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Wood Waste Landfill Restrictions in England: Call for Evidence

Summary of Responses

February 2013

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Introduction and background

The 2011 Review of Waste Policy in England announced Government's intention to consult on introducing a restriction on the landfilling of wood waste in 2012. In July 2012, we launched a consultation in the form of a Call for Evidence on restricting wood waste to landfill. The Call for Evidence invited views on the management of wood waste and measures to divert wood waste from landfill. The Call closed on 28 September.

This report summarises responses to the Call for Evidence (CfE). The report does not seek to offer an opinion on the comments received. In writing this summary, we have tried to reflect the views of and mainly used the language/terminology of the respondents. Evidence from the Call will improve the evidence base and help develop policy options. Our aim is to ensure wood waste is managed in a way that delivers the best outcome for the environment and the economy.

Summary of responses

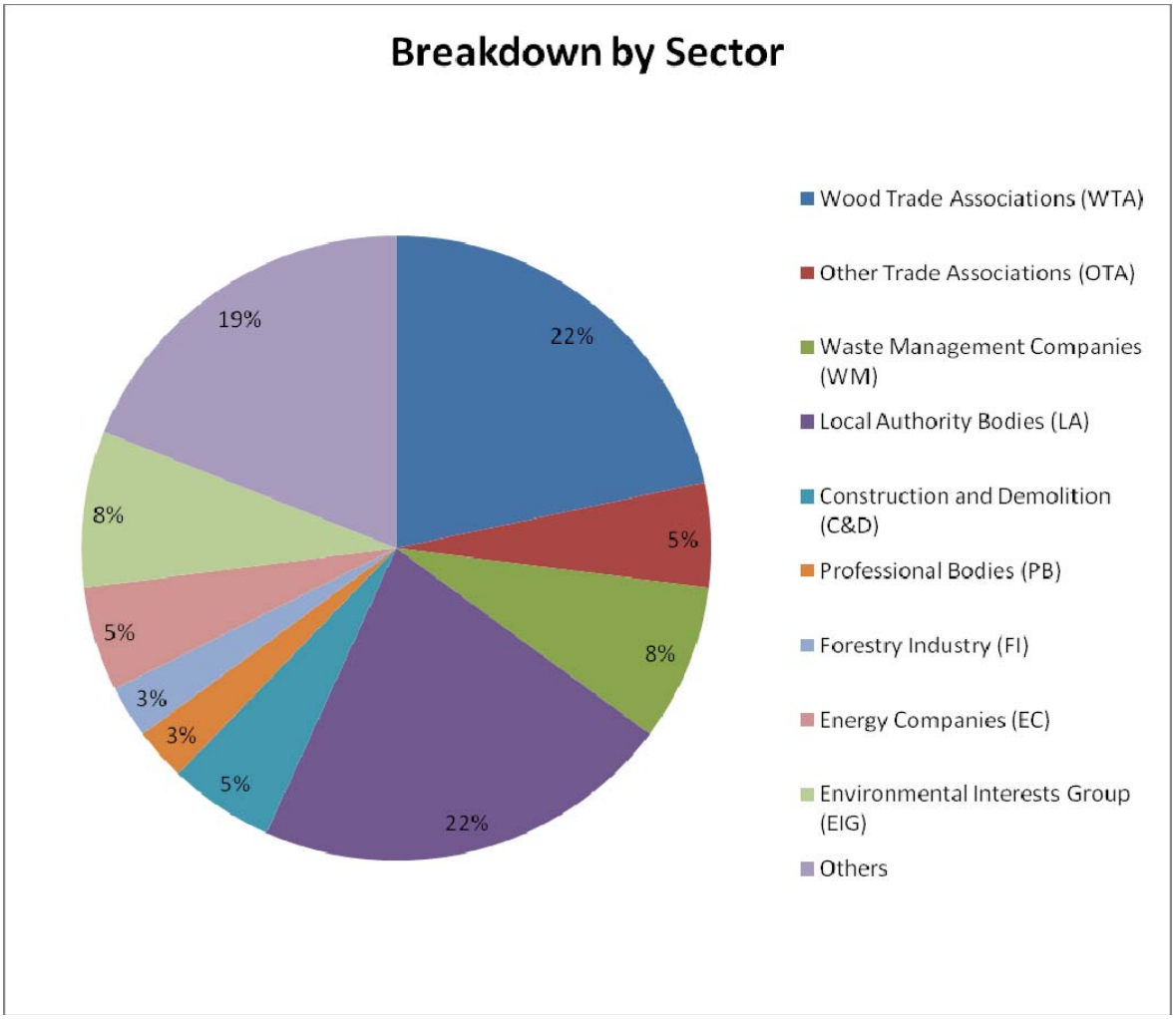
The summary of responses sets out numbers of responses received, and the types of organisations who responded by sector, but does not attribute specific comments to individuals or organisations.

