated, based on analysis of trends, that the rate of growth in the amounts of municipal waste generated will probably stabilise to average 1% over coming years. More work needs to be done on modelling future waste growth to better understand the influences upon it, but there are signs that some kinds of consumer goods are becoming lighter and also that waste prevention measures may be having an impact.

[2] In the 2nd May 2007 Wrexham PFI contract, for example, practically all the relevant information has been censored in spite of rulings by the Information Commissioner that the majority of the information should be provided

This is a more appropriate, but still conservative, growth rate. This would increase the waste arisings by approximately 8% over the same period.

Plotting the various assumed growth rates with the actual data shows:



A cynic might suggest that the approach being pursued is to inflate growth projections and then to set lower targets which require no change from 'business as usual'. ENDS [9] warned of the dangers of this "predict and provide" approach and commented:

"*…basing waste policy upon such dubious assumptions is a sorry story indeed*".

Our current situation is much too serious to keep making the same mistakes that we have seen in the past. The unrealistically high projections that have been endorsed by WAG in the regional plans lead to over-provision of waste capacity, particularly at the bottom of the waste hierarchy; unnecessary long-term blight; and can seriously undermine policy initiative intended to drive the management of waste up the waste hierarchy.

The silver lining is that meeting the targets necessary for zero waste will be easier than it appears from the waste plans and there is no excuse for WAG to set weak reduction targets which have already been passed.

Ecological Footprint:

The consultation says that to achieve a "one planet goal" means reducing the ecological footprint of Wales to a 'fair earthshare' of 1.88[3] global hectares/capita from the 2003 level of 5.16 global hectares/capita. No account appears to have

[3] It is not clear where the 1.88 gha/capita is derived from – the Arup and Stockholm Environmental Institute reports both say 1.8 gha/capita after allowance for non-productive land.

been taken of the fact that the per capita 'fair earthshare' reduces with increasing population thus if WAG wants to set targets for 2050, in spite of the unsustainabability of Wales for the next forty + years, then much lower target should be set that reflect the likely 'fair earthshare' at the target date.

Whilst it took from our emergence as a species to about 1820 to reach 1 billion it now takes us only 14 years to add each additional billion to our current total of 6.6 billion [10]. The global population is anticipated to increase from the 2003 population of c 6 billion (from which the consultation earthshare was calculated) to between 7.3 and c.10.7 billion in 2050 [11]:

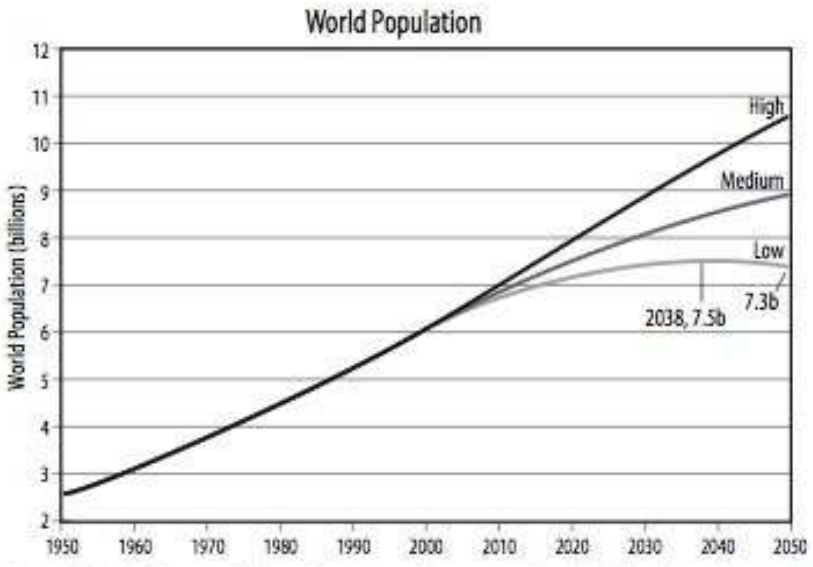


Figure 11. World population, history and forecast. Credit: United Nations Population Division, World Population Prospects

The consequence is that rather than a target of 1.8 (or 1.88) gha/capita it should be set at 1.03 to 1.48 gha/capita. Obviously this makes a very significant difference to the levels of waste reduction required to achieve a 'fair earthshare'.

Whilst the Ecological Footprint approach has been criticised it can provide a useful indication of the scale of the problems related to carrying capacity. The indicator is most effective, meaningful and robust at aggregate levels as used here and can provide a useful guide as to how effective policy proposals may be at achieving sustainable outcomes.

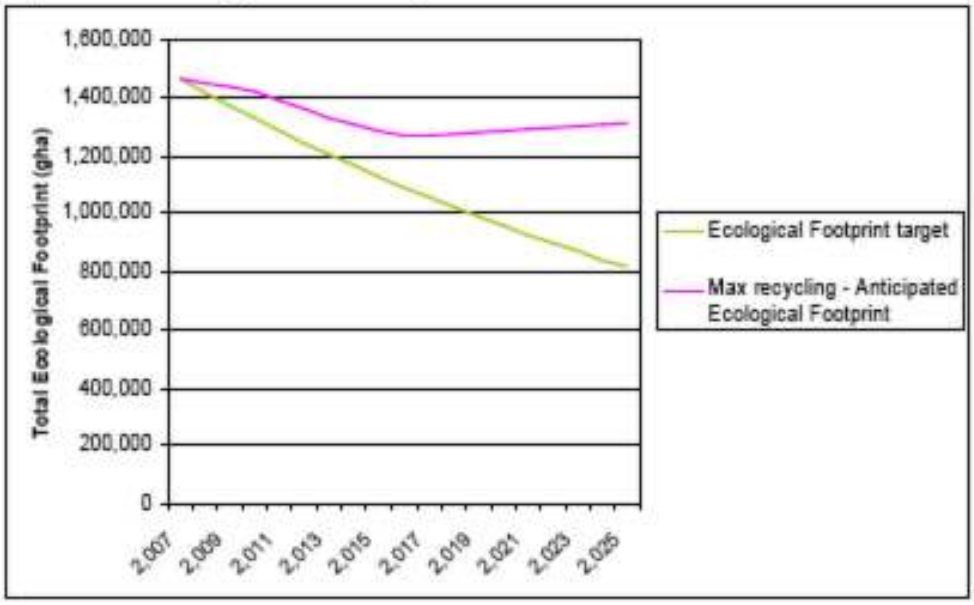
It does not remove the need for consideration of climate change independently and these linkages are addressed in more detail in the Climate change section of this response below.

Ideally the indicator should be used as one of a small basket of resource indicators together with Environmentally-weighted Material Consumption (EMC); Human Appropriation of Net Primary Production (HANPP) and Land and Ecosystem Accounts (LEAC). This combination of indicators can be applied to monitor de-coupling of economic growth from environmental impacts as well as illustrating the effectiveness of a number of specific policies aiming at a more sustainable use of natural resources (especially energy and climate policies, agriculture and forestry policies, material policies and spatial planning/urban planning).

Capturing the geographical distribution of pollution impacts and impacts on ecosystems and biodiversity would require the use of additional indicators.

A supplementary report by Arup assesses the ecological footprint associated with the waste strategy [12]. This emphasise that to be able to significantly reduce the size of the ecological footprint "*it is fundamental that recycling becomes an option for waste management only after reduction and reuse*" (emphasis in the original). The report shows that with recycling alone, even at the relatively high rates proposed, the total impact of waste arising will only be reduced by 10% for municipal waste, 6% for commercial and industrial waste and 14% for construction and demolition waste, based on a 2007 baseline. This is best illustrated graphically and the figure below, taken from the Arup report, shows how even 70% recycling by 2025 fails to meet even the current (high) ecological footprint target unless accompanied by very significant waste reduction:

Figure 22: Comparison of the reduction in EF that can be achieved through the targets in the proposed waste strategy versus that required to reduce the EF to sustainable levels



Furthermore this report confirms "*although the proposed recycling targets will help to reduce the EF* [Ecological Footprint] *of waste that can be recycled, research suggests that high statutory recycling targets can lead to local authorities focussing on recycling at the expense of waste prevention."*

The ARUP report concludes with "*numerous recommendations*" for WAG and highlights "*some overarching themes that need to be addressed*" including:

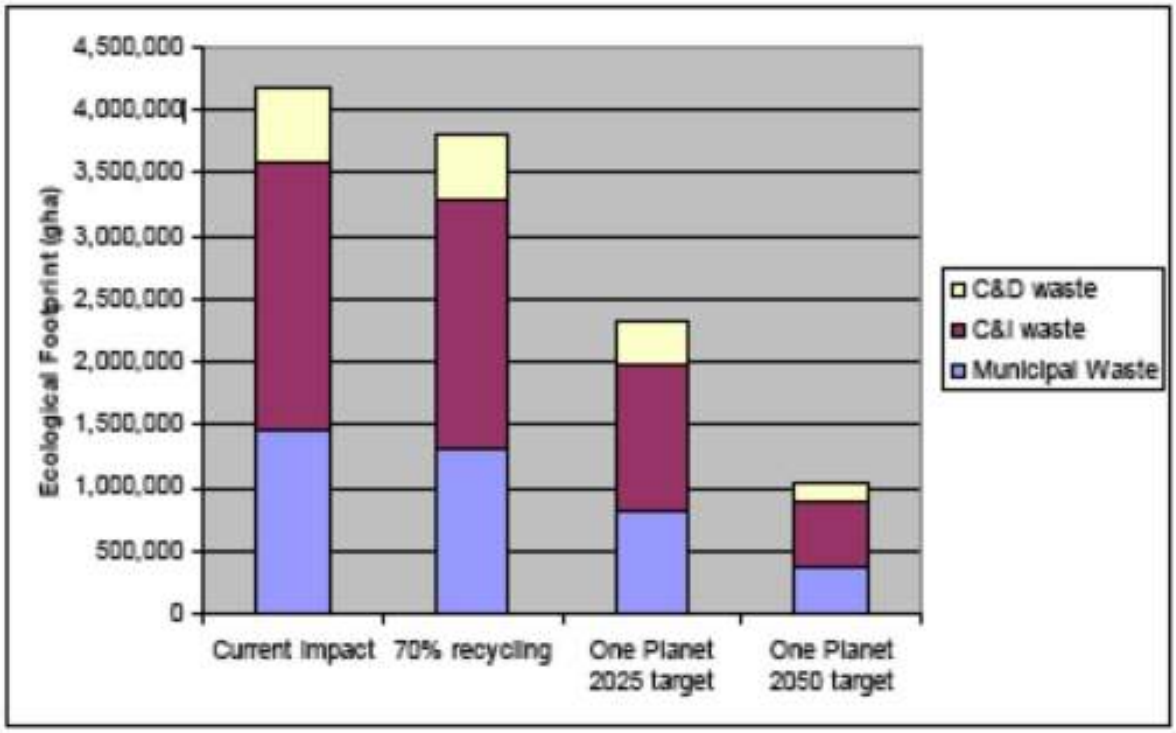
- Linking waste policy with policy on design, production and retailing in a coordinated way across particular products.
- Addressing behaviour change and prioritising awareness raising activities that link consumption and purchasing activities to waste
- Making the business case for waste prevention by sharing the limitations on what recycling can achieve. This needs to be coupled with sharing best practice and what can be done in terms of waste prevention.

- Ensuring that recycling is as effective as it can be e.g. by ensuring that waste segregation is carried out and supporting the infrastructure for closed loop recycling.
- The public sector leading by example through procurement policy and action, and supplier development.
- Achieving waste minimisation across all waste streams and materials will not be easy. Monitoring and measuring progress will be vital to success and is dependent upon the collection of robust data.
- Current data for C&D and C&I waste is piecemeal and therefore the WAG should consider putting time and effort into developing a consistent methodology for regular and consistent waste data collection.

Crucially these also recommended :

"**WAG set targets to reduce both the total volume of waste arising in the municipal waste stream and the total volume of household waste generated per capita**" (bold emphasis in original).

The graph in the report clearly shows the scale of mismatch between a 70% recycling target and the "one planet" goals without the recommended waste reduction targets:



Lower 'one planet' targets should be set for 2025 and 2050, as discussed above and this would obviously increase the need to set challenging waste reduction targets.

It is not clear why WAG seems to have ignored practically all the recommendations made by their consultants and did not follow their

consultant's advice to set the essential waste reduction targets which should so obviously be the headline indicators of the strategy if it is to have change of meeting 'one planet' targets at all.

The current proposals include two options of reducing waste by just 9% (option 1) or 21% (option 2) in the 16 years to 2025 but then suggest that the next stage will be to reduce waste arising by a further 43% (or 31%) in the 25 years from 2025 to 2050[4]. Leaving the so much of the necessary waste reduction to the next generation is a classic example of "cheating on our children". Both options would miss the One Planet 2025 target shown above by a large margin. To reduce the Ecological Footprint to sustainable levels even by 2050 will require a further reduction in the footprint, on top of the current recycling targets, of:

- Municipal waste - 34% by 2025 and 65% by 2050.
- Commercial and Industrial waste - 39% by 2025 and 69% by 2050
- Construction and Demolition waste - 28% by 2025 and 59% by 2050

It is imperative to focus primarily on waste reduction and these targets, corrected to reflect the significantly reduced 'fair earthshares' in 2025 and 2050, should be the minimum targets set in the final strategy.

Recycling and Incineration:

A key difference between the current targets and those proposed in 2007 [3] is that whilst the consultation still proposes at least 70% of waste in Wales should be recycled or composted by 2025 this now includes counting the use of incinerator ash use as 'recycling' [5]. This is an option which has recently been rejected in England.

The 'Future Directions' Document explains the detail of this change saying:

With a net limit of 30% of MSW going to EfW, and assuming that authorities rely on recycling residue to just meet, and not exceed, the 70% recycling target, and assuming that bottom ash is around 20% of the waste input to an energy from waste plant, then the Welsh recycling rate of 70% would be comprised of 63% recycling prior to EfW and 7.4% from the residue: 63% + (20% of 37%) = 70.4% [70%]. The net amount recorded as being converted to energy would be 29.6% [30%]. This would give a gross amount going to EfW as being a maximum of 37%, with a maximum achievable recycling rate of 70%. The recycling rate would be made up of 63% front end collection of dry recyclables and garden/kitchen waste and 7% recycled ash residue.

This calculation makes the unrealistic assumptions that all residual waste could be incinerated and that all the ash is re-usable. In practice less than 50% of ash could be used. Furthermore there is now good evidence that a significant portion of the

[4] The waste arisings on which the MSW reductions are based are not clear as footnotes 10 and 11 in the consultation are (obviously mistakenly as one relates to MSW and the other to commercial waste arisings) the same. It appears, by back calculation, that the MSW arising which is assumed needs to be reduced is over 2 million tonnes but this should be corrected and clarified.

[5] This was left as an option in the earlier 2007 paper but there was no indication in that report that incineration was to be considered on the scale suggested by the current consultation.

bottom ash would, like the fly ash[6], be hazardous waste [13]. There are no suitable landfill sites for these residues in Wales and they would need to be exported to England. This offends the proximity principle and Tan 21 [14] which highlights the commitment to self-sufficiency for disposal in Wales and says "*Reducing hazardous waste is a priority because its treatment, transport and disposal need careful management and demands high levels of resources in view of the potential to pollute the environment*".

The proper regulation of incinerator bottom ash by the Environment Agency (who have laid a very light regulatory hand on operators in terms of the reporting of ecotoxicity of their ash to date) would inevitably increase the proportion of bottom ash that will have to be landfilled.

It is proposed in the 17th April 2009 "Future Directions for Municipal Waste" report that the Landfill Allowances Scheme (Wales) Regulations 2004 be amended to reflect maximum municipal waste landfill limits of:

• 10% of total municipal waste in 2019-20; and

• 5% of total municipal waste in 2024-25.

It is explained that these targets will apply to each individual local authority and that "it is important that all fractions of municipal waste landfilled are counted against these targets – for example, the following fractions must be included if landfilled: material recycling facility (MRF)rejects, reprocessor rejects, rejected loads, hazardous incinerator fly ash". Obviously bottom ash should be added to the list – and this alone would be likely to constrain incinerators to less than 30% of waste arisings (given that bottom and fly ash can be 25% or more of the input and no incinerator operates with some by-pass to landfill). It is not helpful from a sustainability perspective, to apply blanket limits to landfill without qualification – nobody seriously argues that the impacts of landfilling inert material are the same as landfilling hazardous wastes, for example. If stabilised biological waste is treated to the same standards as digested sewage sludge, which is spread on land as standard practice, then what benefit is gained by banning this from landfill (or landspreading - as it suggested may be the case from 1st April 2016)?

