December 2003

Friends of the Earth

Briefing

Money to burn

Perverse subsidies for incineration

Introduction

Waste management within the UK is reaching a crisis point. We continue to generate increasing volumes of waste, but European laws are forcing us to abandon landfill as our main method of waste disposal. In any case, landfill space is running out. Incinerators are very unpopular and proving almost impossible to deliver through local planning. Moreover, recycling rates are barely inching forward: the latest Government figures show that recycling has increased by just one per cent a year since 1999.[1] This situation represents a scandalous waste of economic resources and a source of significant environmental damage.

One of the reasons that recycling rates are so low is that incineration currently receives more tax breaks and subsidies than recycling and is therefore cheaper. Much of this investment is driven by energy policy, through exemptions in the Climate Change Levy and the Renewables Obligation. This policy pulls in the opposite direction to waste policy, but it also makes little sense in terms of averting climate change. More energy savings can be made through recycling.

At a time when the Chancellor is considering introducing incentives to deliver on the policy goals in both these areas, it is vital that proper joined-up thinking informs the policy choices. This briefing is a contribution to that thinking.

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Waste and the economy

In November 2002 the Cabinet Office Strategy Unit published its review of waste policy, stressing the need for a coordinated package of strong policy measures to stimulate the widespread radical change in waste management required in the UK. At the same time, the 2002 Pre-Budget Report set out two ways in which the tax system would help bring about the changes in behaviour needed to bring about that change, subsequently confirmed in the 2003 Budget Report.

Landfill tax and the budget

The 2003 Budget Report announced that the taxation of landfill would increase at a steady, if slightly increased, rate and a greater amount of the Landfill Tax Credit Scheme would be directed at increasing recycling. These are welcome policies that organisations including Friends of the Earth have argued for strongly over the past five years. However, under the proposals for increasing landfill tax, it is unlikely that the benchmark rate of £35 per tonne (widely regarded as the level that will start to drive fundamental change in waste management) will be reached before 2010. If the Prime Minister's desire to see each household with doorstep recycling is be realised, an extra £200 million per year is required and the reform of the Landfill Tax Credit Scheme is unlikely to provide more than 40% of this.

Incineration and the budget

The 2003 Budget Report was far less clear about how waste incineration and similar technologies were to be treated. The Government said it would consider the case for an economic instrument for incineration following a review of the environmental and health effects of all waste management and disposal options. This report is expected to be published at the time of the Pre-Budget Report 2003.

In considering the case for an economic instrument for incineration, the Treasury should assess the existing tax breaks and support measures which reduce the cost of incineration. t. It should also assess the extent to which these subsidies distort market conditions in favour of incineration over recycling.

Friends of the Earth, as a contribution to that assessment, commissioned Eunomia Research and Consulting Ltd [2] to examine the implications for incineration of the following subsidies and support mechanisms:

- exemptions from the Climate Change Levy
- relief from business rates
- the Renewables Obligation
- the packaging recovery notes system
- the Private Finance Initiative.

Calculating the costs

The Government's approach to waste management to date has been to seek solutions without introducing new significant economic instruments (with the exception of small increases in landfill tax). The question that both the Strategy Unit and HM Treasury have begun to ask is whether the current cost structure is wrong. In particular, there are serious concerns that the cost structure is biased in favour of incineration and related technologies, and against recycling. The main areas of concern are that:

- the price of incineration is artificially low because it does not adequately include the negative costs to human health and the environment;
- the price of recycling is artificially high because it is not adjusted to reflect the positive costs (or benefits) for the environment;
- the price of incineration is artificially low in comparison with recycling because it receives tax breaks and subsidies for energy production. But the energy it produces is significantly less than the energy saved through recycling. Recycling does not receive similar measures.

In the face of continuing public hostility to incineration and newer, emerging energy from waste technologies, it is important to ask how Government policy affects the price of incineration – particularly in comparison with recycling and composting. In order to answer these questions it is important to look at the costs of both recycling and incineration.

The costs of recycling

Assessments of the environmental impact of recycling have found that it has positive external costs (in other words benefits) that should be reflected in the cost structure. These stem largely from removing the impacts of primary materials extraction, processing, transport and manufacture. As always these assessments need to be considered in the context of the data available.

Ensuring a supply of secondary materials requires an input of energy, but studies demonstrate that this is less than the energy savings to be generated from recycling. Even for plastic, one of the more contentious materials in the debate, a recent study by the German Duales System[3] suggests that whilst the 'energy saving' attained in waste incineration plants is around 19 MJ/kg for plastic, by way of comparison, feedstock processes achieve savings between 26 and 32 MJ/kg. If the collected plastic packaging is recycled mechanically, however, energy savings of over 50 MJ/kg are realistic.