This summary is organised by question.

Breakdown by sector (more detailed list can be found at annex A)

37 responses were received to the call for evidence. 8 responses from wood trade associations (WTA), 2 responses from other trade associations (OTA), 8 responses from local authority bodies (LAs), 2 responses each from energy and construction and demolition (C&D) companies, 3 each from Environmental interest groups (EIG) and waste management (WM) companies, 1 response each from the forestry industry and a professional body and 7 from “others” consisting of companies and individuals with interest in wood waste.

The pie chart below shows the breakdown by sector in more detail.



Question 1: Do you know of any reasons why any of these types of wood waste, or any others should not be included in any potential restrictions?

Who responded?
24 responses. 7 wood trade associations, 1 other trade association, 5 LA bodies, 2 waste management companies, 2 construction and demolition, 2 energy companies, 1 environmental interest group, 1 forestry industry and 3 "others".

How they responded

Wood trade associations (2 responded yes, 3 responded no and 2 did not indicate a choice)
Those who responded yes would like to see all types of wood waste included in a restriction although clarity on the definition of 'waste wood' is necessary. For them and for those who responded no a particular issue was that by-products such as sawmill products should not be considered waste as per Defra's Definition of Waste Guidance.

One WTA responded neither yes or no to this question but thought that before any ban is put in place on low grade wood there needs to be sufficient biomass potential in the UK to deal with treated, laminated chipboard etc.

Other trade associations (1 responded yes)
One other trade association is in support of diverting all wood waste from landfill as long as alternative cost effective management options can be identified. It identifies wood treated with halogenated compounds, paints or lacquers as less straight forward and concludes that WID[1]-compliant power plant capacity would be needed otherwise such materials may need to be exempt from any restriction.

LA bodies (4 responded no, 1 responded yes)
Whilst one LA body didn't see any reason why the types of wood waste mentioned should not be included, they felt that greater detail is required to aid understanding of the implications, for example, on whether waste made up of composite materials such as an upholstered chair would be in scope.

[1] **Waste Incinerator Directives:** http://www.environment-agency.gov.uk/business/regulation/31969.aspx

One LA body stated that a landfill ban on its own will be ineffective in driving change and that consideration should be given to increasing landfill tax beyond 2014/15 accompanied by a phased introduction of a complete ban on biodegradable waste. Another LA felt that fiscal incentives and quality standards are beginning to align to increase opportunities for the reuse, recycling and recovery of wood waste.

Another was of the view that appropriate (particularly reliable landfill alternatives) infrastructure needed to be in place first before including all wood waste in a restriction.

In addition, the only LA body who responded yes stated that consideration should be given as to whether the cost and practical implications of restricting certain materials within the 'wood waste' definition are justified by the associated benefit. They also pointed out that the practicalities of applying such restrictions may be easier if more (or all) wood waste materials are in scope.

Construction and demolition (2 responded yes)
The primary concern raised was the treatments on waste wood. They believe if the appropriate treatment or incineration facilities are not available for these types of wood waste then landfill may be the only option.