It can be seen that MBT outputs are similar in terms of composition to sewage sludge for many contaminants [15]:

[6] More correctly described as "air pollution control residues"

COMPOSITION OF MBT OUTPUTS, COMPOST AND SLUDGE

	MBT outputs*	Sewage sludge	Compost**
Minerals (kg/t fresh weight)			
Nitrogen	6.7	7.5	8
Phosphate	2.9	9.0	3
Potash	2.2	–	6
Sulphur	5.0	6.0	3
Magnesium	2.9	1.3	3
Heavy metals (mg/kg dry matter)			
Zinc	580	800	400
Copper	200	570	200
Cadmium	1.3	3.4	1.5
Nickel	40	60	50
Lead	730	220	200
Chromium	40	165	100
Mercury	0.6	2.3	1.0

*Range of 26 samples from three MBT plants
** Maximum level allowed under the BSI's PAS 100 standard

It is disappointing that this important issue is not examined more fully at this stage. Current regulations say controlled wastes can be spread to land for agricultural or ecological benefits, as long as the wastes do not present either a pollution or a health risk. The Environment Agency *[16]* confirms:

"There is a lack of collated data on the amount and quality of this waste, but an estimated 4.5 million tonnes of industrial waste is recovered to land each year. The paper and food and drink industries are major sources. Conditions applied through the waste regulations should prevent any long-term build-up in soils of contaminants, but this also depends on responsible management. This route for recovery of value from waste may become more important as industries seek alternatives to landfill."

Much more construction and demolition waste is landspread. Research for the Environment Agency by Symmonds [17] indicates that approximately 20.3 million tonnes (28% of the total) of materials are spread or otherwise used on sites registered as exempt from waste management licensing under specific exemptions (Paragraph 9 and 19 sites). These figures relate to England and Wales but it is clear that the limits currently suggested need very careful scrutiny.

It is also a particularly high risk strategy for the proposals to include higher incineration rates of 42% in 2015 with the anticipation of reducing them to 30% in 2025. The higher levels would certainly be used to argue need for large facilities such as those proposed by Viridor at Cardiff and Covanta at Merthyr Tydfil. Once

approved it would be extremely difficult, or impossible, to secure the lower future thresholds or to meet the waste reduction targets necessary for the One Planet goal. When the necessary waste reduction is included in the waste targets there is an overriding requirement for flexibility in terms of waste management and the long-term waste contracts necessary to secure funding for incinerators would certainly restrict scope for the necessary reduction of waste.

The Scottish Waste Strategy proposals places a 25% cap on Energy from Waste[7] and the Scottish Environment Protection Agency says that incinerators in Scotland must achieve a high efficiency level within five to seven years or face enforcement action [18]. They say "*Large, inefficient incinerators are to be rejected*". Our other near neighbour, Ireland, is currently consulting[8] on the strategic environmental assessment for a Ministerial Direction which will introduce an incineration levy together with very stringent controls on incineration[9]. The WAG proposals are that all energy-from-waste plants should "*as far as possible*" achieve a thermal efficiency of 60%. Without any statutory force this requirement is weak but, if enforced, it would require plants to generate both electricity and useful heat. It is recommended that any consultation response should suggest that, in the event that arguments for a ban on incineration are not incorporated in the final version, then statutory requirements should be included for any incinerator to meet a minimum thermodynamic efficiency of 60%[10].

Climate Change:

Earlier this year Friends of the Earth Cymru responded in detail to the waste section of the consultation on the High level Policy Statement on Climate Change[11]. That consultation said:

"We will publish our revised Waste Strategy for consultation in the first half of 2009 and cutting direct and indirect emissions of greenhouse gases as a result of resource use and waste will be a central focus of the strategy. We would continue to focus on increasing recycling and composting rates and increase focus on waste minimisation and energy from waste".

We welcomed the emphasis on cutting greenhouse gases and resource use together with increased recycling and composting rates. We expressed grave concerns, however, that energy from waste was not a sensible approach to address climate change concerns. There has been no obvious change in approach as a result of that response. Much of what we said is, however, equally appropriately directed at the current waste strategy consultation. Furthermore there have been

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[7] http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Waste-1

[8] The consultation was to close on 17th July but has been extended until 31st July 2009.

[9] http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=52522&section=waste_management and see consultation document at: http://www.environ.ie/en/Environment/Waste/PublicationsDocuments/FileDownLoad,20544,en.pdf with the full consultation report at http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownLoad,20552,en.doc

[10] Note this is not the efficiency in the Annex to the Revised Waste Framework Directive (EC 2008/98) which is not a true measure of thermodynamic efficiency nor is it based on a percentage efficiency .

[11] http://wales.gov.uk/docs/desh/consultation/090116climateconsultationen.pdf?lang=en <http://wales.gov.uk/docs/desh/consultation/090116climateconsultationen.pdf?lang=en>

several important policy developments, mainly from DEFRA and Department of Energy and Climate Change ('DECC'), since the previous consultation. These include the publication of the UK Low Carbon Transition Plan [19] (and Annex [20]); the UK Government's case for an ambitious international agreement on climate change [21]; UK Climate Projections Science Reports: Briefing report [22]; Climate change projections [23]; Marine and coastal projections [24]; Projections of future daily climate for the UK from the Weather Generator [25]; and 'Making the right choices for our future: An economic framework for designing policies to reduce carbon emissions' [26]. The more significant changes are therefore reflected in these updated submissions.

In June DECC published the UK Government's case for an ambitious international agreement on climate change [21]. This report emphasises the importance of limiting global temperature increases to 2℃ – equated to an atmospheric concentration of carbon dioxide of 450 ppm and warned:

The challenge facing negotiators at Copenhagen is global in scale. The science is clear that we need to limit global temperature increases to no more than 2℃ compared to pre-industrial levels to have a good chance of reducing the risks of dangerous climate change in the future.

The report continued:

But the consequences are not only environmental. The costs of inaction are economic and financial. If we fail to act, the impacts on our way of life become much greater, and the costs ever higher.

Thus drawing on the conclusions of the Stern Review on the Economics of Climate Change [27] which concluded that there can be ''*no doubt*'' the economic risks of business-as-usual (BAU) climate change are ''*very severe''*. The total cost of climate change was estimated to be equivalent to a one-off, permanent 5–20% loss in global mean per-capita consumption today.

The DECC proposals outlined the required reductions in emissions as:

Developed countries need to lead the way, setting new binding targets to reduce their emissions by at least 80% by 2050,

These targets would include:

…stretching mid-term targets on a pathway to getting there. The IPCC's analysis suggests developed countries should collectively reduce their emissions by 25-40% below 1990 levels by 2020.

The implications of failing to achieve the necessary targets were explained as follows:

The UK is therefore arguing, with our European partners, that climate change needs to be limited to an increase in global mean surface temperature of no more than 2℃ since pre-industrial times. This is based on consideration of impacts and vulnerabilities of peoples and ecosystems around the world. Global temperature increases of more than 2℃ would result in huge impacts on water availability, food security and ecosystems, as well as increasing the likelihood of moving beyond

tipping points and incurring irreversible events or climate impacts such as the melting of permafrost that would have significant but unpredictable effects. It is also based on the view that global mean temperature increases of up to 2℃ (relative to pre-industrial levels) are likely to allow adaptation to climate change for many human systems at globally acceptable economic, social and environmental costs. It is considered to be achievable if we act quickly enough. Therefore, the target is a choice determined by balancing the scientific evidence for risks with the economics of taking mitigation and adaptation actions.

Even these targets will not guarantee limiting temperature changes to below 2℃ but:

Reducing emissions to 50% below 1990 levels by 2050 would dramatically increase the chance of keeping the temperature change below 2℃ – though further significant reductions will still be needed beyond 2050 to make this a 50% chance.

In order to put ourselves on a pathway which keeps 450ppm within reach:

.. global emissions need to peak and start to decline by 2020, and to reach less than 50% of 1990 levels by 2050 and continue falling

It is absolutely clear that if we are to limit our exposure to the enormous social, environmental and economic risks associated with the "business as usual" scenarios then very dramatic changes are necessary to the way that we live, work and consume energy and resources. Perhaps even more fundamental changes are needed to the way that we manufacture and waste goods and resources and the way in which we generate and consume energy. The waste strategy consultation only touches the surface of the changes that are necessary. This is disappointing as the changes that are necessary are already overdue.

It is true that emissions from developed countries have fallen slightly between 1990 and 2006. The DECC report confirms that:

.. those from developing countries grew by around 75% and are set to continue growing rapidly. Although it is difficult to predict, many countries, including China, could see emissions rise by 50% or more between now and 2020. Even if all developed countries could reduce emissions to zero, we would still not be able to achieve the 2℃ goal without mitigation in developi ng countries. It is vital that as well as taking the lead by cutting our own emissions, we support developing countries to make the transition to low carbon development pathways.

The reductions in the developing countries are, however, largely illusory. A significant part of the reductions are due, in the case of the UK, to the burning of our limited natural gas resources in relatively inefficient power stations (albeit still nearly three times as efficiently as most current UK incinerators recover energy…) together with the effective exporting of emissions with the decline of our manufacturing base. The huge level of imports of goods from the China and the Pacific rim, effectively exports a significant part of our ecological (and carbon) footprints to developing countries. We are, in practice, removing our carbon emissions from our own balance sheet and imposing it upon those developing economies. This is self-evidently not a sustainable solution – in fact it simply exacerbates the global problems we face. The carbon intensity of production in

most of those countries now manufacturing our everyday goods is higher than our own and, together with the carbon budget of shipping goods halfway around the world (and increasingly returning our waste the same distance) results in a significant net increase in our ecological footprint and carbon emissions. It is unfortunate that the consultation document is silent on these real costs of our current lifestyles as they are central to the waste management and sustainability issue. Unless we recognise and acknowledge the scale of our ecological debt then we cannot realistically hope to address it.

Emissions associated with Waste:

The Minister, in a written statement of 23rd September 2008 [28], announced the most recent inventory of greenhouse gas emissions in Wales. This inventory includes emissions data up to 2006 [29] but gives a misleading impression of the importance of waste management policy as a tool for abating climate change.

The high level climate consultation document similarly underestimated the importance of waste:

"The waste sector is responsible for a relatively small proportion of the emissions which are covered by the 3% target (less than 10%). Since 1998, the trend in this sector has been towards slightly decreased direct emissions."

There are two principal reasons why these data underestimate the total emissions from waste:

Total greenhouse gas emissions generated by Wales are very much larger than are currently included in the inventory because a significant part of the emissions are generated abroad during the manufacture of goods imported to, and consumed in, Wales.

The current inventory does not give appropriate credits for greenhouse gas reduction associated with waste minimisation, re-use and recycling. Nor would the current accounting approach include many of the climate change emissions that would be associated with any future waste incinerators[12] because of the failure to properly include biogenic carbon.

Considering these points in turn:

The claim that total greenhouse gas emissions generated by Wales are much larger than are currently included in the inventor is clearly demonstrated by two recent studies which report an increase in carbon dioxide emissions when calculated according to the consumption perspective. Druckman et al. [30] estimate a rise of 7.7% in total UK consumer emissions of CO_2 between 1990 and 2004, and suggest "*that the UK is increasingly exporting its more carbon intensive industries*" and confirming the trend that consumer products are increasingly imported and not produced within the UK. The authors stress the "*severe policy implications*" in conjunction with any emission reduction targets.

[12] The only current municipal waste incinerator, at the Neath Port Talbot, Crymlyn Burrows plant, operates only intermittently and burns only about 10,000 tpa of waste (about 15% of design capacity) so the climate change impacts are limited. The emissions associated with the combustion of waste exported to England are not included in the inventory, however.

A second study by Helm et al. [31] presents a consumption account of UK greenhouse gas emissions including indirect emissions from overseas tourism, international aviation and shipping and embedded emissions in the UK's trade balance. The authors say:

Imports are an essential part of the UK economy and the energy embedded within them is part of the energy requirement of the UK. The UK's environmental impact is as significant from the resources exploited to produce its imports as from the domestic resources it consumes. It mandates counting emissions on a ***consumption*** *basis.*

The trade balance was derived by multiplying values of imports and exports with average carbon dioxide intensities by country. The results show a steep increase in emissions embedded in imports (from below 300 Mt CO_2-e in 1992 to almost 1,000 Mt CO_2-e in 2006) while emissions embedded in exports increase much more modestly. The greenhouse gas trade deficit has, they claim, increased six-fold from 110 Mt CO_2-e in 1990 to 620 Mt CO_2-e in 2006 – about 7.5% of which is likely to be attributable to Wales. Overall, the consumption-based estimations indicate a rise of 19% in total for UK GHG emissions between 1990 and 2003. The increase in emissions in Wales is likely to be very similar and of the order of 45-50 Mt CO_2-e in 2006.

It is essential that the targets for Wales address and incorporate the 'export' of production, and thus properly assess life-cycle emissions. Country specific carbon reduction targets cannot be considered adequate in this context and the ecological footprint concept is helpful because it should capture these 'hidden' emissions. It does highlight, however, how waste has to be considered in the context of consumption and not simply as a residual function and emphasises the recommendations made by Arup – and apparently ignored by WAG – that the strategy needs to address:

- Linking waste policy with policy on design, production and retailing in coordinated a coordinated way across particular products.
- Addressing behaviour change and prioritising awareness raising activities that link consumption and purchasing activities to waste

The second point is that in the consultation the Waste sector is given a very narrow definition, and includes only the emissions generated by the treatment and disposal of waste, including emissions generated at landfills, emissions from handling wastewater, and emissions from the incineration of waste. It does not include emissions generated in the transportation of waste, nor, most crucially, does it consider the life-cycle emissions of materials that become waste.

A conventional life-cycle assessment (LCA) analyses the item under scrutiny on a "cradle-to-grave" basis. In general, LCA systems are modelled so that inputs and outputs are followed from raw material acquisition to the point where the material is discarded to the environment without further human transformation. However the considerations of this waste management section starts when the solid waste is generated, with emissions being counted from the point that the discarded material reaches the curb or waste collection bin.

This narrow approach tends to reduce the likelihood that waste management will be seen as a really important consideration in greenhouse gas policy. Reliance on the current greenhouse gas inventory, for example, would lead to the conclusion that as the methane emissions have reduced by c.60% since 1990 - and are likely to fall further with measures needed to ensure compliance with the Landfill Directive - little attention need now be paid to the climate change implications of waste. This is reinforced by the claim in the climate consultation that waste accounts for less than 10% of the emissions that are being targeted. The Assembly has been far sighted in relation to this issue, however, and acknowledged the value of recycling and the ineffectiveness of incineration as climate change abatement strategies back in 2000. On the 10th May 2000 the Assembly resolved in the debate on climate change [32] to develop a waste strategy promoting:

"a clear movement away from unsustainable landfill and incineration towards recycling and sustainability;"

and:

"that a planning presumption be introduced against further incineration and landfill developments in Wales in the interests of sustainability;"

Whilst the intentions of the Assembly were frustrated by civil servants who failed to properly implement this 'presumption against' incineration and landfill the intention was a worthy and well-founded one which certainly merits re-visiting. It is unfortunate that prevarication has lost us nearly ten years at this crucial stage and that the wheel has been turned back to incineration for a significant part of the waste stream.

Against the backdrop of the currently increasing total emissions, it is therefore vital that waste related greenhouse gas emissions are not defined in too narrow terms for the purposes of greenhouse gas accounting. The consequence of doing so is that the very large contribution to climate change – whether positive or negative – may be overlooked by policy makers and others.

When considered holistically the reality is that waste management policy decisions will have a profound effect on the total emissions inventory over the crucial period to 2050. The real effects of waste management on climate change are larger than is currently acknowledged for a number of reasons, including:

Waste management options that return embedded energy into economic use have the potential to make massive greenhouse gas savings.

Current greenhouse gas accounting conventions in Wales (and the UK) ignore biogenic carbon emissions associated with waste combustion.

Current waste management policy choices can reduce the continuing impacts associated with historic landfill legacies and emissions. Addressing these emissions as quickly as possible is an urgent requirement of an effective greenhouse gas abatement strategy because of the timescales over which impacts are currently measured.

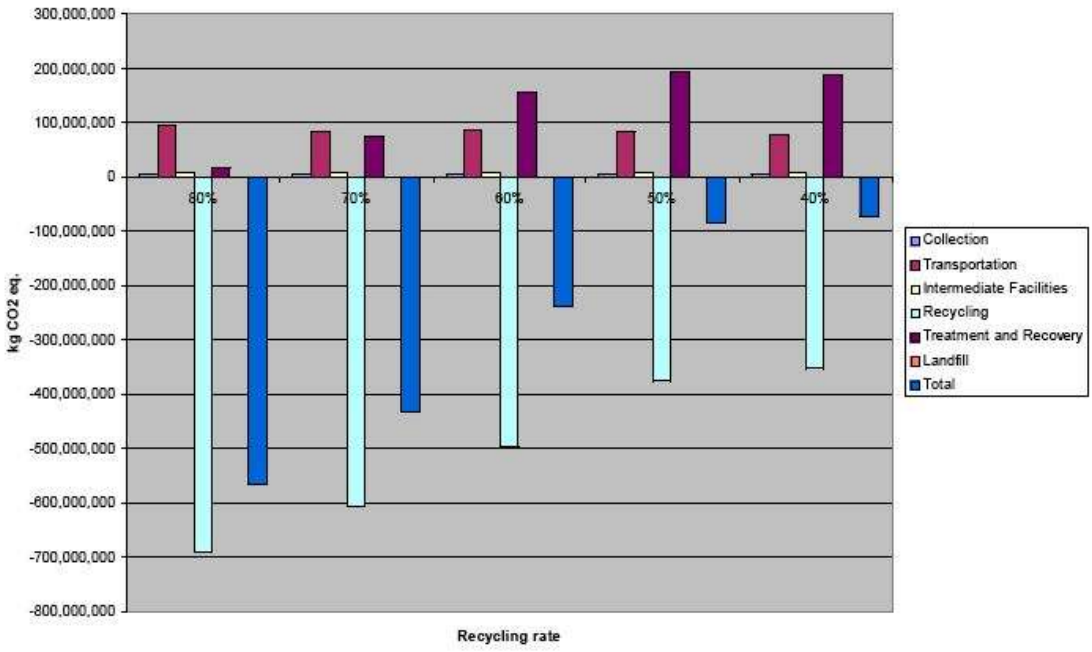
Some waste treatment technologies, such as mechanical biological treatment (MBT) followed by landfill of stabilized residues are extremely effective at

sequestering carbon. Others, like energy-from-waste incineration, release carbon immediately and recover energy only very inefficiently.