External benefits from recycling, as assessed in different studies, are shown below. It should be noted that the analysis boundaries of these studies vary, and all have to rely on datasets that are not the best quality, nor updated as frequently as might be hoped.

Table 1: External Costs / Benefits from Recycling Different Materials in the Household Waste Stream (£/tonne)

	Coopers & Lybrand et al (1997)	Powell et al 1996	Nolan-ITU (2001)	Hogg et al 2000	
Recycling				**Low**	**High**
Ferrous	297	238		49	3239
Non-ferrous	929	1786		315.1	5256.9
Glass	196	188		61.2	1947.1
Paper	69	226		26.4	521.5
Plastic film	-17				
Rigid plastic	48				
HDPE		-2.57		41.1	460.2
PVC		-4.1			
PET		-7.28			
LDPE				15.4	92.8
Textiles	66				
All			A$ 78		

Note: Negative figures represent disbenefits.

The costs of incineration

Incineration has external costs which can be calculated. These include the costs of pollution, disamenity, greenhouse gas emissions and so on. In working out these external costs, it is important to take account of which energy source is likely to be 'displaced' by the energy produced from the waste.

There has been a blanket assumption that the energy generated by incineration is replacing the need for burning more coal. However, to assume that any energy source is being displaced is misleading given that, in reality, the demand for electricity is projected to increase. Rather than sources of electricity being displaced, new sources of energy contribute to the new-build generation required to meet this growing demand. The competition is therefore more likely to be between incineration and other new-build generation, typically renewable energy and combined-cycle gas turbines.[4]

Empirical data also suggests the issue is rather more complex than incinerators displacing coal. There are simply too many other factors at work. Department of Trade & Industry data shows that over the last four years, the supply of electricity from coal has not fallen, but has increased by far more than renewable energy.[5] This does not, in itself, prove or disprove the argument concerning the 'displaced burdens'. It does, however, cast doubt upon the nature of the assumptions made in the past when calculating the costs of incineration.

Taking the figures from two of the most recent studies[6], which calculate the external costs of incineration with (a) no displacement of energy, (b) displacement for coal, (c) displacement for oil and (c) displacement for average mix energy, a broad estimate of a mid-point external cost can be calculated. The results are indicated in Table 2. Plants which only recover electricity are unlikely to generate external benefits unless the energy source displaced is

coal. This cost associated with incineration is not internalised by existing Government policies.

One further issue is critical. The assessment of environmental performance of energy from waste incinerators on the basis of an assumption that the energy generated 'displaces coal' tends to entrench a view that energy from waste plants are more like power stations than waste treatment facilities. The dangers of doing this are that the pollution control elements are de-emphasised at the expense of energy generation; and substantially greater benefits of recycling in terms of reduced energy use is ignored, leading to significant bias toward incineration.

Table 2: Externalities of Incineration (£/tonne)

Form of incineration	Energy displaced	Cost	Mid-point cost	'Average' cost
Incinerator with 20% energy recovery, excluding post-combustion materials recovery (no pollutant emitted at levels higher than the latest EU Incineration Directive) [Hogg et al 2000]	High UDCs, displacing average mix	20.27	-15.42	-5.86
	High UDCs, no displacement	-51.03		
	Low UDCs, displacing average mix	7.37	3.71	
	Low UDCs, no displacement	0.05		
Meeting latest EU Incineration Directive, CHP plant, 83% efficiency [COWI 2000]	Displacing oil	11.84	-2.86	-17.46
	No displacement	-17.56		
Meets previous EU Incineration Directive, electricity only, 25% efficiency [COWI 2000]	Displacing oil	-27.61	-32.05	
	No displacement	-36.48		

Note: High and Low Unit Damage Costs (UDCs) relate to high and low values used for UDCs for different pollutants. In calculating the high figures, all UDCs were assumed to be at their high values.

The figures suggest that if an energy source other than coal is being displaced by energy produced by incinerators, there is a case for incineration to be subject to taxation. Yet at present incinerators are granted several tax breaks which affect both the costs and revenues associated with them.

Tax breaks for incineration

Incinerators receive tax breaks in four ways: exemptions from the climate change levy as 'renewable energy' and through combined heat and power; exemptions from business rates; and enhanced capital allowances.

1. Exemption from the Climate Change Levy as a 'renewable energy'

The climate change levy is a tax on the energy used by both the private and public sectors. The levy does not apply to fuels used by the domestic or transport sector. The generation of electricity is charged at 0.43p per kWh.

Renewable energy sources are exempt from the levy. This means if a business or a public organisation buys electricity from certified renewable source, or has its own on site renewable energy source, it pays no levy on the energy generated. Incineration of municipal and industrial wastes, along with landfill gas, is included in the list of renewable energy technologies. This is irrespective of whether or not it recovers or wastes the heat generated and despite incineration being deemed ineligible for Renewables Obligation Certificates.