It has been clear for many years that a lot of energy can be saved by recycling. There has been no doubt for more than a decade that this energy saving is very much greater than that which can be recovered by incineration [33, 34] and some of the results in “Environmental Life Cycle Assessment of Waste Management Options for Priority Waste Measures” report (the ‘WRATE’ assessment)accompanying the consultation merit particular comment – particularly as the outcomes are at odds with much of the peer reviewed literature; with Waste Strategy 2007 for England and even with the previous modelling used by the Environment Agency for WAG [3] .

The earlier modelling clearly demonstrated that recycling gives net reductions of climate change emissions and incineration is a net generator of climate change gases:

Figure 1 – Global warming potential for each recycling target option for 2024/25 (a negative figure means greenhouse gas emissions are displaced).



In this previous work it was assumed that all non-recycled waste was incinerated. The incinerator emissions were illustrated by the ‘treatment and recovery’ bars all of which were net carbon dioxide generators (the higher the level of incineration the greater the carbon emissions).

The differences between these results and the more recent WRATE assessment should be clarified and explained as it is difficult to work out why there are such major changes from the limited data in the new report (not least because the headers have been left off all the tables in the web version!).

Many of the assumptions in the new report - including all incineration being CHP and the carbon intensity of future displaced electricity – are unrealistic and would support incineration over recycling. This raises the question as to why WAG does not at least require this as a minimum standard for any incinerator (and the requirements in the draft strategy are extremely weak as discussed in this response).

The WRATE assessment describes the results for paper and card as "surprising" but then fails to investigate fully the reasons that this anomalous outcome arose. It is suggested that the WRATE outcomes "sit within the results" found by WRAP and this claim merits closer examination.

In their recent evidence to the Environmental Audit Committee for their report into Climate change and local, regional and devolved Government [35], WRAP drew attention to their specialist review of international studies "*Environmental Benefits of Recycling*" [36] which shows how increased recycling is helping to tackle climate change and emphasises the importance of recycling over incineration and landfill as the appropriate way forward. The evidence from WRAP said:

- *In the vast majority of cases, the recycling of materials has greater environmental benefits than incineration or landfill.*
- *The UK's current recycling of these materials saves 18 million tonnes of CO_2 equivalent greenhouse gases per year, compared to applying the current mix of landfill and incineration with energy recovery to the same materials.*
- *This is equivalent to about 14% of the annual CO_2 emissions from the transport sector and equates to taking 5 million cars off UK roads.*

WRAP concluded:

14. The message of this 2006 study is unequivocal. Recycling is good for the environment, saves energy, reduces raw material extraction and combats climate change. It has a vital role to play as waste and resource strategies are reviewed to meet the challenges posed by European Directives, as well as in moving the UK towards more sustainable patterns of consumption and production, and in combating climate change by reducing greenhouse gas emissions.

WRAP tabulated the results of their review showing the numbers of studies in each category:

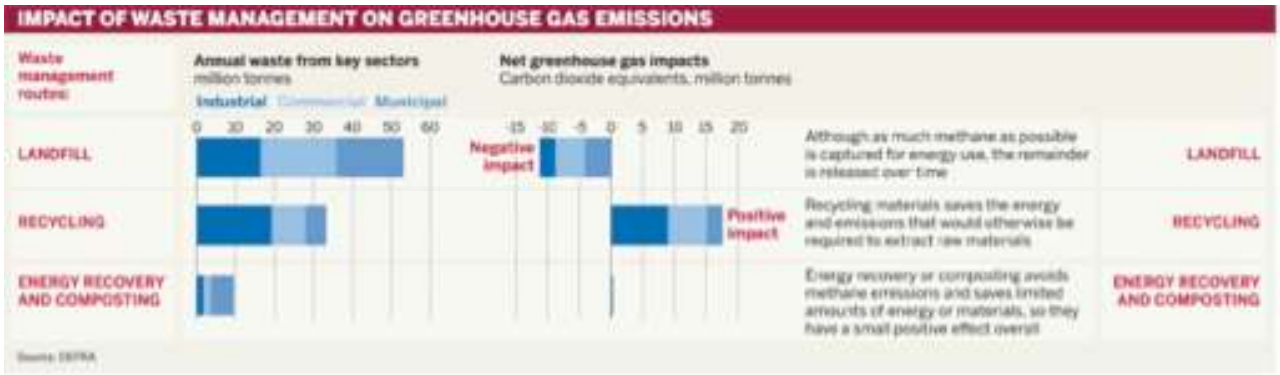
Table ES 4: Overall environmental preference of waste management options across all reviewed scenarios

	Recycling v Incineration			Recycling v Landfill		
Material	Recycling	Incineration	No preference	Recycling	Landfill	No preference
Paper	22	6	9	12	0	1
Glass	8	0	1	14	2	0
Plastics	32	8	2	15	0	0
Aluminium	10	1	0	7	0	0
Steel	8	1	0	11	0	0
Wood						
Aggregates				6	0	0
Totals	80	16	12	65	2	1

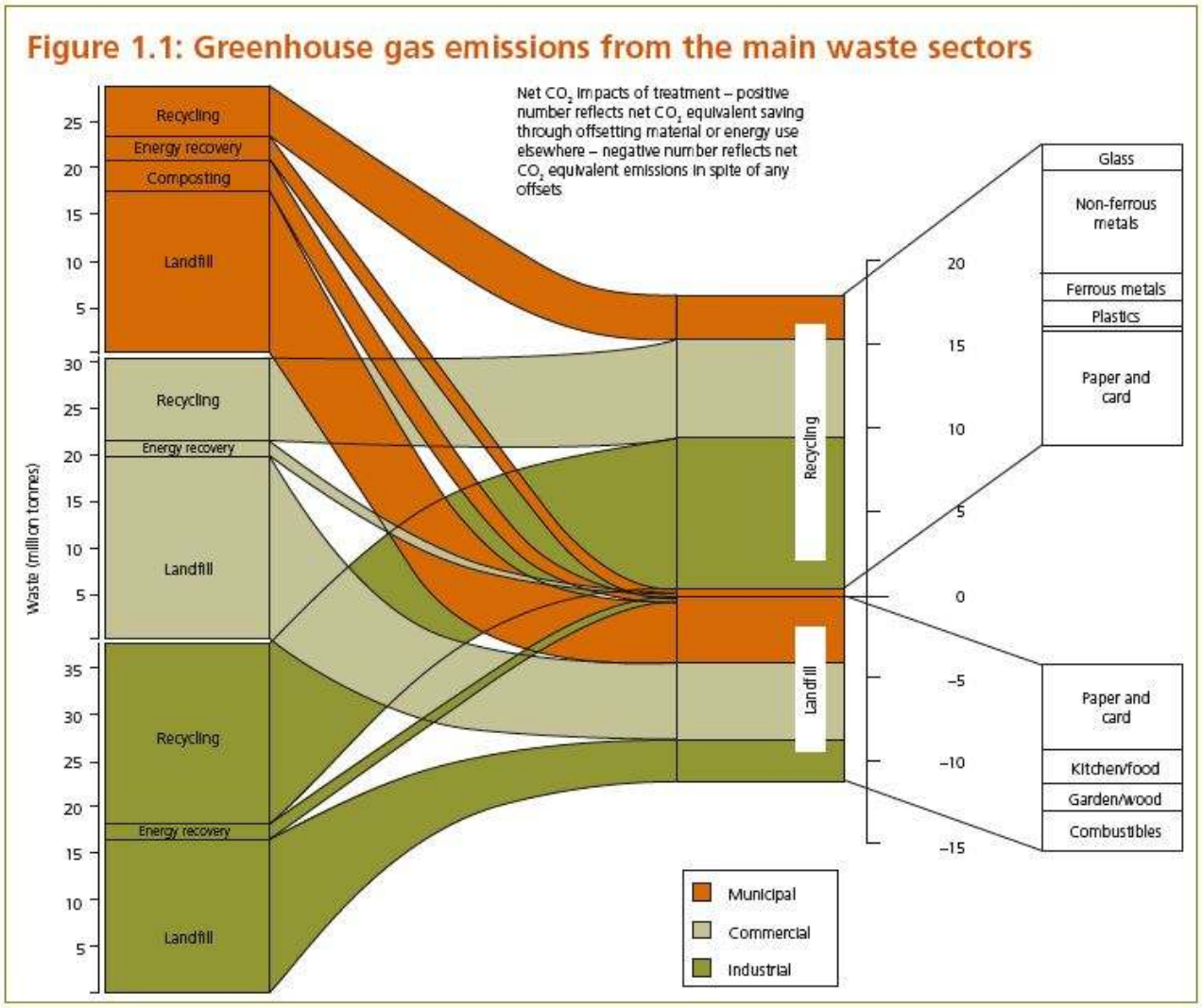
	Incineration v Landfill			Recycling v Mixed			Grand Total
Material	Incineration	Landfill	No preference	Recycling	Mixed	No preference	
Paper	1	0	0	12	0	0	63
Glass							25
Plastics	2	0	1				60
Aluminium	2	0	0				20
Steel							
Wood	7	0	0				7
Aggregates							6
Totals	12	0	1	12	0	0	201

Just six out of 37 papers reviewed by WRAP supported incineration over recycling. When the original papers are examined it is clear that these tended to make assumptions that are known to favour incineration such as the displacement of high carbon electricity generation - as in the WAG/Environment Agency WRATE assessment.

Waste Strategy 2007 for England [37] similarly shows that whilst recycling makes a strong positive contribution to reducing climate change impacts, energy from waste is, at best, very slightly positive [38]:

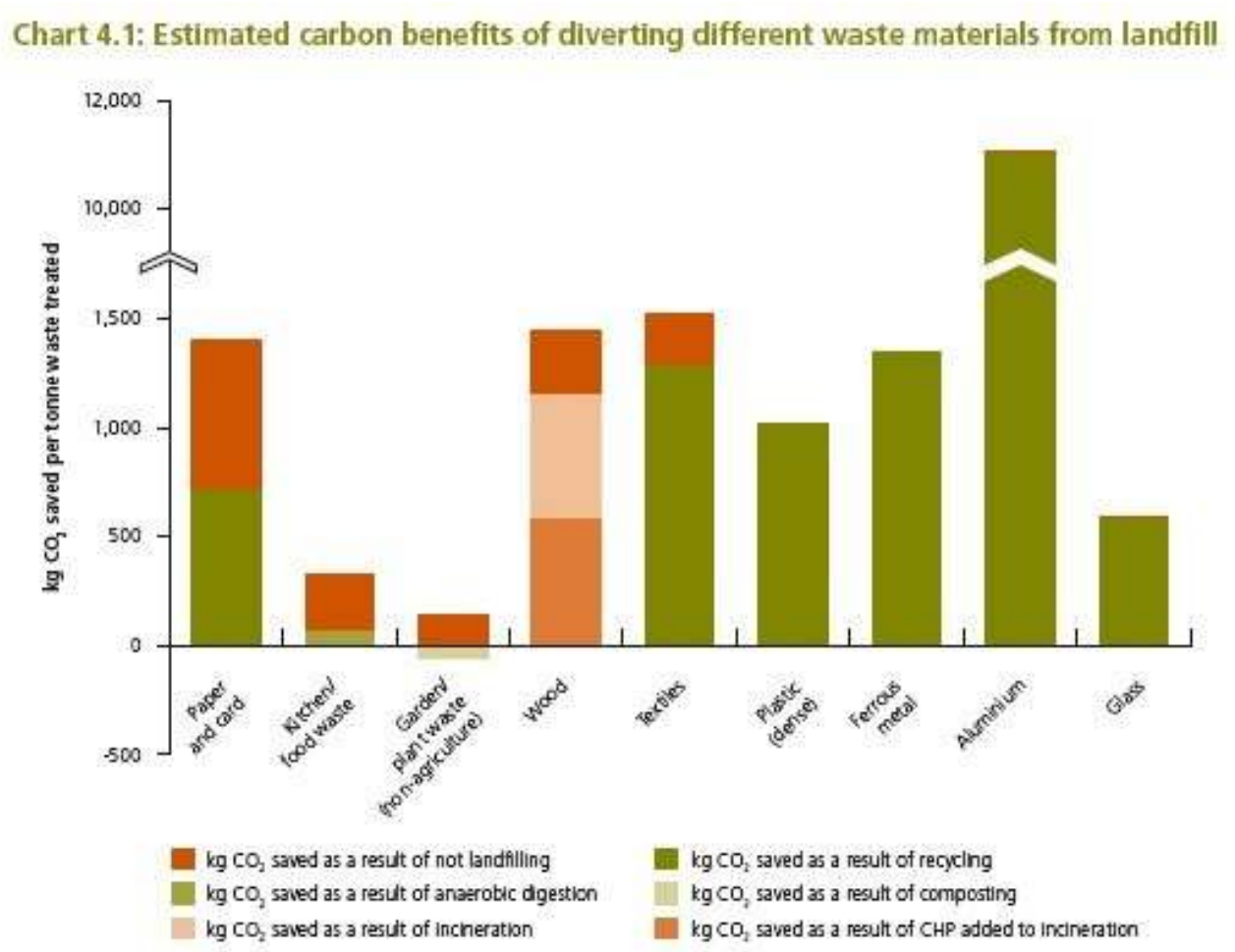


This can also be seen in figure 1.1 from WS 2007:



It can be seen that recycling gives positive benefits in terms of greenhouse gases in every case whilst incineration is effectively considered carbon neutral. Clearly the 'opportunity cost' of incineration in circumstances where recyclable material is burned would include the lost benefits associated with recycling.

Waste Strategy 2007 also includes a helpful comparison of the carbon benefits of diverting wastes from landfill. The assumptions made by DEFRA are: paper and card, textiles, plastics, metals and glass are recycled; food waste is anaerobically digested, and garden/plant waste is composted. Only wood is incinerated with energy recovery – even this assumption is questionable as discussed below.



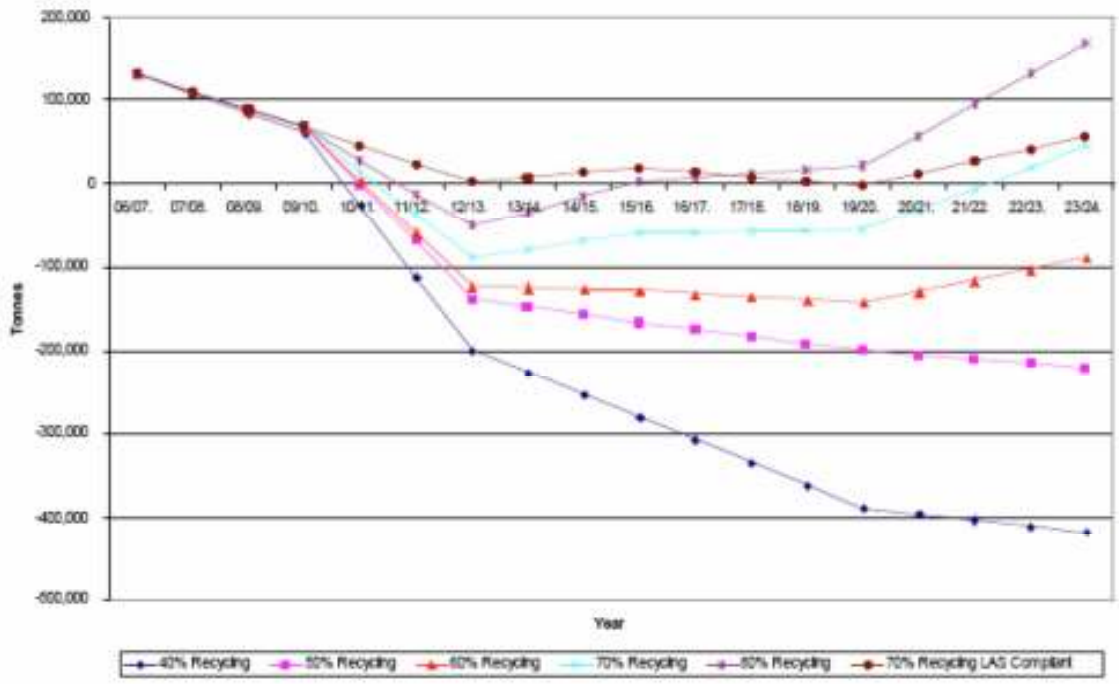
Similarly modelling for the Committee on Climate change report 'Building a low-carbon economy – the UK's contribution to tackling climate change' [39] indicated that by far the most effective treatment strategy to reduce greenhouse gas emissions from waste was to increase recycling.

It is clear from the work that has been carried out and published[13] on the National Waste Strategy to date [3] that the landfill Directive targets for diversion of biodegradable municipal waste can be met without incineration.

To do so requires a 70% recycling target with 52% recycling/composting in 2012/13, which the consultants say will be cost effective because recycling will be cheaper than the costs of treating the residual wastes in the longer term.

[13] It is clear that there has also been much work which has not been released. WAG has, for example, refused our requests for provide copies of the reports by Grant Thornton and AEA on the cost of treating food waste by anaerobic digestion and residual waste by 60% energy efficient EfW plant.

Figure 2: Balance of Landfill Allowances, All Recycling Scenarios (positive means targets exceeded, negative means a shortfall with targets not being met)



A Pro-Incineration Perspective within WAG:

The consultation documents confirm that incineration is not necessary to meet the statutory requirements of the Landfill Directive - nor the implementing Regulations. When properly assessed incineration also offers no climate change benefits – especially compared to recycling It is therefore disturbing to see that WAG has been promoting incineration through Prosiect Gwyrdd and through the activities of International Business Wales. Prosiect Gwyrdd is strongly biased towards incineration and has received significant public funding[14] (about which WAG refuses to divulge full details[15]). 'International Business Wales', on behalf of WAG, has been courting Covanta, a large US waste disposal operator, since early 2007 to encourage the construction of an enormous (800,000 tpa[16]) incinerator in Wales. This would be the largest incinerator in Europe.

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[14] WAG announced in January extra government funding of up to £7.8 million in a full year of operation, depending on the final costs of the project <http://www.newswales.co.uk/?section=Environment&F=1&id=16154>

[15] WAG has refused to provide copies of the Outline Business Case (OBC) even though the DEFRA guidance recommends disclosure and many similar OBCs in England are fully available to the public (see <http://new.wales.gov.uk/publications/accessinfo/disclosurelogs/disclosures2000-2099/disclog2020/?lang=en>.

[16] The capacity of the plant is described differently in various reports but this figure it taken from the Ministerial briefing provided by Mark Powell (WAG Policy, Strategy and Corporate Services) and circulated widely, including to the First and Deputy First Ministers on 28th January 2009.

It is shocking to see that, whilst a great deal of time was spent on the Ryder Cup[17] and other sporting events[18] during the extended discussions with IBW/WAG, not a single mention was made of the climate change implications of the proposal that was being promoted in any of the correspondence or briefings produced in relation to those discussions.

This is entirely inconsistent with the 2000 resolution of the Assembly to presume against incineration and it is difficult to see how the effort and expenditure of WAG on this project can be reconciled with the aims and objectives of the waste consultation. If WAG is to deliver a "Zero Waste" strategy then Government thinking evidently needs to be significantly more "joined-up" than has been demonstrated by the strongly pro-incineration activities supported to date.

The total MSW waste arisings in Wales for 2007/8 are shown in the Environment Agency LATS report [40] as 1,787,466 tonnes (table 4). If 70% of this waste is recycled then the remainder would be 536,240 tonnes – some of which would not burn or would be unsuitable for incineration. To meet the one planet target this must be reduced by over 60% - and thus only around 200,000 tonnes would remain. It is not reasonable to rely upon commercial/ industrial waste arisings to make up any difference because these are price sensitive and would mainly divert from incineration which is a very expensive disposal option.

The 2008 "Renewable Energy Route Map" consultation [41] has, however, estimated the availability of industrial and commercial wastes for incineration. The route map says the joint ESRC Centre for Business Relationships, Accountability, Sustainability and Society (BRASS) at Cardiff University and Environment Agency Wales 2003 Commercial and Industrial Waste Survey:

"estimated total wastes produced by commerce and industry to be 5.28 million tonnes per annum. Removing mineral wastes from this total, we get a total figure of 2.87 million tonnes per annum, of which 0.65 million tonnes is landfilled or used for land recovery, and 2.2 million tonnes is recycled, reused, composted or incinerated. In this latter total incineration only accounts for around 0.023 million tonnes per annum, and may be regarded as insignificant for the purpose of this paper".

The Route map poses the question " how much of the residual fraction of 0.65 million tonnes to landfill is suitable for use in a thermal treatment process?". The estimate it presents is "that the combustible fraction in the residual fraction of C&I waste in Wales is around 0.45M tonnes per annum". The warning is given that "these figures should, however, be treated with caution, and further study is needed". It is also suggested that "an amount of material which is currently recycled would be reassessed as combustible material, and would find a higher value as energy feedstock". This is probably true but is worryingly counter-productive. If the necessary waste reduction is subtracted from the combustible commercial and industrial waste we are left with less than 130,000 tonnes per annum. It follows that

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[17] "*Just a note of Thanks for last week, I hope you found the visits in Washington to be informative. The Ryder Cup experience was excellent shame about the result*" Email from Jason Baldwin of Covanta to Geraint Jones and Mel Hiscox of IBW Sent: 23 September 2008 15:59;

[18] Another email from Jason Baldwin to Jones and Hiscox, sent on 2 October 2008 at 08:38 invites Geraint Jones and Mel Hiscox to join Covanta in their box: "i*f you are both around on the 29th November we have booked a box for the Wales v Australia game*".

even if ALL the residual waste in Wales was incinerated the maximum capacity required, consistent with 'one planet' goals would be less than 350,000 tonnes/year. This obviously raises the question "Why on earth is the assembly spending public money promoting an 800,000 tpa incinerator for Wales"? It appears that at least part of the answer must be that International Business Wales are either not aware of - or don't care about - the one planet target.

Using the figures in the Route Map the total energy value of this material "*in a conventional mass-burn incinerator generating electricity only (at 22% net efficiency)"* would be less than 30 MWe/hr[19] Heat value.

It is difficult to understand therefore, why WAG, through Intenational Business Wales, has been promoting and supporting the enormous 800,000 tpa Covanta incinerator proposals near Merthyr. Besides being far too large and located in a position which is completely unsuitable for CHP (there is no heat load for miles from the site and no realistic prospect of facility ever providing CHP) the greenhouse gas emissions from this single incinerator would be enormous. Burnley [42] calculates that on average each tonne of UK waste contains about 340 kg carbon. Assuming complete burn-out was achieved in an incinerator this would release about 1,246 kg carbon dioxide/ tonne of waste (44/12 x 340). The proposed 800,000 tpa incinerator would therefore release approximately one million tonnes of carbon dioxide each year – nearly 25% more than the current total emissions from all metal production in Wales [29] .

At the shadow carbon price set by the Government [43, 44] of £27/ tonne for 2010 rising to £59.6 by 2050 the cost of the carbon release would be over £ 27 million pa. Over the expected 40-year operating period, with the current shadow carbon prices and escalator [43, 44], the climate change damage caused by the incinerator would therefore be more than £ 1.6 Billion.

It may be argued that this is "*renewable energy*" and is carbon neutral. This would be wrong for the reasons outlined in the attached Appendix 1. High levels of recycling and composting remove much of the paper, wood and short-cycle carbon and leave the incinerator largely dependent on fossil fuel based plastics and other wastes for the energy content. This can only be considered 'renewable' using the most obtuse definition of the word.

Accounting for Biogenic Carbon:

It is claimed in the 'WRATE' assessment that:

"WRATE records all carbon emissions to atmosphere in the inventory for completeness but distinguishes between biogenic and fossil carbon when calculating the results"

It is not clear that this is correct – although, as noted above, there are no headers on any of the tables in the web version it is difficult to understand the report in any

[19] The Route Map uses the 'unusual' units of MWe/hr which indicates an interesting level of understanding of energy within WAG.

case. The output in the report, however, appears to be exclusively fossil carbon and biogenic carbon is not reported and thus effectively ignored.

From the results presented it seems extremely unlikely that biogenic carbon has been counted as the WRATE assessment concludes that:

"High Energy Recovery from paper and card materials has clear environmental benefits in terms of Resource depletion, GWP, and Ecotoxicity when compared to the other three options. Currently a large proportion of paper and card collected within Wales is reprocessed via a large paper mill.

The results of the WRATE assessment suggest that Energy Recovery from paper and card via a CHP Incinerator has a greater environmental benefit. These results are influenced by the way WRATE calculates the global warming potential, differentiating between biogenic and fossil fuel carbon emissions. This point is discussed further in the results. This setting cannot be varied in the WRATE model."

This is an anomalous result inconsistent with WS2007 and the majority of the published literature, and which brings the credibility of WRATE into question.

The review should be repeated with a clear explanation of why these unusual conclusions are reached by the model and a clear indication of the biogenic carbon emissions as the IPCC says[45]:

If incineration of waste is used for energy purposes, both fossil and biogenic CO_2 emissions should be estimated[20]*.*

That this is the appropriate approach has recently been confirmed in a strongly worded editorial by Ari Rabl in the International Journal of Life Cycle Assessment [46]:

In a part of the LCA community, a special convention has been established according to which CO_2 emissions need not be counted if emitted by biomass. For example, many studies on waste incineration do not take into account CO_2 from biomass within the incinerated waste, arguing that the creation of biomass has removed as much CO_2 as is emitted during its combustion.

"*The logic of such a practice*" he continues:

would imply absurd conclusions, e.g. that the CO2 emitted by burning a tropical forest, if not counted, would equalize the climate impact of burning a forest and preserving it, which is obviously wrong. Likewise, the benefit of adding carbon capture and sequestration (CCS) to a biomass fuelled power plant would not be evaluated because that CO_2 is totally omitted from the analysis.

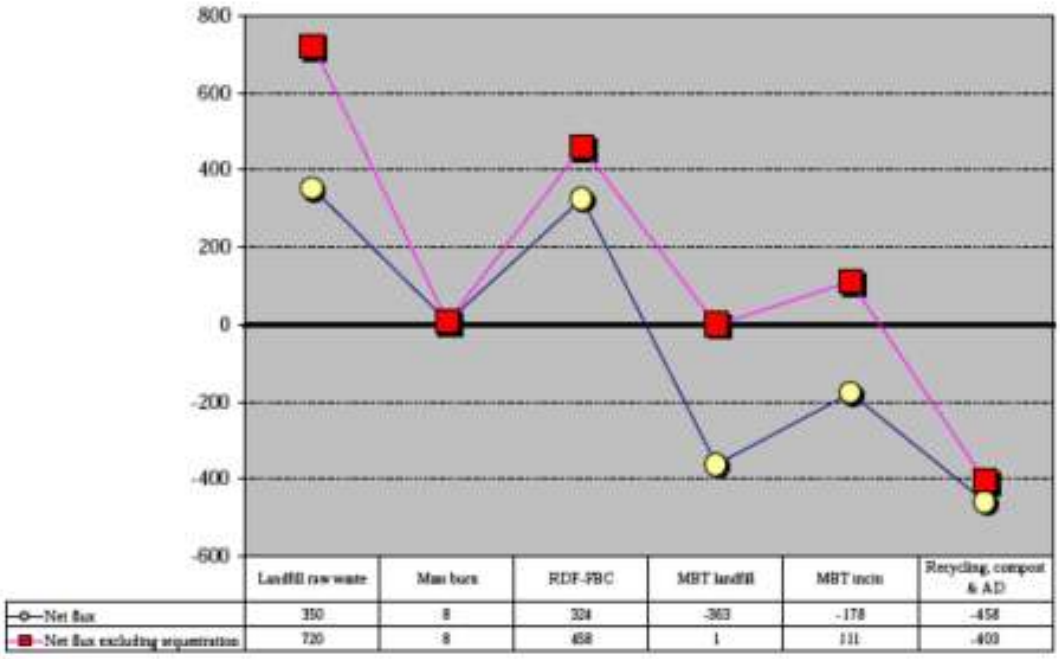
Amongst the advantages of including biogenic carbon emissions, Rabl says, are those:

By explicitly counting CO_2 at each stage, the analysis is consistent with the 'polluter pays' principle and the Kyoto rules which imply that each greenhouse gas contribution (positive or negative) should be allocated to the causing agent.

[20] Fossil CO2 should be included in national emissions under Energy Sector while biogenic CO2 should be reported as an information item also in the Energy Sector.

Lifecycle calculations for real efficiencies of biostabilisation and following the IPCC prescription are included in the Eunomia ATROPOS model, which found [47] that "*scenarios using incineration were amongst the poorest performing*"[21] while those using MBT were much better. A detailed review by AEAT for the European Commission[22] similarly finds that MBT when sequestration is taken into account performs much better than energy from waste. The graph when the displaced fuel is assumed to be low carbon, as will be increasing the case over the next 40 years and is true when there is competition on price or for subsidy with renewables, as in the UK, shows:

Figure 21: Overall net greenhouse gas fluxes from waste management options – EU-average landfill gas collection and wind electricity replaced kg CO2 eq/tonne MSW.



Mass burn, uniquely amongst the scenarios, is unaffected by considerations of sequestration because the carbon is nearly all released immediately. It is therefore favoured by models which do not take any account of sequestration. WAG unfortunately places heavy reliance on one of these models - the flawed WRATE software which also does not properly account for the reduction in respirability of treated residues. Almost uniquely amongst modern LCA models WRATE therefore penalises MBT and compost-based options by largely ignoring the biological changes undertaken in the processes and attributing them with high methane

[21] This report was peer reviewed by EMRC Consulting, who concluded that the report is free from major flaws in terms of the methods and data used. The findings and recommendations of the peer review were incorporated into the final report.

[22] Waste Management Options and Climate Change: Final Report, AEAT for DG Environment, 2001 <http://ec.europa.eu/environment/waste/studies/pdf/climate_change.pdf>

emissions – and thus climate change impacts. The consequence is that any system that is assessed using WRATE and which includes a residual landfill or MBT/compost element will almost invariably appear to perform worse than a mix including higher levels of incineration.

Assumptions in the WRATE modelling on carbon intensity of displaced electricity:

It is not appropriate to use the current displaced electricity mix for modelling of incineration in the future. Current policy requires a progressive reduction in the carbon intensity of the future fuel mix. This reduces the benefits associated with incineration – because the displaced electricity is generated with lower carbon emissions. Although a "sensitivity" test was carried out using what is claimed to be a '2020' energy mix in the WRATE report[23] this is not based on the reductions in carbon intensity included in current policy as detailed in the *UK Low Carbon Transition Plan [19]*.

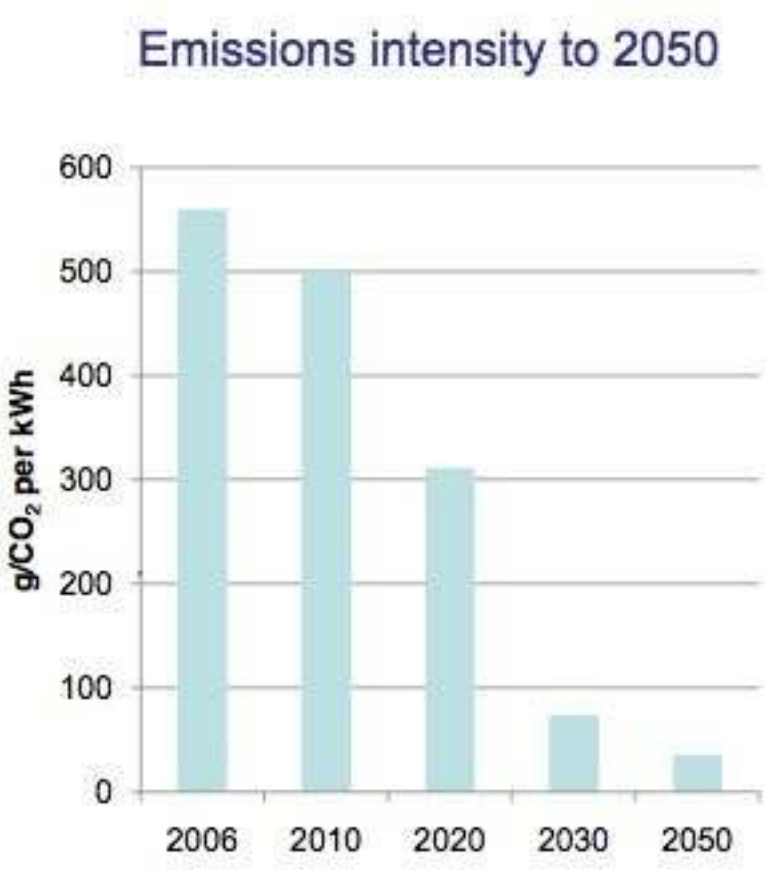


Figure: CO2 intensity per kWh of electricity generated, 2006-2050 [48]

Unlike with waste recycling, which can be implemented rapidly given the political will (and the rapid intensification of recycling in WWII was one example), it is more understandable that the reductions in carbon intensity targets for electricity

[23] At page 26

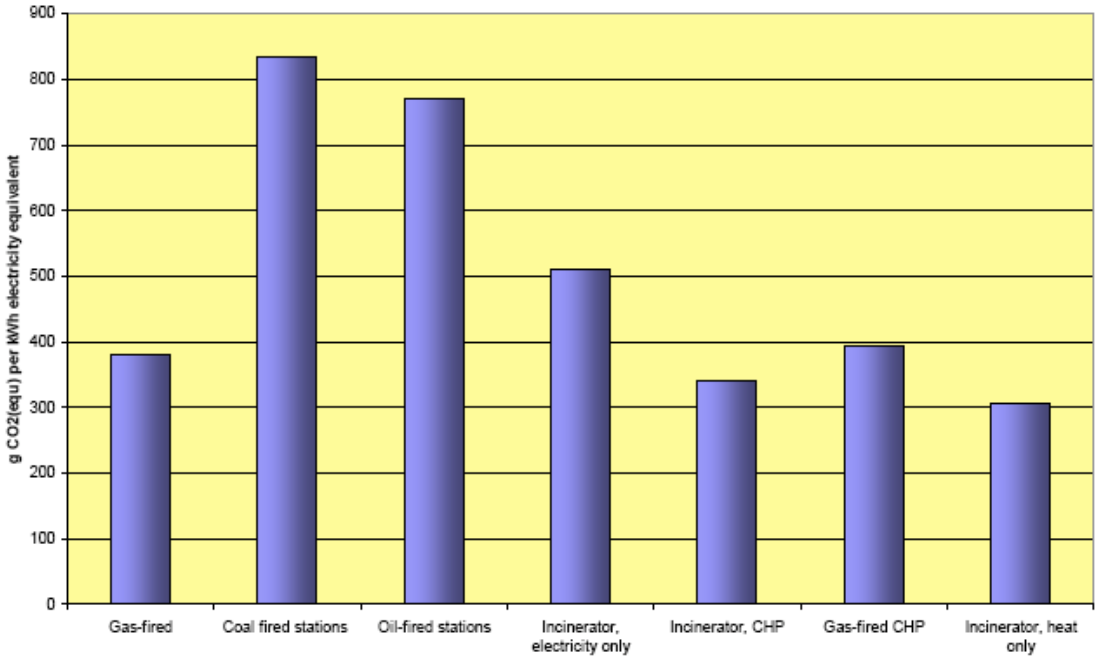
generation should be skewed until after 2020. This is because of the capital intensive nature of the generating plant It can be seen from the graph of carbon intensity an approximately 75% reduction in carbon intensity (from greater than 300 to c.80 g CO_2/kWh) is anticipated between 2020 and 2030. Had a later date than 2020 been used for the sensitivity test then the outcome would have been very different and much less favourable to incineration.