To bring the levy exemptions into line with the proposals under the European Directive on Electricity from Renewable Sources, the exemption is calculated on the basis of energy derived from biodegradable wastes only. This is assumed by Ofgem, the electricity regulator in charge of administrating this tax break, to be 50 per cent of the electricity generated unless the incinerator operator makes the case that a higher proportion of biodegradable waste is being burnt. Operators are also expected to report to Ofgem if the contribution of biodegradable materials to the energy delivered is less than 50 per cent.

The energy derived from the biodegradable fraction of waste is around 280kWh per tonne. The per-tonne exemption (based on 0.43p per kWh) is therefore equivalent to £1.20 per tonne of waste.

The installed capacity of UK incinerators registered for levy exemptions is 262.2MW (see Table 3). At full capacity, approximately 2.3 billion kWh would be generated.[7] The levy exemption on this, at a 50 per cent qualifying level, is currently equivalent to £4.9 million per annum. In England, incineration of municipal and industrial waste is the second largest recipient of Levy Exemption Certificates for renewable energy, the largest being landfill gas.

Discouraging source-separation

Whether or not waste is properly source-separated before the residual waste is incinerated makes a difference to how much biodegradable waste is available to be burnt. An analysis of waste composition and the calorific values of different materials suggest that if waste is intensively source-separated to remove recyclable material, the remaining residual waste has a smaller percentage of biodegradable material and a lower calorific value[8]. Where the non-biodegradable waste is subject to the full levy, the implied levy per kWh generated is 0.18p/kWh where no source separation occurs, and 0.26p/kWh where intensive source separation is in place. The reduction from the 'unaltered' levy rate is therefore 0.25p/kWh where no source separation occurs, and 0.17p/kWh where intensive source separation is in place. In other words, incinerator operators pay more where source separation occurs.

This situation discourages the reduction of biodegradable waste through source separation schemes. It flies in the face of what is sought by current European Directives and may be reinforced when the Biowaste Directive is completed. The exemption from the climate change levy is worth more the greater the proportion of calorific value derived from the

biodegradable matter. This sends a conflicting message.

There is a further problem inherent in the changing composition of waste. The qualifying percentage at any incinerator is likely to change on a dynamic basis. This is irrespective of source separation: waste composition will change in an as yet unknown way. Even just a 1 per cent increase of qualifying energy across all UK incinerators would have a significant impact, amounting to £0.1 million. We estimate that this is equivalent to a level of support of just over £1 per tonne of waste input. The design of this tax break therefore has implications for the cost to the Exchequer.

Table 3: Waste Incinerators and the Qualifying Exemptions from CCL Claimed

Generator Name	Total Installed Generating Capacity (kW)	Qualifying Percentage	Owner / Operator Company
Baldovie Waste to Energy Plant (Dundee)	10500	50	Dundee Energy Recycling Ltd
Bernard Road (Sheffield)	6800	50	Sheffield Heat & Power Ltd
Coventry Waste to Energy Plant G1	12925	65	Coventry & Solihull Waste Disposal Co Ltd
Coventry Waste to Energy Plant G2	4800	65	Coventry & Solihull Waste Disposal Co Ltd
Dudley Incinerator	7300	50	Dudley Waste Services Ltd
Edmonton Energy From Waste Plant	55000	50	London Waste Ltd.
Fiberpower (Slough)	12000	50	Fibre Power (Slough) Ltd.
Kirklees Waste to Energy Facility	10980	50	Kirklees Waste Services Ltd
London Road Heat Station	14400	50	Enviroenergy Ltd.
Raikes Lane CHP (Manchester)	11670	50	Greater Manchester Waste Ltd
SELCHP Kennels Site Deptford	35000	67	South East London Combined Heat & Power Limited
Stoke Incinerator	15400	50	Hanford Waste Services Ltd
Teeside Energy From Waste Plant	21562	50	SITA Cleveland Waste Management Limited
Tyseley Waste Disposal Site	32600	64.8	Tyseley Waste Disposal Ltd
WDF Powerplant, Newport, 10W	2550	80	Contract Heat & Power Ltd
Wolverhampton Incinerator	8700	50	Wolverhampton Waste Services Ltd.

The problem with self-reporting

One of the most obvious criticisms of the approach is that at present levy exemptions certificates are made available on the basis of the operators' own reported data. Given the incentive installed by this system runs counter to the both the waste management policy of reducing the biodegradable content in residual waste and has implications for the revenue raised through the Climate Levy, it is important sampling protocols are put in place to establish the changing biodegradable proportion of the waste stream. One way that this could be done is through a system equivalent to the way in which compost outputs are sampled for their content of heavy metals, pathogens and other substances.

Ofgem was asked how they checked the figures claimed by incinerator operators for the fraction eligible for a Levy Exemption Certificate. We were not given any meaningful

response. We also asked whether any application for a Levy Exemption Certificate had been rejected on the basis of poor information. Ofgem refused to answer this because it regarded this information as confidential. Lastly, we asked what mechanism Ofgem would use to verify the figures claimed. We were told that Ofgem would audit the figures but that they were not prepared to say how these audits will be carried out. This is perhaps something that the National Audit Office should look into.

2. Exemption from the Climate Change Levy as a CHP plant

In the 2002 Budget, the Government announced the extension of the exemption to the Climate Change Levy to all good quality Combined Heat and Power (CHP). Ofgem is responsible for administering this exemption and issuing the Levy Exemption Certificates for electricity generated.

In May 2002, the Department for Environment, Food and Rural Affairs released a public consultation draft of its Strategy for Combined Heat and Power to 2010. This consultation ran until August 2002. The draft strategy highlights the various support measures available to CHP such as Climate Change Levy exemption for good quality CHP, enhanced capital allowances, VAT reduction for domestic CHP.

In order to obtain a Levy Exemption Certificate as good quality combined heat power, an incinerator has to meet criteria set in a Guidance Note covering fuel inputs, power outputs and power capacity (the 'quality index' approach).[9] One apparent problem with the criteria is that it is possible to qualify as 'good quality' by only producing power or heat. Alternatively, only a minimal amount of heat might need to be recovered or vice versa.[10] For new capacity the design, specification, tendering and approvals stages are apparently given greater weight than what actually happens at a plant. This is important for incinerators since, as is well known, some facilities such as SELCHP might have been designed to operate as CHP facilities, but they have not subsequently done so.

As any municipal incinerator can claim a 50% exemption from the Climate Change Levy whether it wastes or recovers the heat it produces and no matter how efficient or inefficient it is this 100% exemption for good quality CHP is equivalent to an extra 50% exemption (or less for those incinerators claiming a biodegradable content of greater than 50%). This extra benefit is equivalent to approximately £1 per tonne of waste.

It appears from Ofgem records that only five energy from waste facilities have registered as Good Quality CHP schemes. The nature of these schemes, and the criteria under which they qualify, is deserving of closer examination.

Table 4: Energy from Waste Facilities Classified as CHP Facilities

Company name	Ogwr Borough Council	Slough Heat and Power Ltd	Coventry & Solihull Waste Disposal Co. Ltd	Newcastle City Council	Enviroenergy Ltd
Comissioning date	01/10/1990	01/06/1935	01/03/1975		01/01/1952
Economic sector	Waste Incineration	Offices	Waste Incineration	Large Scale DH	Large Scale DH
Industrial sector	Other	Commercial	Other	Other	Other
Size code	S	L	L	L	L
Generating capacity	220	90000	13000	1000	18300
CHP capacity	220	90000	40000	1000	15400
Max Heat Output	380	125250	40000		70000
CHP Type	I C Engine	Gas Turbine Combined Cycle	Heat Recovery Steam Cycle	Heat Recovery Steam Cycle	Heat Recovery Steam Cycle

Source: Ofgem

3. Enhanced Capital Allowances for CHP

As part of the Climate Change Levy package, investments in listed energy saving equipment have been granted an Enhanced Capital Allowance (ECA) of 100% of the first year capital allowances. Businesses are able to write off the whole cost of their investment against their taxable profits during the period in which they make the investment. Most of the elements that make up a combined heat and power plant, from fuel storage and handling equipment to electrical generation and heat recovery equipment, are eligible for this allowance. New incinerators with certified Good Quality CHP can therefore claim this tax break on all the capital costs related to producing power, recovering and distributing heat.

In recent work for DTI and DEFRA carried out by Cambridge Econometrics, the measure for CHP as a whole was represented by assuming that the benefit would be equivalent to 10% of capital expenditure on CHP equipment. This measure proved to be one of the most significant of the Government's new measures in bringing forth CHP capacity (along with the CCL exemptions).[11]

New incinerators with good quality CHP can claim the allowance on all capital expenditure except the building that houses it and capital maintenance. Investments in existing incinerators aimed at either improving the CHP system or installing one can are also eligible for the allowances. If the upgrade of the CHP does not meet the good quality standard only a proportion of the allowance is available.

At present HM Treasury does not have robust figures for the amount claimed under this enhanced capital allowance either for individual technologies or collectively. However, for new incinerators with good quality CHP this is a significant subsidy.

4. Exemption from Business Rates for CHP

Conventional power generation is exempted from paying business rates. In March 2002 the Government extended this exemption to the plant and machinery used to generate electricity in all 'good quality' CHP sites. Heat supply plant and machinery are not included in the exemption. The benefit of this tax break to operators of incinerators with good quality CHP is 43 per cent of the rateable value of the plant and machinery which qualifies for relief.