The use of 2020 as a sensitivity test does not, in any case, reflect the operating life of any incinerator built today. Any new plant would be likely to operate until at least 2035-40 given that current waste contracts based on incineration are normally for 25-30 years.

The recent Environment Agency biomass policy [49, 50] says that by 2030, "*biomass electricity will need to be produced using good practice to avoid emitting more GHG emissions per unit than the average for the electricity grid indicated to be necessary by the Committee on Climate Change*".

This would require that any incinerator should produce electricity with a carbon intensity of 80 gCO_2/kWh. However the carbon intensity of incineration, even if biogenic carbon is ignored - as shown in the figure below [51], is more than 500 g/kWh. This is clearly inconsistent with the climate change objectives and viewed this way incineration is unarguably, in the words of the Environment Agency [50] a "carbon sinner" rather than a "carbon sink".

Figure 1: Excludes CO_2 from Biogenic Carbon, Heat=0.4 x Electricity

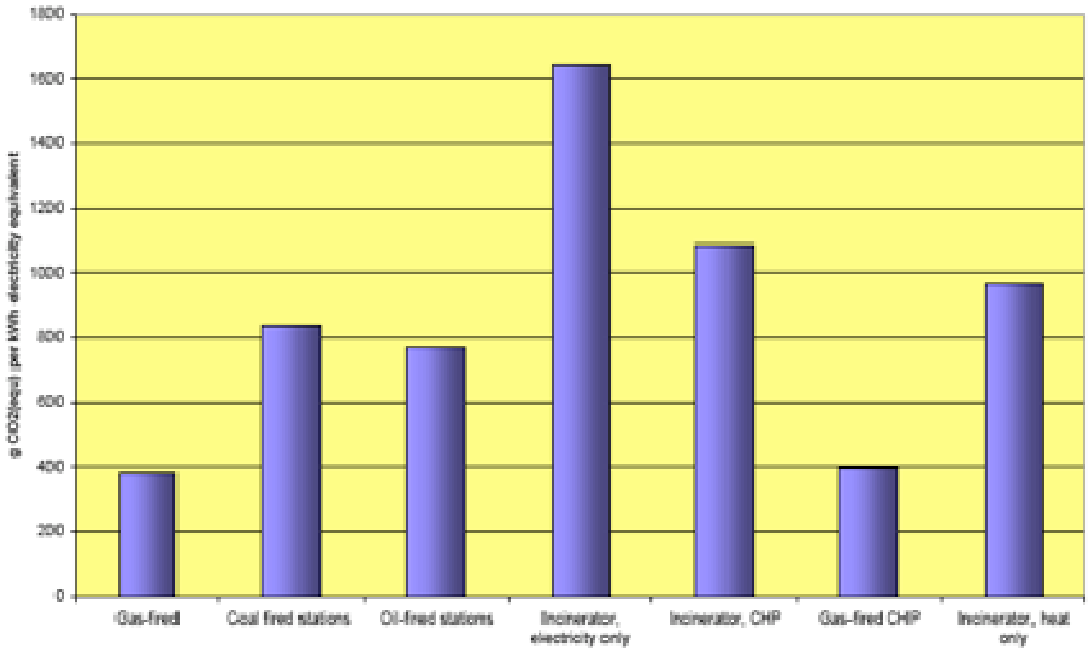


In practice the impacts are even worse. It is explained in the appendix how the 2007 consultation [52] on the review of the Renewables Obligation and the January 2008 Government response to the submissions to the consultation [53] showed that the biogenic proportion of residual waste reduces with increased recycling. Whilst unsorted waste was calculated to derive 66% of the calorific value from biomass this falls to 38% when recycling c 45% and then to just 30% biomass when

recycling c 60%. This is because the wastes that tend to be pulled out for recycling/composting are those like paper and kitchen waste with high biogenic proportions. This concentrates the plastics and composite materials in the residual – and the consultation documents show that burning is not the BPEO for plastics wastes.

If biogenic carbon is included, as shown in the figure below [51], then electricity only incinerators are likely to have approximately **20 times** the carbon intensity of the fuel mix required in 2030.

Figure 3: Includes CO_2 from Biogenic Carbon, Heat=0.4 x Electricity



It is not acceptable to base a strategy that is planned to run to 2050 on such a 'front-end biased' assessment and modelling should be supplemented by, at least, corrected 2020 data and 2030 data based on the latest policy trajectories. When these corrections are made it becomes clear that incineration is completely incompatible with the policy targets for the reduction of carbon intensity of electricity generation.

Combined Heat and Power:

The performance of incinerators is better with good quality CHP – but still well above the necessary target level.

In a report for DEFRA on extending the Renewable Obligation to include energy from waste with CHP in 2005 ILEX consulting wrote:

"We estimate that EfW with CHP will produce a net environmental gain, producing additional carbon savings beyond that from electricity-only EfW plant – of between 120 kgCO_2 and 380kgCO_2 for each MWh$_{th}$ of heat produced[24]*".*

[24] Additional net carbon savings assumed for the upper bound a plant operating at 20MWth capacity producing 125GWhth per annum, at a net saving of 380kgCO2/MWhth. For the lower bound ILEX

They estimated that:

" a 400kt/yr EfW with CHP facility would create additional carbon savings of between 0.7 and 1.0 million tonnes of carbon dioxide (CO_2) in total over a 20-year lifetime, over and above those achieved by a conventional EfW facility without CHP."

There have often, however, been grand claims made about intentions to deliver CHP at the planning stage which have not subsequently been delivered in practice. The incorrectly named SELCHP ('South East London Combined Heat and Power') which is not a CHP plant, and looks increasingly unlikely to ever become one, is a case in point having now operated for 17 years without any heat being exported at all. The reality is that unless a site is chosen with CHP heat load as an initial criteria and that CHP is incorporated into the original design then it is unlikely that the incinerator would ever operate in CHP mode. This is confirmed by the Environment Agency biomass policy report [50]:

"It is difficult, if not impossible in some cases, to retrofit a combined heat and power (CHP) system, which makes it imperative that biomass plants – like all other new power stations – are designed to utilise heat from the outset. If they are not, and if the plants cannot be retro-fitted, operators risk being left with stranded assets within 20 years"

The consultation is particularly weak in relation to the requirement for any new facilities to be CHP. The consequence of not strengthening the requirements for CHP to be incorporated in any new proposal from the outset will be that operators will continue to make hollow promises like those of SELCHP and will rely on their waste contracts to ensure that they continue to operate in spite of their appallingly low efficiencies even when their greenhouse gas emissions are far higher than the average electricity generation intensity.

MBT as an Alternative Residual Waste Treatment:

As the inflexibility of incineration is likely to be a key barrier to the effective implementation of the level of waste prevention that is necessary to achieve the One World goal more flexible alternatives should be promoted.

It is of particular concern that the consultation and, it appears, the emerging waste strategy ignore the option for an MBT-based approach to residual wastes as a stepping stone to true 'zero waste'. This is widely used in parts of Europe, is increasingly popular in England and is being considered in Ireland. It is certainly a viable and tested option that could be applied in Wales. MBT leads to about half the emissions of an energy-from-waste strategy (two third when offsets are included), so should not be excluded from consideration. The Welsh Local Government Association has raised similar concerns [54]:

"*54. The WLGA welcomes the recognition by the Assembly of the need for energy from waste facilities but is cautious about the ruling out of intermediate treatment altogether (the Assembly has categorically stated in the Regional Capital Access Fund that intermediate treatments such as MBT will not be financially supported).*

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assumed a plant operating at 45MWth capacity producing 280GWhth per annum at a net carbon saving of 120kgCO2/MWhth.

The Regional Waste Plans currently out for consultation evidence that where a local outlet is available for the RDF from MBT plants it is the most sustainable solution. In parts of Wales this therefore might be an appropriate strategy and we feel should not be ruled out solely because of the concern of paying two gate fees for treatment and the uncertain markets for the RDF; this should be a matter for local or regional analysis by authorities. There should be sufficient flexibility in the system to allow local authorities to make a business case which includes intermediate treatment and have it tested. This must be preferable to an absolutist presumption that no such business case could ever be achieved. Local authorities are concerned about this current policy in that it may make procurement exercises anti-competitive where there maybe very real markets for RDF within close proximity. The WLGA would therefore appreciate WAG looking at this in more detail, work with the authorities and PUK through their procurement activities and retain an open mind on appropriate and sustainable solutions to meet local and regional need."
And:
"*73. It needs to be noted that currently Flanders has a ban on the building of any new EfW plants but has a problem of how to deal with an additional 600,000 tonnes of waste. Instead they have decided to invest in MBT plants to produce RDF which can be utilised in the existing EfW plants. The Assembly's ban on MBT is therefore at odds with the policy it is trying to emulate."* [54]

Mechanical Biological Treatment is a far more flexible approach and allows biological treatment to be realigned to cleaner compost/ digestion outputs. The proposals blight these alternatives by proposing *"to explore a potential ban on land-spreading non-source separated treated municipal waste from 1 April 2016".* This would inevitably undermine proposals for alternatives which include this option and increase uncertainty associated with MBT. The consultation should review the issue now and reach conclusions that can be used as a stable basis for development in time to meet the 2016 and 2020 targets of the landfill Directive. Depending upon the quality of the input material the MBT residues could be used for land spreading; remediation of contaminated sites; landfill cover (where they are effective at oxidising methane emissions [55] and thus reducing climate impacts). Whilst not favoured there is also the back-stop option of using these residues in cement kilns as they are likely to be cleaner than the petcokes currently used and they displace fossil fuels more efficiently than in incineration.

Concerns raised by the officials, but not so far supported by hard evidence, are the toxicity of organic outputs that could be used on land. Strangely there has been no similar concern expressed about the hazards associated with incinerator residues (bottom ash, fly ash and APC residues). All of the fly ash/ APCD residues and a substantial proportion of the bottom ash are likely to be hazardous wastes for which there is no suitable landfill site in Wales. Indeed the 2007 Consultation on the Regional Waste Plans First Review [56, 57] said, quite incorrectly:

"The …. <u>bottom ash is inert</u>, and can be used as a construction material for building roads or as a substitute for aggregates." [<u>our emphasis</u>]

At best the bottom ash is 'non-hazardous' waste and no UK municipal waste bottom ash meets the regulatory criteria for inert wastes and this has now been recognised by HMRC. The default option for taxation of incinerator bottom ash has been

recommended at the ‘non-hazardous’ waste (rather than the current ‘inactive’) rate in the current consultation on the review of the landfill tax [58].

The wider environmental costs associated with MBT are also very much lower than landfill or incineration as demonstrated by work undertaken by WAG’s consultants in Ireland [59]:

Table 15: **Externalities from Landfill, Incineration and MBT**

	Landfill	Incineration	MBT
Direct emissions non-GHG related	€ 2.64	€ 23.51	€ 0.49
Direct emissions GHG related	€ 59.13	€ 28.71	€ 15.62
Total Direct Emissions	**€ 61.78**	**€ 52.22**	**€ 16.11**
Offsets GHG related	-€ 1.60	-€ 6.79	-€ 4.72
Offsets non-GHG	-€ 2.95	-€ 9.61	-€ 6.18
Total Offsets	**-€ 4.55**	**-€ 16.40**	**-€ 10.90**
Net Environmental damages	**€ 57.23**	**€ 35.82**	**€ 5.22**
Disamenity	€ 4.25	€ 14.30	€ 9.28[a]
Total External Costs	**€ 61.48**	**€ 50.12**	**€ 14.49**

[a] This is an average of the two figures for landfill and incineration (see discussion in main text above).

Residues from MBT not only sequester carbon effectively but help to reduce historic impacts of landfill because the methane emissions from landfill sites are effectively reduced by oxidising the methane in the capping laying via MBT stabilate used as landfill cover [55].

It should also be noted that these technologies are not only well established in Europe but are increasingly common in the UK [60]:

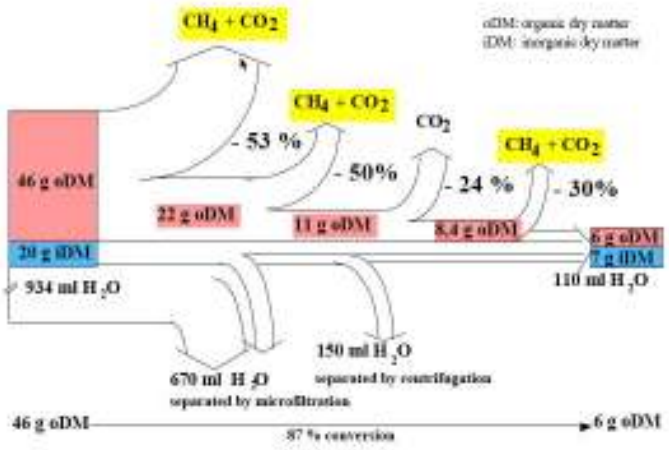
Authority	MBT Input Capacity (T/Yr)	Project status	Contractor/Applicant
Dumfries and Galloway	95,000 (Ecodeco/SRF - 60,000)	Signed Nov/04 - Operational	Shanks
ELWA*	500,000 (2x)	Signed Dec/02 - Operational	Shanks
Gloucestershire	Abandoned Sep 2008 with 2 remaining bidders, as solutions 'too expensive'		Cory - Shanks
Leicester City	150,000 MBT/AD	Signed May/03 - Operational	Biffa
London Borough of Southwark	137,000	Signed Jan/08 - in construction	Veolia
Cumbria County Council	75,000 (2x)	In procurement 2010/2011	Shanks and WRG preferred bidders
Wiltshire County Council	60,000 (SRF-30,000)	Planning permission application submitted - still to be approved by the Council (contract in place with Lafarge - cement manufacturer)	The Hills Group
Leicestershire County Council	30,000 to 50,000	Construction starts autumn 2008, to be operating by 2009 (contract in place with Lafarge - cement manufacturer)	New Earth Solutions
Merseyside Waste Disposal Authority	800,000	Approved April/07 - in procurement in 3 parts: treatment (MBT), landfill and recycling	Recycling Contract: SITA UK Ltd, Veolia, WRG Recovery: Covanta, Resource from Waste Alliance, Shanks, SITA
Great Manchester Disposal Authority	1,400 000	Approved 2005, in procurement - final agreement imminent	Viridor
Telford and Wrekin Council	65,000	In procurement	n/a
Cheshire County Council	300,000 MBT/SRF or 436,000t EfW	Approved May/06 - in procurement, 4 bidders remaining (March/08)	Viridor, WRG, United Utilities, Shanks/INEOS Chlor
Lancashire County Council	600,000 (2x)	Signed 2006/07, Operational	Global Renewables
East of England			
ESSEX COUNTY COUNCIL			
Colchester	250,000	Committee made resolution to grant planning permission subject to legal agreement.	Colchester - Cory Environmental (as the applicant)
Witham	510,000	Committee made resolution to grant planning permission subject to legal agreement.	Witham - Gent Fairhead (as applicant)
Basildon	378000 MBT, 107,000 In vessel composting, 80,000 MRF	Planning permission granted in October 2008	Basildon - Essex CC and site owners (as joint applicants)
CAMBRIDGE COUNTY COUNCIL	300,000	Signed Apr/08 - in construction - to be operating by Nov/Dec 2009	Donarbon
NORFOLK COUNTY COUNCIL	150,000	Planning permission granted in November 2007 - plant expected to be operational in 2011	SRM
SUFFOLK COUNTY COUNCIL	250, 000	PFI credits approved April/08 - tender issued May/08	n/a

Sources: Various sources including Letsrecyle.com, ENDS, Edie and Defra.