Market support for incineration

Government support can also be provided by regulations that directly influence either prices or purchasing decisions in a market. In the energy market, two regulations affect incineration and associated technologies: the Non Fossil Fuel Obligation provides price support for incineration and the Renewables Obligation provides support for gasification and pyrolysis. In addition, in the waste management market producer responsibility laws have an effect, particularly the Packaging Regulations.

1. Non Fossil Fuel Obligation (NFFO)

Under this scheme, the operators of proposed electricity generation sites that used non-fossil fuels could bid to benefit from enhanced prices for the electricity generated. Electricity generated by incineration qualified for NFFO. The system operated as a series of bidding rounds and was established in 1989 Electricity Act. The average subsidy delivered was between £0.02 and £0.025 per kWh.[12] The most recent NFFO rounds saw reduced levels of support.

NFFO has had a significant impact on the economics of incineration. For electricity generation of 500kWh per tonne of municipal waste the enhanced price under NFFO contracts was equivalent to £10 per tonne of waste at 2p/kWh, and £5/tonne of waste at 1p/kWh. Some NFFO contracts have not expired and therefore the scheme continues to support incineration.

2. Renewables Obligation

The Renewables obligation succeeds the Non Fossil Fuel Obligation. Established through the Utilities Act, it requires electricity suppliers to obtain 3% of their power from renewable sources by 2003 and 10% by 2011.

Incineration is excluded from the Renewables Obligation. However, related technologies such as gasification and pyrolysis are included along with anaerobic digestion. In the same approach as the Climate Change Levy only the proportion of the waste stream which is not fossil fuel or manufactured from fossil fuels (such as the majority of plastic) will be an eligible renewable resource.

The reasoning for including pyrolysis and gasification does not follow a consistent rationale. The statutory consultation suggested that incineration of mixed waste was excluded because of the potential for conflict with waste management objectives. The same potential conflict exists for gasification and pyrolysis. Further questioning of DTI officials suggests that the reason for including them was to promote these waste treatment processes as new renewable energy technologies. This reasoning makes the potential for conflict with waste management objectives even greater.

The level of support that the Renewables Obligation will provide to gasification and pyrolysis will depend on the potential for electricity generation from the non-fossil fuel derived fractions of waste, and the buy-out price for renewables obligation certificates (ROCs). The ROC buy-out price is currently 3p/kWh. The figures in Table 5 summarises the revenue available from the sale of ROCs per tonne of treated waste. It assumes that the calorific value of the biomass fraction of waste going to gasification and pyrolysis is 60% in the absence of quality source separation systems, and 40% with intensive source separation.[13]

Table 5: Revenue from sales of ROCs (sold at buy-out price) by treatment

Treatment	Total Electricity Delivered (kWh)		Proportion of Energy from Biomass		Revenue Per Tonne of Waste Treated from Sales of ROCs	
	Low	High	Low	High	Low	High
Anaerobic Digestion	81	176	100%	100%	£2.43	£5.28
Pyrolysis	200	400	40%	60%	£2.40	£7.20
Gasification	500	600	40%	60%	£6.00	£10.80
Incineration (NFFO and Locational Flexibility, 1p/kWh)	450	550	40%	60%	£1.80	£3.30

This level of support for gasification and pyrolysis are likely to reduce costs significantly. It will also have two perverse effects:

- when trade offs are made in the design and operation of these technologies between power and heat, this system will place a premium on the generation of electricity as opposed to heat which could act to deter installing viable CHP plants.
- as with the Climate Change Levy exemptions, the more biomass that is treated the greater the financial support can be claimed. This installs an incentive in direct contradiction to the European legislation which is driving minimum levels of biomass in residual waste streams. With an incentive of around 3p per kWh (or above), this is a rather more significant issue than the 0.43p/kWh exemption under the Climate Change Levy.

At present there are few plants that can register for the obligation but in future this is likely to be an important issue. It will be the responsibility of Ofgem to ensure that certificates are issued only against electricity derived from renewable sources.

3. Packaging Recovery Notes

Recycling and recovery of waste from packaging is covered by the Packaging Regulations, which embed a form of producer responsibility. The Packaging Regulations contain material specific recycling targets, a general recycling target and a recovery target which can be met by recovery of energy rather than the recovery of materials. A system of compliance certificates, called Packaging Recovery Notes (PRNs), is in operation to provide evidence that obligated companies are meeting these targets. All PRNs are issued by the organisations which run the recycling or energy from waste schemes.

Incinerator operators in the UK can issue and therefore sell PRNs for 19% of the municipal waste they burn. In other words, it is assumed that this proportion of the waste is packaging waste. Revenue from the sale of PRNs reduces the net costs of operating incineration plant.

In 2002, of the 4.96 million tonnes of packaging accepted for recovery and recycling, just over 584,000 tonnes were recovered using energy from waste. Energy from waste PRNs accounted for 8.7% of the total costs of the Packaging Recovery Notes scheme and incineration accounted for more than 90% of these.

Recovery PRNs are not in general less valuable than recycling PRNs, even though the value of the energy recovered is less than the value of materials recycled. The average PRN price for 2002 (for mixed packaging for energy recovery) was £22.90 a tonne. Since a £22.90 PRN can be set against 19% of the input, the level of support is equivalent to £4.35 for each tonne of mixed waste incinerated[14].

This is not a public subsidy; it is a regulation that requires firms producing packaging waste to make payments to incinerator operators. It is an extremely easy 'rent' for incinerator operators to capture. Its only effect is to make the price of incineration cheaper.

Public subsidy through the Private Finance Initiative

A specific strand of the Government's Private Finance Initiative applies to waste. Since November 1996, the Government has encouraged use of PFI by paying additional revenue support (now known as PFI Credits) to schemes approved by the nominated Project Review Group. These are essentially a form of grant, based upon the capital expenditure element of the project.

£220 million in PFI credits has been made available to local authorities through this mechanism for the period covered by The Strategic Spending Review (2001/2 – 2003/4). The PFI credits for waste are to be £50 million in 2001/2, £70 million in 2002/3 and £100 million in 2003/4. These are usually paid to local authorities in instalments through the usual rate support grant regime to cover the cost of new capital expenditure required as a result of the PFI project.

The major problem with PFI Credits in waste management has been its bias toward capital heavy options for waste management. Because the choice in waste management is made from a range of approaches that differ considerably from one another, including in terms of capital expenditure, the mechanics of the PFI scheme can skew decision making[15]. Incineration is a capital intensive option compared to recycling and composting. Of the first eight waste projects to attract PFI support, seven included incinerators and none supported recycling and / or composting of *source separated* materials in isolation.

Partly in response to the criticisms levelled, new guidance on PFI for waste management projects was released in September 2000.[16] This set out, amongst other things, the requirement that proposals including incineration must demonstrate that all opportunities for recycling have been considered first and that there is no barrier to the future development of recycling.

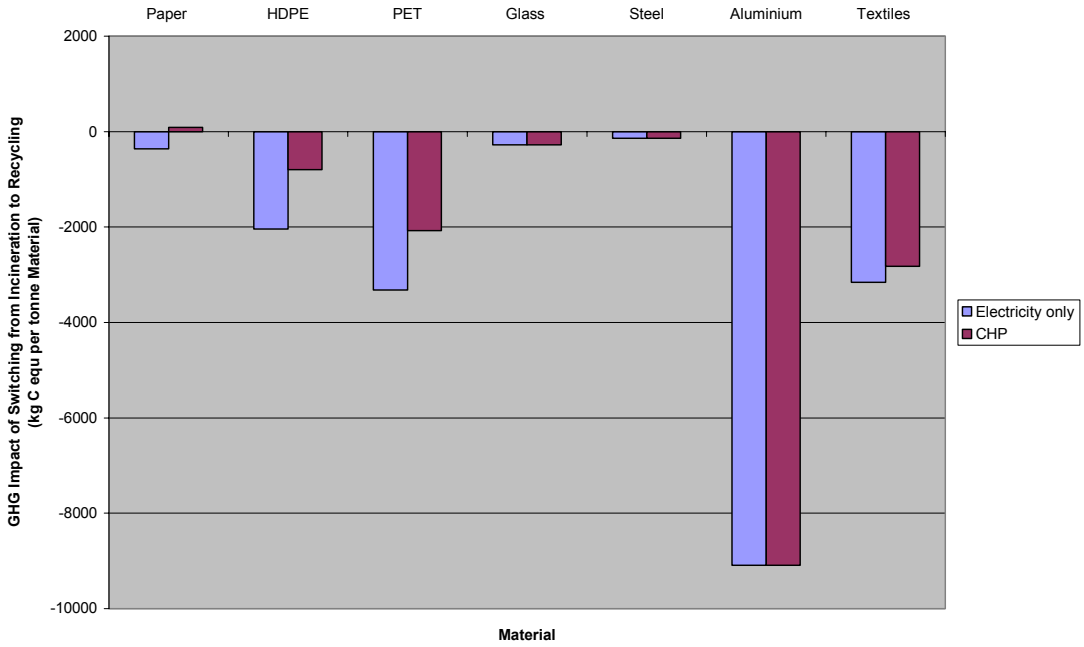
Subsequent schemes proposed in Berkshire and West Sussex, which support source-separated recycling and composting, indicate that the new guidelines may be having a positive effect[17]. More recently, DEFRA appears to have used PFI Credits to obtain leverage over the direction which a strategy for waste management is taking. This is another positive development but it does show that PFI Credits, in themselves, do not help to move waste management in a positive direction. If these Credits are effectively being used to bribe the recipients to change what they would otherwise have done the question has to be asked whether this is the most effective policy.