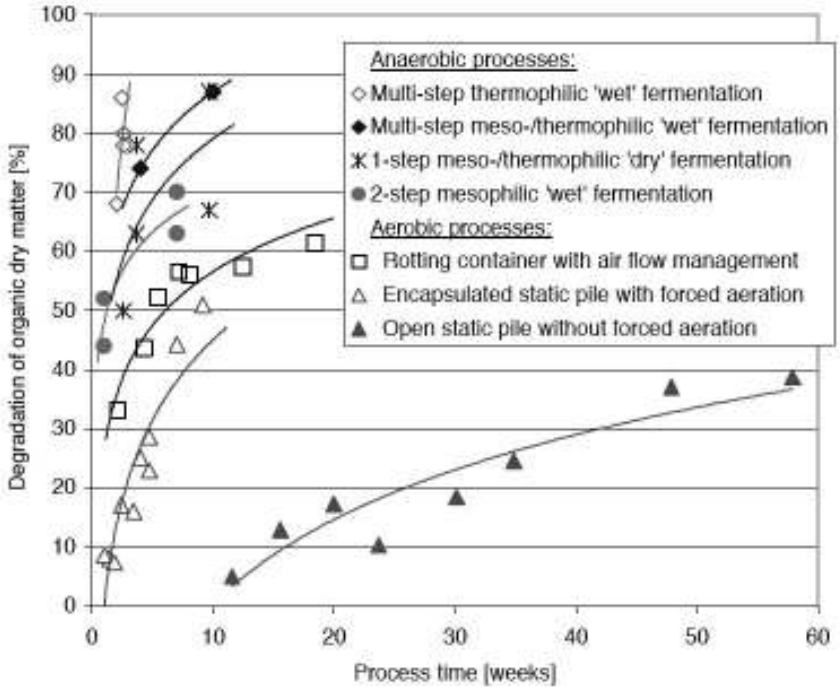
There are a wide range of possible alternatives for uses of MBT Outputs [61];

Type of Use	Application
Compost-like output uses	On food crops
	For forestry
	On land used to grow energy crops
	To improve soil structure and moisture retention in arid areas of poor soil quality
	For pasture land
	Horticultural applications
	For use in domestic gardens
	Liquid fertiliser
	On verges & amenity land
	As landfill cap
	For landscaping during road construction and similar civil engineering projects
	On brownfield (contaminated land) sites
Solid fuel applications	Co-fuel for direct combustion in power plants
	Fuel for indirect combustion in power plants
	Co-fuel for cement kilns
	Co-fuel for industrial boilers
	Fuel for a dedicated incinerator
	Fuel for a dedicated gasifier
	Co-fuel for an existing incinerator
Biogas applications	Produce electricity (& heat)
	Blend with landfill gas &/or syngas from waste gasification
	Produce a transportable fuel
Disposal Options	Landfill daily cover
	Bio-stabilised residue suitable for depositing in landfills

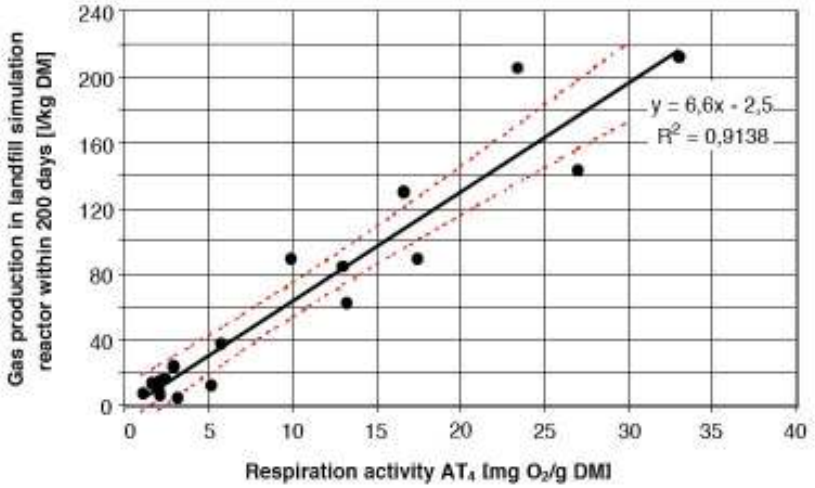
There are also various options for disposal of stabilate to land. Soyez [62] for example shows that the level of biological treatment that can be achieved by MBT is remarkably high – particularly when the biological element of the process recovers methane:



Processing time can be relatively short if the operation is carried out anaerobically as shown below. This accords much more closely with the Government's stated preference for anaerobic digestion for food wastes in WS 2007 and in this consultation.



The consequence of such treatment is that the MBT stabilate has external disposal costs very similar to, or lower than, those for incinerator bottom ash [63] and has very low levels of landfill gas generation. This is not reflected in the default modelling by WRATE and the Environment Agency modelling of MBT processes thus gives a distorted impression of the impacts of options that include the use of compost like material on land.



ENDS [15] reported that Organic outputs from mechanical-biological treatment (MBT) of municipal solid waste are being spread on farmland in Leicestershire in a

two-year trial. The trial, which started in October 2008 at Loddington Farm near East Norton, is being carried out by environmental consultancy ADAS UK for Leicester City Council and waste firm Biffa. It intends to quantify the nitrogen release from the organic fraction of MBT residues to show it has a beneficial effect on crop yield. Up to six tonnes of the compost-like outputs will be spread on 0.2 hectares of land during the trial.

Jobs

The Minister says in the introduction to the consultation that the proposals in the draft strategy:

" will all contribute to our new Green Jobs Strategy which aims to green existing jobs and creating new green jobs in the environmental industry sector".

There is little doubt that the recycling and re-use elements of the strategy will generate more jobs in waste management than is currently the case. In 2000, Renner found that creating an environmentally sustainable economy has already generated an estimated 14 million jobs worldwide [64]. He reported that many new opportunities for job creation are emerging, ranging from recycling and remanufacturing of goods, to greater energy and materials efficiency and the development of renewable energy. Jobs are more likely to be at risk where environmental standards are low. He concluded that investing in the environment, in renewable energy, and energy efficiency will generate more jobs than investing in extractive industries and fossil fuels.

More recently Bezdek [65] reviewed the relationship between environmental protection, the economy and jobs in the US and found, contrary to conventional wisdom, that environmental protection, economic growth, and jobs creation are complementary and compatible:

- Whilst investments in environmental protection create jobs and displace jobs, but the net effect on employment is positive.
- Second, environment protection has grown rapidly to become a major sales-generating, job-creating industry—$300 billion/year and 5 million jobs in 2003.
- Third, most of the 5 million jobs created are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, etc., and the classic environmental job (environmental engineer, ecologist, etc.) constitutes only a small portion of the jobs created. Most of the persons employed in the jobs created may not even realize that they owe their livelihood to protecting the environment.
- Fourth, at the state level, the relationship between environmental policies and economic/job growth is positive, not negative. States can have strong economies and simultaneously protect the environment.
- Finally, environmental jobs are concentrated in manufacturing and professional, information, scientific, and technical services, and are thus disproportionately the types of jobs all states seek to attract.

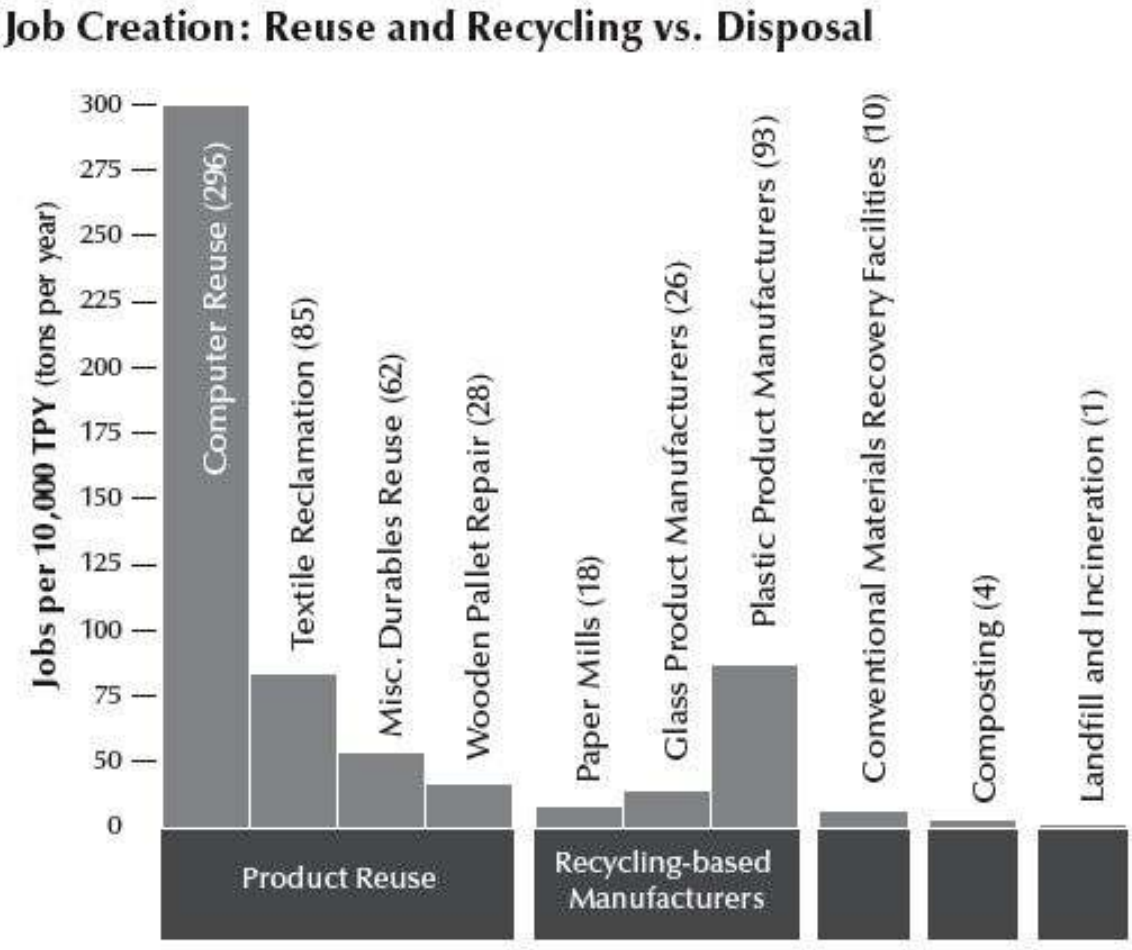
Similar conclusions are reached by UNEP [66]. UNEP confirms that studies show that recycling is not only preferable to landfills and incineration on an environmental basis, but also creates more jobs. A study of the three U.S. cities of Baltimore, Washington, D.C., and Richmond found that 79 jobs were required for every 100,000 tons of materials collected and sorted, and another 162 jobs for processing, for a total of 241. This is 10 times the job potential of waste disposal. Earlier studies in the U.S. state of Vermont; in New York City also showed that recycling similarly has the upper hand as a job creator [67].

The British Newsprint Manufacturers' Association estimated that recycling of newspapers and magazines created 1,200 jobs (directly and indirectly) per 100,000 tonnes as opposed to 400 jobs per 100,000 tonnes if incinerated [68].

Research by the US Institute of Local Self Reliance concluded:

On a per-ton basis, sorting and processing recyclables alone sustain 10 times more jobs than landfilling or incineration. However, making new products from the old offers the largest economic pay-off in the recycling loop. New recycling-based manufacturers employ even more people and at higher wages than does sorting recyclables.

And some types of reuse businesses can generate even higher levels of jobs as illustrated in the table below:



Each recycling step a community takes locally means more jobs, more business expenditures on supplies and services, and more money circulating in the local economy through spending and tax payments.

The reliance on incineration for residuals - which will inevitably include burning recyclable materials given that Eunomia estimatd that 93.3% of the waste stream was recyclable or compostable - can therefore be considered counter productive in relation to the Minister's enthusiasm to generate 'green jobs'.

Further observations:

Approximately 37% of commercial waste was recycled in 2007 according to a recent Environment Agency survey [69]. WAG sees a 77% recycling and composting rate for commercial waste as "*feasible*" by 2025, but asks whether a 70% target would be more appropriate. The urgency of the challenge requires the higher target.

The targets set for industrial waste and construction and demolition waste are not particularly challenging given their current performance. Greater emphasis should again be placed on waste reduction.

The proposals require that Councils lower the level of residual waste produced per head per year to 150 kilograms by 2024/25. This is a completely inadequate substitute for a waste reduction target as it can be met simply through the recycling targets (see page 50 of the Ecological footprint report).

The consultation is very weak on detail of how any of the targets will be met. There are general comments about the need to improve collection systems so more waste is separated at kerbside rather than in recycling facilities and says the government will try to sign voluntary agreements with industry sectors to improve recycling rates and encourage the use of recyclate in manufacturing. Detailed proposals will, it says, only be revealed in "*individual sector plans*" which will be drawn up at a later date[25].

ENDS [70]reported that one main reason for the lack of detail is that Wales has few legislative powers over waste. Draft legislation was laid in the House of Commons at the end of April that aims to give the Welsh Assembly Government powers on environmental issues which, if passed, would allow legislation to be enacted specifying what materials councils and businesses must collect and even require the introduction of variable charging for waste collection and disposal.

An analysis by Waste and Resources Action Programme of the benefits of different collection systems was issued alongside the consultation. This says sorting recyclables at the kerbside is better than co-mingled collections and gives net cost of kerbside sorted collections as about £11 per household per year, compared with more than £25 per household for co-mingled collections. Carbon emissions are also about 20kg per household lower a year.

[25] Four plans are proposed 1) municipal waste; 2)the waste industry; 3) construction and demolition firms; and 4) retailers. Subsequent plans may be issued for food and drink manufacturers and public sector bodies such as schools and hospitals.

Whilst those promoting incineration claim that the dioxin problems have been solved they invariably ignore the large concentrations of dioxin in the residues – and particularly the dioxin in the ash from the air pollution control system. The Stockholm Convention is an international treaty which has the goal of the elimination of dioxins, where this is possible. The Convention is incorporated into European law by Council Regulation (EC) 850/2004 [71]. This should be implemented in Wales through the Persistent Organic Pollutants Regulations 2007 [72]. These regulations require that that "*priority consideration*" should be given to processes which do not generate persistent organic pollutants[26] including dioxins. The consultation contains no reference to the requirements of this legislation but it is important that strategic consideration should be given to these obligations at this stage. The implementation of the Regulations cannot be left wholly to the Environment Agency, as in the past, as they take a very limited interpretation of the range of alternatives that they consider in Environmental Permit Determinations.

Combustion of Wood?

WAG, like DEFRA and DECC, appears enthusiastic to increase the level of combustion of waste wood (both in this consultation and in the renewable energy route map for Wales [41]). Little or no consideration seems to have been given to the implications of the contamination of significant parts of this wood with industrial wood preservatives.

Since the 1970s sawn timber treated with water-borne preservatives has totally dominated the industrial preservation market (Krook et al., 2006b). Most of this wood has been treated with CCA-preservatives (containing copper, chromium and arsenic).

In 2002 wood containing hazardous substances was classified as hazardous waste according to the Swedish waste decree [73]. This legislation requires that such waste should be separately handled by operators who have permission to manage hazardous waste. Whilst the types of wood waste which should be classified as hazardous is, to some extent, open to varying interpretations the Swedish Environmental authorities have interpreted that wood treated by CCA and creosote preservatives is most likely to be regarded as hazardous waste [73]. This legislation has resulted in most Swedish combustion plants not having permission to handle industrial preservative-treated wood (Krook et al., 2006b).

Incineration of wastes containing CCA is likely to be problematic for several reasons:

- Incineration and subsequent ash disposal greatly concentrates the chromium, often oxidizing it to the more toxic and mobile Cr(VI) form [74].
- The copper is a potent catalyst for dioxin formation in incinerators [75-77]

Some older wood treated with Pentachlorophenol (PCP) such as railway sleepers can have extremely high levels of dioxin contamination. Asari [78] reported 21,000 ng/kg which exceeds the Stockholm Convention and EU levels at which the wastes are POPs wastes.

[26] Defined for the purposes of the regulations as chlorinated dioxins, hexachlorobenzene, PCBs and PAHs

An increasing proportion of the wood now used in decking and outdoor applications (22% in 2006 and estimated to be 30% by 2011 [79])is a wood plastic composite[27]. The plastics used are polyethylene (PE), polypropylene (PP) and polyvinyl chloride (PVC). Any energy recovered from combustion of this composite would be largely fossil based and would add, in the case of PVC based composites, significantly increased risks of dioxin and similar compounds if burned.

Rather than burn this contaminated wood the contamination it contains should ideally be treated. Alternatively engineered landfill sites are a more appropriate disposal route than combustion. In no circumstances should the wood be landfilled in unlined landfills [80] or open-burned. The Consumer Safety Information Sheet for Inorganic Arsenical Pressure-Treated Wood (*14*) cautions that CCA treated wood "*should not be burned in open fires or in stoves, fireplaces, or residential boilers because toxic chemicals may be produced as part of the smoke and ashes*". The Environment Agency does not appear to have taken this issue seriously to date and still permits the burning of contaminated wood on construction and demolition sites. Open burning is banned in several US states [81] and should not be tolerated in Wales.