A perverse approach to climate change

In terms of climate change, the existing subsidies for incineration outlined above make little sense. They focus only on the supply and use of electricity, failing to consider the savings in energy to be made through the efficient use of embodied energy in materials.

If there is a climate change rationale for supporting energy recovery, there is a stronger one for supporting recycling, though at different levels for different materials. Figure 1 indicates, by material, the levels of reductions in greenhouse gas emissions that would result from switching from incineration to recycling.

Figure 1: Climate change impacts of switching from incineration to recycling[18]



The Environment, Transport and Regional Affairs Committee of the House of Commons has recommended that waste to energy technologies are not regarded as sources of renewable energy.[19] European law supports this view: Directive 2001/7/EC on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market states that "the incineration of non-separated municipal waste should not be promoted under a future support system for renewable energy sources, if such promotion were to undermine the (waste) hierarchy".

The case for keeping these tax breaks and support measures for incineration and other thermal technologies is further weakened by the fact that regulation is demanding increasingly high standards of energy efficiency and heat recovery from them. Both the Incineration Directive and the Integrated Pollution Prevention and Control Directive demand that waste heat is recovered.

Conclusion

The current system of tax breaks and exemptions benefit energy from waste to the tune of at least £11.17 a tonne; more if you include the value of PFI credits and NFFO contracts (see Table 6). There are two problems with this system:

- the benefits of energy from burning waste as a renewable energy have been internalised economically, while the benefits of energy from recycling have not been internalised;
- the costs (or negative impacts) of energy from waste have not been internalised.

Table 6: Available support for energy from waste incinerators.

Source of support			£ Per tonne
Climate Change levy exemption			1.00
CHP			1.00
Capital allowances			Not estimated
Renewables Obligation	Pyrolysis 2.4 – 7.2	Mean 4.8	Range 1.3 - 8.4
	Gasification 6.0 – 10.8	Mean 8.4	
	Incineration 0.9 – 1.7	Mean 1.3	
Packaging regulations			4.35[20]
NFFO contracts			Not estimated
PFI credits			Not estimated
TOTAL			**7.65 – 14.75**

It is clear that a perverse situation exists whereby the energy saved through incineration is treated more favourably, in economic terms, than the energy saved through material recycling. This calls for two actions by Government:

- **Economic support for recycling**

If the Government is to maintain existing price supports and exemptions for 'renewable energy' (including energy from residual waste treatments) then, for consistency, some form of equivalent support for recycling and composting ought to be implemented. The subsidy could include enhanced capital allowances for reprocessing technologies.

Table 7 calculates the levels of support for recycling that would be needed. It is calculated by taking the figures for the energy saved by recycling (in Figure 1) and attributing to this the costs savings that renewable energy (including energy from waste) is granted for displacing fossil fuels.[21]

Table 7: Cost of support per tonne of material recycled

Material	Energy saved per tonne recycled [22]	Cost of support per tonne recycled
Aluminium	53,000 kWh	£622
Textiles	15,000 kWh	£217
Steel	4,700 kWh	£102
PET		£121
HDPE		£34
Paper		£41
Glass	900 kWh	£17

The net effect on a typical tonne of recyclables collected on a kerbside round would be to increase the revenue from materials sales by somewhere between £40 and £50 depending upon materials mix.[23]

The Government currently subsidises the recycling of municipal waste by £29 a tonne through the Waste Minimisation and Recycling Fund.[24] However, the Government has set targets for recycling to increase to 25% by 2005. In addition, municipal waste arisings are also increasing by around 2.5% a year. Therefore, by 2005 we should be recycling at least 7.4 million tonnes. This suggests that the Government needs to provide direct subsidies for local authority recycling (based on £40-50 a tonne) by between £296 million and £370 million a year. This is equal to an additional £182m – £256m a year.

- **A tax on incineration**

There would also appear to be a rationale for a tax on incineration. Existing energy policy works to internalise the benefits associated with energy recovery. However, as we have shown, incineration has its negative external costs as well (see Table 2 for the external costs of incineration). Taking account of these costs would suggest that a tax on incineration of around £10 per tonne is justified. The tax would be relatively high for non-CHP facilities and lower for those that generate CHP.

The fact that emissions from plant vary so much with the specification of flue gas emissions control also makes clear the rationale for tighter implementation of standards (through IPPC) or the inclusion of incineration within a wider tax or emissions trading scheme for key emissions such as NOx, SOx and particulates.