Conclusion

The OECD [82] has emphasised how important it is to move beyond the limitations of our current approach to waste management:

"Conventional waste policies have been successful in diverting many valuable materials from landfills and in promoting further use, remanufacturing and recovery. They may not, however, be sufficient to improve material efficiency and to offset the waste-related environmental impacts of materials production and use in the longer term. Broader approaches, considering the whole lifecycle of materials, are needed."

Waste policy in Wales should link disposal more closely with whole life cycle impacts through extraction, production and disposal in the context of the waste hierarchy which strongly prioritises waste reduction and encourages feedbacks to promote increased recyclability of products.

The Waste Strategy should promote very high levels of recycling: Eunomia estimated that up to 93.3% of Welsh municipal waste could either be recycled or composted/ anaerobically digested and that recycling 80% would be cheaper than recycling 70% [3]. The scale of the crisis that faces us requires that we take exceptional steps to address our climate change impacts. In this case there is little doubt that an 80% recycling target linked with high levels of waste reduction will be very challenging – but nothing like as difficult or damaging as extreme climate change

[27] Wood-plastic Composite 'WPC' building materials consist of a blend of cellulosic fibers and industrial grade polymers, such as polyethylene, polypropylene, and polyvinyl chloride. "Cellulosic fiber" or "wood" in this context is (ligno)cellulosic fiber, such as wood flour, rice hulls, and so on, typically in the form of milled wood products or particles of waste lumber, bleached cellulose fiber or natural fiber of different grades and origins. WPC materials are made by mixing plastic and (ligno)cellulose fibres with additives (lubricants, coupling agents, pigments, antioxidants, UV stabilizers, antimicrobial agents, etc.), and manufacturing, using a high volume process such as extrusion or compression or injection molding.

Residual waste should be dealt with in a way which is flexible and which encourages reduction in quantities of wastes. Incinerators are inflexible and require fixed quantities of wastes of certain calorific values over very long timescales. Such systems have no place in sustainable waste management for Wales.

Wales has been slow to adopt alternatives to landfill but can now use this late-mover advantage to out-perform other EU Member States, who have tied themselves into inappropriate and inflexible options – the commitment to high levels (53%)[28] of incineration in Denmark (albeit in their case linked to CHP networks that would be unlikely in Wales) means that Denmark simply does not have the headroom to develop levels of recycling that we know are environmentally better options. Furthermore even a high level of incineration tax is not helping Denmark to reduce waste now that there is a commitment to continue to feed those incinerators. The result has been that current levels of waste disposal are amongst the very highest in Europe – and the Danes are producing 40% more waste than we do (801 kg/capita vs 572 kg/capita)[29]. Denmark also faces the problem that would be raised in Wales of having to export fly ash and APC residues. In their case these are banned for landfill and so they are exported to Norway and Germany for disposal. This 'exemplar' of incineration is not a good example for Wales to follow. We can, and must, do very much better.

Last month Congressman Dennis Kucinich[30] said (in relation to the proposed American Clean Energy and Security Act of 2009):

"Today's bill is a fragile compromise, which leads some to claim that we cannot do better. I respectfully submit that not only can we do better; we have no choice but to do better. Indeed, if we pass a bill that only creates the illusion of addressing the problem, we walk away with only an illusion. The price for that illusion is the opportunity to take substantive action".

The sentiment can equally be applied to the current proposals. Given the extended preparation period; the spin accompanying the launch; and the volume of supporting paperwork that has been produced[31], the outcome is rather disappointing. Wales, too, must do better.

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[28] Eurostat shows that Denmark waste burns 427 kg/capita vs 801 kg/capita arisings <http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&init=1&pcode=tsien130&language=en>

[29] See Eurostat: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdpc210>

[30] http://kucinich.house.gov/News/DocumentSingle.aspx?DocumentID=134813

[31] Much of which contains large areas of colour which add nothing to legibility but increase waste from printing.

Appendix 1

Is Energy from Waste a "Renewable Energy"?

This review considers the policy implications that arise from a recent planning decision by the Secretary of State and specifically the interpretation of the guidance in PPS1 supplement. PPS1 does not apply in Wales but the Welsh Assembly Government has been giving similar policy support for 'energy from waste' as a renewable energy [41, 83, 84]. The 2008 consultation on Renewable Energy Route Map for Wales says, for example:

> *"Residual wastes, following the removal of useful material for recycling, can be a significant source of renewable energy. Energy from waste (EfW) processes contribute to greenhouse gas reduction both through generation of energy from the organic matter in the waste stream, and from the avoidance of release of methane from landfill sites."*

The glossary of the Climate Change Supplement to PPS1 ("CCS PPS1") published in December 2007 [85] says:

> ***"Renewable and low-carbon energy***
> *Includes energy for heating and cooling as well as generating electricity. Renewable energy covers those energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of the oceans, from the sun and also from biomass. Low-carbon technologies are those that can help reduce carbon emissions.*
> *Renewable and/or low-carbon energy supplies include, but not exclusively, those from biomass and energy crops; CHP/CCHP (and micro-CHP); waste heat that would otherwise be generated directly or indirectly from fossil fuel; energy-from-waste; ground source heating and cooling; hydro; solar thermal and photovoltaic generation; wind generation."*

This glossary has been interpreted by the Planning Inspector in the recent Nottingham incinerator extension decision letter [86] as meaning that "*energy-from-waste*" is a renewable energy:

> *62) The glossary for Climate Change Supplement to PPS1 identifies EfW as a renewable and/or low carbon energy supply. It suggests that planning authorities should not require applicants to demonstrate either overall need for renewable or low carbon energy development, or the energy justification for its siting [Para 20].*

And:

> *141) As the proposal is both a waste recovery facility and a development which supplies renewable or low carbon energy, the PPS1 Supplement states that there is no requirement for need to be justified.*

And:

> *344) The glossary for Climate Change Supplement to PPS1 identifies EfW as a renewable and/or low carbon energy supply[62]. It suggests that planning authorities should not require applicants to demonstrate either overall need for renewable or low carbon energy development, or the energy justification for its siting. Whilst the parties have considered the need argument in some detail, I thus do not consider it to be relevant to this appeal. It is also not primarily a developer's responsibility to consider the potential for waste treatment higher in the waste management hierarchy. PPS10 clearly places this duty on regional planning bodies and planning*

authorities in terms of planning strategies. In this case, these support the proposal. The Supplement to PPS1 is also supportive of the proposal in terms of its potential for use of the energy generated via the DHS.

The Secretary of State [87] agreed with the reasoning of the Inspector:

28. For the reasons given at IR 344, the Secretary of State agrees with the Inspector that need is not relevant to this appeal (IR344). She also agrees that the proposal is consistent with the emphasis in the Climate Change Supplement to PPS1 on providing renewable and low carbon energy and supporting infrastructure, including in this case the potential for some of the energy generated to be used via the Nottingham District Heating System (IR 243, 344 & 364).

What the relevant paragraph (Para 20) of CCS PPS1[32] says is:

20. In particular, planning authorities should:

*– not require applicants for energy development to demonstrate either the overall need for **renewable energy** and its distribution, nor question the energy justification for why a proposal for such development must be sited in a particular location; [**our emphasis**]*

The paragraph is silent on low carbon energy and had CLG intended this to cover "low carbon" energy then the supplement would have said so[33]. It is clear, therefore, that the supplement only removes the requirement to demonstrate need for "*renewable energy*" and not for "*low Carbon Energy"*.

The Glossary of the PPS1 supplement makes it clear that 'renewable' energy and 'low-carbon energy' are different:

1) Renewable energy: "*covers those energy flows that occur naturally and repeatedly in the environment – from the wind, the fall of water, the movement of the oceans, from the sun and also from biomass*". Fossil fuels are, for practical purposes, finite and would be excluded from this coverage. Therefore processes which rely on fossil fuels or materials derived from them would not be consistent with this definition.
2) Low carbon technologies: are, more generally all those "*that can help reduce carbon emissions*" (our emphasis). This would include all the technologies listed – including energy-from-waste, as subject to conditions relating to sources, technology and efficiency, energy from waste can reduce carbon emissions. Anaerobic digestion, for example, is a low carbon treatment for food wastes and is supported by the Government in Waste Strategy 2007 [37].

If these elements are then tabulated it can be seen that all the technologies listed in the glossary provide "*low carbon energy*" consistently with the glossary definition but not all of technologies provide "*renewable energy*" as defined:

[32] The full paragraph is included with the footnote for CCS PPS1

[33] In other places the two are listed together – in all there are ten references to "renewable and low carbon energy"; twelve references to "renewable or low carbon"; and one reference to "renewable and/or low carbon energy"

	Low carbon energy	Renewable Energy
biomass and energy crops;	Yes	Yes
CHP/CCHP (and micro-CHP);	Yes	Only if biomass fuel
waste heat that would otherwise be generated directly or indirectly from fossil fuel;	Yes	
energy-from-waste;	Yes	Only if biomass fuel
ground source heating and cooling;	Yes	Yes
hydro;	Yes	Yes
solar thermal and photovoltaic generation;	Yes	Yes
wind generation	Yes	Yes

Note that we have interpreted "low carbon" in this context to having the potential to be lower than coal fired generation. Not all these technologies can realistically be described as being "low carbon" in absolute terms. The assessment in the table is consistent with the wording "*Renewable and/or low-carbon energy*" (our emphasis) because some technologies are '*Renewable'* and '*low-carbon'* whilst the others are all '*low-carbon*' because they have the potential to reduce carbon emissions.

This interpretation is also consistent with the clarification given by the Minister to Parliament on 17th December, the day the Supplement to PPS1 was published:

> *17 Dec 2007 : Column 1064W—continued*
>
> **Electricity Generation: Wastes**
>
> Mr. Laurence Robertson: To ask the Secretary of State for Business, Enterprise and Regulatory Reform what assessment he has made of the effectiveness of incinerating waste for the purpose of producing electricity; and if he will make a statement. [174567]
>
> Malcolm Wicks: The Energy White Paper recognised the energy and waste policy benefits of generating energy from waste that cannot be prevented, reused or
> recycled. Recovering energy from waste by incineration or other methods has benefits for security of fuel supply, with the biomass fraction of waste also being a renewable energy source.
>
> According to the latest available statistics, in 2006 1,083 GWh of electricity were generated from the biodegradable fraction of municipal solid waste and a further 651 GWh from the non-biodegradable fraction most of which was of fossil fuel origin. These together accounted for 0.4 per cent of the UK's electricity generation in 2006.

We note that the clarification presented by the Minister to Parliament is also consistent with that used in the more recent[34] Department of Business Enterprise and Regulatory Reform consultation on 'Heat' [88]:

> *"Where there is no environmental or economic case for recycling, recovering energy from waste can make an important contribution to a well balanced energy policy. The fraction of waste that is bio-degradable is classed as a renewable fuel"*

For completeness we note also that the interpretation that only the non-fossil element of waste is renewable energy is consistent with the Renewables Directive [89] in which only the biodegradable fraction of the waste is defined as 'renewable':

Definitions

For the purposes of this Directive, the following definitions shall apply:

(a) *'renewable energy sources'* shall mean renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases);

(b) *'biomass'* shall mean the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste;

(c) *'electricity produced from renewable energy sources'* shall mean electricity produced by plants using only renewable energy sources, as well as the proportion of electricity produced from renewable energy sources in hybrid plants also using conventional energy sources and including renewable electricity used for filling storage systems, and excluding electricity produced as a result of storage systems;

More recently at the European level we note that, on 23rd January 2008, the European Commission issued proposals, in the form of a draft Directive of the European Parliament and of the Council, on the promotion of the use of energy from renewable sources [90]. The definition of renewable energy in the draft did not extend any further than the 2001 Directive in relation to energy from waste and included only "*the biodegradable fraction of industrial and municipal Waste*".

Following discussion, the 26th September report of the Parliamentary Rapporteur MEP Claude Turmes[35] proposes to restrict the scope of the definition of biomass in Article 2 (b) even further to:

> *(b) "biomass" means the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), aquaculture, forestry and related industries, <u>the separated collected biodegradable fraction of industrial and municipal waste</u> as well as wastewater sludge; (<u>our emphasis</u>)*

Finally the Minister, Malcolm Wicks [91] has confirmed that "*only the biogenic carbon content can be counted as renewable*" in a letter dated 13th June 2008 (copy below).

[34] 31st January 2008

[35] http://www.euractiv.com/ndbtext/080926%20Turmes_report_final_adopted.doc

The next question which must be addressed is therefore what is the biogenic carbon content of the waste which would be incinerated?

This is best considered in the light of the 2007 consultation [52] on the review of the Renewables obligation. The Government response to the submissions to the consultation was published in January 2008 [53] and said :

> ***Deeming the biomass fraction of waste:*** *we will proceed with the introduction of deeming, but will begin with a lower deemed level of 50% fossil fuel energy content that will increase over time to 65% following a trajectory in line with the Government's waste policy*[36]*.*

And warns:

> *5.9 Ofgem will be given powers to withhold ROCs for mixed waste streams where there is reasonable doubt that the biomass energy content reaches the deemed level. This is consistent with the approach currently used under the scheme for issuing Climate Change Levy Exemption Certificates. It should be noted that lowering the deemed level of fossil-fuel energy from 65% to 50% is likely to increase the risk for some stations that a test of reasonable doubt will be met.*

This consultation and response considers the carbon levels in the waste that would be burned after the removal of the recyclables that the Government clearly considers should be taken out. Thus if the incinerators currently proposed for Wales were to be approved when they started operating only less than 40% of the output from the incinerator would be biogenic carbon and this would be expected to fall to 35% by 2018 as more recycling is undertaken.

[36] The Government proposes setting the deemed levels of fossil energy content at: 50% from 2009 to 2013; 60% from 2013 to 2018; 65% from 2018. There is the possibility of producing evidence of different waste analysis but this must be well founded and evidence based: *We will allow operators the opportunity to present Ofgem with evidence that the fossil fuel content is lower than the deemed level and look to make the fuel measurement system more flexible.*

Annex E: Analysis on Biomass Fraction of Waste for Use in Deeming the Fossil Fuel Fraction of Waste

			Unsorted waste			Scenario A[32]			Scenario B[33]		
	Biomass %	GCV (MJ/kg)	% waste	Total GCV	Biomass GCV	% waste	Total GCV	Biomass GCV	% waste	Total GCV	Biomass GCV
Paper and card	100	12.6	18.0	2268.0	2268.0	2.7	340.2	340.2	9.0	1134.0	1134.0
Plastic film	0	23.6	2.7	637.2	0.0	9.5	2249.3	0.0	8.6	2039.0	0.0
Dense plastic	0	26.7	3.5	934.5	0.0	1.4	373.8	0.0	2.1	560.7	0.0
Textiles	50	15.9	2.4	381.6	190.8	1.2	190.8	95.4	1.4	229.0	114.5
Absorbent hygiene products	50	8.0	2.2	176.0	88.0	7.8	621.3	310.6	7.0	563.2	281.6
Wood	100	18.3	3.2	585.6	585.6	1.6	292.8	292.8	2.4	439.2	439.2
Other combustibles	50	15.6	1.5	234.0	117.0	5.3	826.0	413.0	4.8	748.8	374.4
Non-combustibles	0	2.8	12.3	344.4	0.0	43.4	1215.7	0.0	39.4	1102.1	0.0
Glass	0	1.5	6.6	99.0	0.0	3.3	49.5	0.0	3.3	49.5	0.0
Ferrous metal	0	0.0	1.6	0.0	0.0	0.8	0.0	0.0	0.8	0.0	0.0
Non-ferrous metal	0	0.0	0.4	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0
Kitchen waste	100	5.3	17.2	911.6	911.6	4.3	227.9	227.9	4.3	227.9	227.9
Green waste	100	6.5	19.2	1248.0	1248.0	1.9	124.8	124.8	1.9	124.8	124.8
Fines	50	4.8	4.0	192.0	96.0	14.1	677.8	338.9	12.8	614.4	307.2
WEEE	0	7.6	4.5	342.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous household waste	0	0.0	0.6	0.0	0.0	2.1	0.0	0.0	1.9	0.0	0.0
TOTAL			**99.9**	**8353.9**	**5505.0**	**99.7**	**7189.9**	**2143.6**	**100.0**	**7832.6**	**3003.6**
Biomass GCV					**66%**			**30%**			**38%**

Base data from:
Carbon Balances and Energy Impacts of the Management of UK Wastes: Table 3.2 (GCV); Table 1.24 (municipal waste composition England), Table B1.2 (recycling and recovery upper limits – for Scenario A), Impact of EfW and recycling policy on UK GHG emissions: Table 3.1 (% biodegradability)

32 Scenario A: Removed 85% paper/card, 75% food, 90% green, 50% wood, textiles, glass & metals, 60% dense plastic, WEEE
33 Scenario B: Removed 50% paper/card, 75% food, 90% green, 25% wood, 40% textiles & dense plastic, 50% glass & metals, WEEE

It is incorrect, therefore, to define energy from waste as renewable energy for planning purposes or when interpreting the PPS 1 supplement on climate change.