As yet, government policy has policy internalised all the benefits of energy from waste but failed to clamp down on its external costs. It has also failed to internalise any of the benefits of recycling. Comparing the external costs of incineration with the external benefits of recycling, the differentials between recycling and incineration are potentially enormous. The resort to piecemeal funding of source-separated recycling through diverse pots of money creates a culture of bidding for money, with no real incentive to make use of it in the most efficient manner. Getting the incentive structure right would help enormously.

With tradable permits for landfill diversion on the horizon, the logic which has recommended using permits as a 'least-cost' approach suggests that local authorities are being encouraged to choose the least-cost options. With this change now imminent, there is no more important time to rectify the raft of perverse incentives implemented through energy policy which fail to take account of the linkages that exist in a wider resource management policy.

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4 Community Recycling Network (2002) Maximising Recycling Rates; Tackling the Residuals.

5 DTI, 'Evolution in Electricity Generation by Fuel Source 1998-2003'.

6 COWI (2000) A Study on the Economic Valuation of Environmental Externalities from Landfill and Incineration of Waste, Final Report for DG Environment, European Commission; Hogg et al (2000) Beyond the Bin: The Economics of Waste Management Options, Wastewatch.

7 This figure seems quite high given that it implies, on a rough calculation, some 4.1 million tonnes of waste input. However, the input of commercial and industrial waste to the sites may make this the level of input at what are mainly municipal waste facilities.

8 AEA Technology (2001) Waste Management Options and Climate Change, European Commission.

9 Available from the CHP Quality Assurance website, http://www.chpqa.com/html/notes.htm

10 Presumably, one might, in any case, legitimately claim that any incinerator generates 'space heating'.

11 Cambridge Econometrics (2002) Modelling Good Quality Combined Heat and Power Capacity in the UK to 2010, Final report to DTI and DEFRA, May 2002.

12 Based on ESD (2000) *Going to Waste: How Public Subsidies go to Incineration Rather than Offshore Wind Power*, Report for Greenpeace, UK, London: Greenpeace UK.

13 The mechanism by which OFGEM will calculate this is set out in '*The Renewables Obligation – OFGEM's Procedures*' which can be found on the OFGEM website (http://www.ofgem.gov.uk/renewables/renewables_obligation.htm). It is far from clear that this is a sufficiently rigorous testing process and without proper sampling methods for the input material, this type of approach is likely to lead to some abuse of the system. There seems to be little appreciation of issues such as seasonality of waste streams, or the potential for simply manipulating samples. Without adequate guidance for the sampling process and its subsequent independent testing (with the independent testers also subject to scrutiny), it is not unlikely that some manipulation or selective extraction of the samples will occur so as to increase the component of the energy generated which is deemed to arise from renewable sources.

14 Based on average PRN price during 2002. http://www.letsrecycle.com/prices/prnArchive.jsp

15 D. Bulman (2000) Exploring the Private Finance Initiative as a Route to Finance for Renewable Energy Projects, ETSU K/BD/00216/REP.

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17 Even here, there are almost bound to be grey areas precisely because the definition of composting remains unclear.

18 Smith, A., K. Brown, S. Ogilvie, K. Rushton and J. Bates (2001) Waste Management Options and Climate Change, Final Report to the European Commission, DG Environment, July 2001.

19 Environment, Transport and Regional Affairs Committee's Fifth Report on Delivering Sustainable Waste Management HC36-I 21st March 2001.

[20] Based on average PRN price during 2002. http://www.letsrecycle.com/prices/prnArchive.jsp

[21] We estimate this, conservatively, as 3.43 per kWh – the sum available through ROCs and CCL exemptions – per 500g carbon, the approximate emissions of carbon per kWh electricity generated from gas-fired generation. The 500g figure is not so far from the life-cycle emissions of the average mix in the UK. We calculate this to be of the order 550g / kWh (global warming potential over 100 years in CO2 equivalents). For gas, the figure is of the order 470g/kWh although some source place this as high as 767g/kWh over the whole life cycle.

[22] GEMIS Database (maintained by Oko Institut, Darmstadt, Germany) for metals other than steel; IISI Life Cycle Inventories for steel; and Smit, A, K Brown, S Ogilvie, K Rushton and J Bates (2001) Waste Management Options and Climate Change, Final Report to the European Commission, DG Environment, July 2001.

[23] A full analysis of the external costs of recycling would need to be reflected. However, cost-benefit analysis of waste is an imperfect art because some costs, such as the global impacts on habitat loss and the livelihoods of mining communities in developing countries, are not taken into account.

[24] The Waste Minimisation and Recycling Fund amounts to £114m in 2003-4. The latest available recycling data from Defra indicates that 3.9 million tonnes of waste was recycled in 2001-2. See footnote 1.