WAG should ensure that energy from waste is not given unmerited support by describing all waste to energy as renewable energy in any revisions to TAN 8[92].

Supplement 1:

Letter from Malcolm Wicks MP Minister of State for Energy [91]:

BERR | Department for Business Enterprise & Regulatory Reform

Malcolm Wicks MP

Mike Hall MP
House of Commons
London
SW1A 0AA

Our ref: RD/60508
Your ref: HILL01005/01051944MF

13 June 2008

Dear Mike,

Thank you for your letters of 21 and 25 April to John Hutton, about energy generated from waste. I am replying as the matter falls within my portfolio and I apologise for the delay in doing so.

The bio-degradable element of all waste (i.e. that which can be safely burned), is regarded as a potentially renewable source of energy. Our Waste Strategy, published last year, highlighted that certain types of wastes, such as food and wood, can be recycled, but that it is not always an efficient use of such resources. The environmental costs of re-use or re-cycling can sometimes be higher than incineration. We certainly continue to encourage waste prevention, reuse and recycling, but there will always be such residual wastes and incineration, as Energy from Waste is itself preferable to landfill. As we are also seeking to divert and reduce the amount of waste going into landfill, Energy from Waste through incineration will also help to achieve this.

Regarding your second point, 'Energy from Waste' is a broad term. It is of course not only the biomass content of waste that can be burned for energy - plastics, paints, old sofas etc., can all be burned. However, only the biogenic carbon content can be counted as renewable. Work is under way in Defra to assess the renewable content of such waste streams. I am sure Defra would be interested in telling you about this, and I am copying this reply to Joan Ruddock, whose officials provided me with the information in this letter.

MALCOLM WICKS

Approved by the Minister
and signed in his absence

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EndNotes:

1. Barnet, R. and R. Muller, *The Ideology of Growth* Pediatrics, 1975. **55**(2): p. 231-.
2. Murray, R., *Zero Waste*. 2002, London: Greenpeace Environmental Trust.
3. National Assembly for Wales, *Future Directions For Municipal Waste Management In Wales - A Paper For Discussion*, WAG, Editor. 2007.
4. Karani, P. and S. Jewasikiewitz, *Waste Management and Sustainable Development in South Africa.* Environment, Development and Sustainability, 2007. **9**(2): p. 163-185.
5. Fehily Timoney & Company and BRASS, Cardiff University, *Direct and variable charging for residual waste from householders*. 2008, For Welsh Assembly Government.
6. Welsh Assembly Government Statistical Directorate, *Municipal Waste Management Annual Bulletin, 2007-08 SB 35/2009 24 June 2009* 2009.
7. North Wales Region, *North Wales Regional Waste Plan November 2003 – 2013 - Endorsed by WAG on 17 March 2004*. 2004.
8. South West Wales Region, *South West Wales Region Regional Waste Plan November 2003* 2003, SLR and Welsh Assembly Government.
9. ENDS, *Focus June 1999.* Environmental Data Services (ENDS), 1999(293).
10. Johns, D., *A New Conservation Politics: Power, Organization Building and Effectiveness*. 2009: Wiley-Blackwell. 408.
11. Heinberg, R., *Peak Everything: Waking Up to the Century of Declines (New Society Publishers)*. 2007: New Society Publishers 224.
12. Arup for Welsh Assembly Government, *Ecological Footprint impact of the Welsh Waste Strategy Study Report January 2009 (http://wales.gov.uk/docs/desh/consultation/090429wasteecologicalfootprinten.pdf)*. 2009.
13. ENDS, *Confusion over status of incinerator bottom ash.* Environmental Data Services (ENDS), 2009. **410**: p. 23-24.
14. Welsh Assembly Government, *PLANNING POLICY WALES Technical Advice Note (Wales) 21 WASTE NOVEMBER 2001*. 2001.
15. ENDS, *Spreading MBT output on farmland goes on trial.* Environmental Data Services,, 2008(406): p. 20-21.
16. Environment Agency, *The State of Soils in England and Wales March 2004*. 2004: Bristol.
17. Symmonds Group Ltd, *Construction and Demolition Waste Survey National survey of the production, recycling and disposal of construction and demolition waste in England and Wales, 1999-2000 R&D Technical Report P402 May 2001*. 2001, Environment Agency: Bristol.
18. Scottish Environment Protection Agency (SEPA), *SEPA's Thermal treatment of waste guidelines 2009*. 2009.
19. Department for Energy and Climate Change (DECC), *The UK Low Carbon Transition Plan - Presented to Parliament pursuant to Sections 12 and 14 of the Climate Change Act 2008 National strategy for climate and energy* 2009.
20. Department for Energy and Climate Change (DECC), *Analytical Annex - The UK Low Carbon Transition Plan*. 2009.

21. Department of Energy and Climate Change, *The Road to Copenhagen - The UK Government's case for an ambitious international agreement on climate change June 2009.* 2009.
22. Jenkins, G.J., et al., *UK Climate Projections: Briefing report*. 2009, Exeter, UK,: Met Office Hadley Centre.
23. Murphy, J.M., et al., *UK Climate Projections Science Report: Climate change projections* http://ukclimateprojections.defra.gov.uk, ed. E. Met Office Hadley Centre. 2009: DEFRA,.
24. Lowe, J.A., et al., *UK Climate Projections science report: Marine and coastal projections*. 2009, Met Office Hadley Centre for DEFRA,: Exeter, UK.
25. Jones, P.D., et al., *UK Climate Projections science report: Projections of future daily climate for the UK from the Weather Generator*. 2009, University of Newcastle for DEFRA: UK.
26. DEFRA and DECC, *Making the right choices for our future: An economic framework for designing policies to reduce carbon emissions March 2009* <http://www.defra.gov.uk/environment/climatechange/research/pdf/economicframework-0309.pdf>. 2009.
27. Stern, N., *Stern Review: The Economics of Climate Change.* 2006.
28. Davidson, J., Minister for Environment, Sustainability and Housing., *Greenhouse gas emissions in Wales in 2006 and update on action to tackle climate change Written Statement by the Welsh Assembly Government 23 September 2008*. 2008.
29. AEA Technology plc, *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 - 2006 AEAT/ENV/R/2669 Issue 1*. 2008, For Department for Environment, Food and Rural Affairs The Scottish Government The Welsh Assembly Government, The Northern Ireland Department of Environment.
30. Druckman, A., et al., *Measuring Progress towards Carbon Reduction in the UK*, in *International Ecological Footprint Conference,* <http://www.brass.cf.ac.uk/uploads/fullpapers/DruckmanA29.pdf>. 2007: Cardiff, Wales,.
31. Helm, D., R. Smale, and J. Phillips, *Too Good To Be True? The UK's Climate Change Record 10th December 2007*. 2007.
32. National Assembly for Wales, *The Official Record 10 May 2000 - Climate Change Debate.* 2000.
33. Morris, J., *Recycling versus incineration: an energy conservation analysis.* Journal of Hazardous Materials, 1996. **47**(1-3): p. 277-293.
34. Denison, R.A., *Environmental life-cycle comparisons of recycling, landfilling and incineration: A Review of Recent Studies.* Annual Review of Energy and the Environment, 1996. **21**(1): p. 191-237.
35. House of Commons Environmental Audit Committee, *Climate change and local, regional and devolved Government Eighth Report of Session 2007–08 Report, together with formal minutes, oral and written evidence HC 225 Ordered by The House of Commons to be printed 8 July 2008*. 2008.
36. WRAP, *Environmental Benefits of Recycling - An international review of life cycle comparisons for key materials in the UK Recycling Sector Sep 2006*. 2006, Waste Resources Action Programme,: Banbury.
37. DEFRA, *Waste Strategy for England 2007, May 2007, Cm 7086*. 2007.
38. ENDS, *Connecting the waste and carbon agendas.* Ends Report,, 2007(389): p. 34-38.

39. Committee on Climate Change (CCC), *Building a low-carbon economy – the UK's contribution to tackling climate change The First Report of the Committee on Climate Change December 2008*. 2008: London.
40. Environment Agency Wales, *Report on the Landfill Allowances Scheme (LAS) Wales 2007/8 September 2008 ref: GEWA0908BOMQEE.* 2008.
41. Welsh Assembly Government, *Renewable Energy Route Map for Wales consultation on way forward to a leaner, greener and cleaner Wales*. 2008.
42. Burnley, S.J., *The use of chemical composition data in waste management planning - A case study.* Waste Management, 2007. **27**(3): p. 327-336.
43. Department for Environment Food and Rural Affairs, *How to use the Shadow Price of Carbon in policy appraisal.* 2007.
44. Department for Environment Food and Rural Affairs, *The Social Cost Of Carbon And The Shadow Price Of Carbon: What They Are, And How To Use Them In Economic Appraisal In The UK - Economics Group, DEFRA December 2007* 2007.
45. IPCC, *2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5 Waste*. 2006.
46. Rabl, A., et al., *Editorial - How to Account for CO2 Emissions from Biomass in an LCA.* International Journal of Life Cycle Assessment, 2007. **12**(5): p. 281.
47. Eunomia Research & Consulting and EnviroCentre, *Greenhouse Gas Balances of Waste Management Scenarios - Report for the Greater London Authority January 2008*. 2008.
48. Committee on Climate Change, *Building a low-carbon economy – the UK's contribution to tackling climate change - The First Report of the Committee on Climate Change*. 2008: The Stationery Office.
49. Georges, M. and H. Huyton, *Policy Conclusions and Recommendations for biomass - 22 April 2009 London* http://www.environment-agency.gov.uk/static/documents/Research/Environment_Agency_Policy_conclusions_and_recommendations.pdf. 2009, Climate Change Policy, Environment Agency.
50. Environment Agency, *Biomass: Carbon sink or carbon sinner?* . 2009.
51. Hogg, D. and Eunomia Research & Consulting Ltd, *A changing climate for energy from waste - Final Report for Friends of the Earth*. 2006.
52. Department of Trade and Industry, *Renewable Energy - Reform of the Renewable Obligation May 2007.* 2007.
53. BERR, *RENEWABLES OBLIGATION CONSULTATION Government Response January 2008*. 2008.
54. WLGA, *WAG Paper 'Future Directions for Municipal Waste Management in Wales' The WLGA Response March 2008*. 2008.
55. Einola, J.K.M., K.M. Sormunen, and J.A. Rintala, *Methane oxidation in a boreal climate in an experimental landfill cover composed from mechanically-biologically treated waste.* Science of The Total Environment, 2008. **407**(1): p. 67-83.
56. Welsh Assembly Government, *South East Wales Regional Waste plan Consultation Document First Review*. 2007.
57. Welsh Assembly Government, *North Wales Regional Waste Plan Consultation Document First Review*. 2007.
58. HM Treasury and HM Revenue and Customs, *Consultation Paper - Modernising landfill tax legislation April 2009*. 2009.

59. Eunomia Research & Consulting and TOBIN Consulting Engineers, *Meeting Ireland's Waste Targets - the Role of MBT Final report for Greenstar* http://www.greenstar.ie/docs/Eunomia_MBT.pdf. 2008.
60. Valpak, *East of England Study into the Markets for Hard to Recycle Materials December 2008*. 2008, East of England Regional Assembly.
61. Juniper Consultancy Services Ltd, *Mechanical-Biological-Treatment : A Guide for Decision Makers Processes, Policies and Markets*. 2005.
62. Soyez, K. and S. Plickert, *Mechanical-Biological Pre-Treatment of Waste: State of the Art and Potentials of Biotechnology.* Acta Biotechnologica, 2002. **22**(3-4): p. 271-284.
63. Baddeley, A., Eunomia Research & Consulting,, *'Biostabilisation' of Wastes: Making the Case for a Differential Rate of Landfill Tax January 2008.* 2008.
64. Renner, M., *Working for the Environment: A Growing Source of Jobs - Worldwatch paper No. 152 - September 2000*. 2000, Worldwatch Institute.
65. Bezdek, R.H., R.M. Wendling, and P. DiPerna, *Environmental protection, the economy, and jobs: National and regional analyses.* Journal of Environmental Management, 2008. **86**(1): p. 63-79.
66. United Nations Environment Programme, *Green Jobs - Towards decent work in a sustainable, low-carbon world* <http://www.unep.org/PDF/UNEPGreenJobs_report08.pdf>. 2008.
67. Mclaren, D., *Working Future, Jobs and the Environment.* 1994, London: Friends of the Earth.
68. British Newsprint Manufacturers' Association, *Recycle or incinerate? the future for used newspapers: an independent evaluation*. 1995, BNMA.
69. Scholes, P., E. Areikin, and A. Davey, *Survey of Industrial & Commercial Waste Arisings in Wales* <http://www.environment-agency.gov.uk/research/library/publications/107692.aspx>. 2009, WRc for Environment Agency Wales.
70. ENDS, *Wales needs powers to meet bold waste targets* Environmental Data Services (ENDS), 2009. **412**: p. 31-32.
71. European Commission, *REGULATION (EC) No 850/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC NOTE: Whilst this was published in the Official Journal of the European Union L158 of 30th April 2004. A Corrigendum to the Regulation was subsequently published in the Official Journal L229/5 of 29th June 2004*. 2004, Official Journal of the European Union L 229/5.
72. HMSO, *The Persistent Organic Pollutants Regulations 2007 Statutory Instrument 2007 No. 3106*. 2007.
73. Krook, J., et al., *Swedish recovered wood waste: Linking regulation and contamination.* Waste Management, 2008. **28**(3): p. 638-648.
74. Jambeck, J., et al., *CCA-Treated wood disposed in landfills and life-cycle trade-offs with waste-to-energy and MSW landfill disposal.* Waste Management, 2007. **27**(8): p. S21-S28.
75. Stanmore, B.R., *The formation of dioxins in combustion systems.* Combustion and Flame, 2004. **136**(3): p. 398-427.
76. Shibamoto, T., A. Yasuhara, and T. Katami, *Dioxin formation from waste incineration.* Rev Environ Contam Toxicol, 2007. **190**: p. 1-41.

77. Hatanaka, T., A. Kitajima, and M. Takeuchi, *Role of copper chloride in the formation of polychlorinated dibenzo-p-dioxins and dibenzofurans during incineration.* Chemosphere, 2004. **57**(1): p. 73-9.
78. Asari, M., et al., *Waste wood recycling as animal bedding and development of bio-monitoring tool using the CALUX assay.* Environment International, 2004. **30**(5): p. 639-649.
79. Klyosov, A.A., *Wood-Plastic Composites*. 2007: Wiley-Interscience 698.
80. Jambeck, J.R., T.G. Townsend, and H.M. Solo-Gabriele, *Landfill Disposal of CCA-Treated Wood with Construction and Demolition (C&D) Debris: Arsenic, Chromium, and Copper Concentrations in Leachate.* Environ Sci Technol, 2008. **42**(15): p. 5740-5745.
81. Wasson, S.J., et al., *Emissions of chromium, copper, arsenic, and PCDDs/Fs from open burning of CCA-treated wood.* Environ Sci Technol, 2005. **39**(22): p. 8865-76.
82. OECD, *OECD environmental outlook to 2030* 2008: OECD. 519.
83. Welsh Assembly Government, *A Guide to the New Renewable Energy Route Map for Wales Consultation on the way forward to a leaner, greener and cleaner Wales*. 2008.
84. Welsh Assembly Government, *Renewable Energy Route Map for Wales - Analysis of responses to Consultation Report December 2008* <*http://wales.gov.uk/docs/desh/consultation/090123energymapresponseen.pdf>.* 2008.
85. Communities and Local Government, *Planning Policy Statement: Planning and Climate Change Supplement to Planning Policy Statement 1 (PPS1) - 17th December 2007.* 2007.
86. Planning Inspectorate, *Report to the Secretary of State for Communities and Local Government by Stephen Roscoe BEng MSc CEng MICE an Inspector appointed by the Secretary of State for Communities and Local Government 10 December 2008 Appeal by Waste Recycling Group Eastcroft Energy from Waste Facility, Off Incinerator Road, Cattle Market Road, Nottingham NG2 3JH File Ref: APP/Q3060/A/08/2063129 Inquiry held on 9-12, 16-19 and 24 September 2008 Site Visit held on 25 September 2008* 2008.
87. Secretary of State for Communities and Local Government, *Appeal by Waste Recycling Group Ltd: Eastcroft Energy From Waste Facility, Off Incinerator Road, Nottingham NG2 3JH Application Ref 07/01502/PMFUL3 12th February 2009*. 2009.
88. BERR, *Heat Call for Evidence http://www.berr.gov.uk/files/file43609.pdf*. 2008.
89. European Commission, *DIRECTIVE 2001/77/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.* Official Journal of the European Communities, 2001: p. L 283/33 -40.
90. European Commission, *Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of the use of energy from renewable sources (presented by the Commission) {COM(2008) 30 final} {SEC(2008) 57} {SEC(2008) 85} Brussels, 23.1.2008 COM(2008) 19 final 2008/0016 (COD).* 2008.
91. Wickes, M., *Letter to Mike Hall MP 13th June 2008 confirming only the biomass element of Energy from Waste is renewable*. 2008.

92. Welsh Assembly Government, *Technical Advice Note (TAN) 8: Renewable Energy July 2005*. 2005.