Waste management companies (2 responded no)
The waste management companies responded no but one was of the opinion that a distinction needed to be made between clean wood and contaminated wood waste if a landfill ban is to be considered. Their view was that markets exist for grade A and B wood waste, whilst grade C and D are more difficult to deal with. They stated that before a landfill ban can be considered the Government must give a clear indication of how it expects the low grade wood to be dealt with.

Energy companies (2 responded no)
One was of the opinion that the policy objective of reducing GHG emissions from waste wood should be fulfilled to the maximum and the implementation of the restriction should be simple.

Environmental interest groups (1 responded yes)
Concerns were raised about the practical implications of a ban covering wood from industrial sources, arboriculture and green garden waste. The respondent states that it is unclear how diverting waste wood from arboriculture and green garden waste would fit into the BAU. It notes that the waste wood data sources do not appear to include virgin wood waste from forestry or park and garden waste. They conditionally support a ban on biogenic waste to landfill.

Forestry industry (1 responded yes)
Responded yes but was of the opinion that a clearer definition of wood waste is needed.

Others (1 responded yes, 2 responded but did not indicate their preference)
One responded yes however was of the opinion that wood panel waste should not be treated as wood waste but treated separately. One respondent was of the opinion that all the wood wastes would need to be considered separately due to the different opportunities and threats that the streams pose, and that wood panel waste should not be treated as waste. One thought that legal clarity over which types of wood waste would be covered by any restrictions needed to be provided.

Question 2: Do you have any additional evidence that could improve our estimate of greenhouse gas emissions from wood waste in landfill?

Who responded?
16 responses. 6 wood trade associations, 4 LA bodies, 1 waste management companies, 2 construction and demolition, and 3 environmental interest groups.

How they responded

Wood trade associations (2 responded yes, 4 responded no)
One WTA did not have any evidence but refers to the use of wood waste for soil improvement/creation in land restoration. This would result in significant greenhouse gas emission savings when compared to both landfill and combustion due to carbon sequestration in soil organic matter and the soil microbial biomass, resulting in locking in of carbon in soil for hundreds of years.

One WTA did not have any evidence but mentions that it is essential that only waste wood which could not have been reused or recycled should be incinerated. Energy plants will naturally gravitate towards the cheapest and easiest material to use – namely, uncontaminated wood – unless specific measures are put in place to focus incentives (and restrictions) around contaminated wood.

One WTA made reference to journals (see list at Annex B question 2).

One WTA referred to various studies that cover the behaviour of wood in landfill (see list under Annex B, question 2). They believe that there is evidence that although the cellulose and hemicellulose components of wood can degrade under anaerobic landfill conditions, the lignin component does not. As the cellulose and hemicellulose components are embedded in the lignin, they are afforded a degree of protection

against degradation. To understand fully the behaviour of wood in UK landfill and the implication for greenhouse gas emission, there is a need for research to be undertaken.

LA bodies (3 responded no, 1 responded yes)
Two LA bodies cited a report on Zero Wood Waste to Landfill which concluded that the highest carbon benefits are obtained from disposing of waste wood through Energy from Waste routes particularly for the more contaminated waste wood.

Another LA body thought that the overall environmental impact (not just GHG emissions) from restricting wood waste to landfill should be considered including the resource depletion value of wood. The issue of carbon sequestration was mentioned and reference was made to a UNEP report. See Annex B, question 2 for the cited report and studies.

One LA body referred to two studies; one on wood products and the other on protocol for the quantification of greenhouse gas emissions from waste management activities (see Annex B, question 2 for the relevant table and websites)

Waste management companies (1 responded no)
One WM company was of the opinion that carbon emissions of wood to landfill seem to have been overestimated (and rates will be slower given diversion of organic materials from landfill).

Construction and demolition (1 responded yes, 1 responded no)
See Annex B, question 2 for sources provided.

Environmental interest groups (3 responded yes)
One environmental interest group is of the opinion that there is ample evidence that the rate of decomposition of wood under anaerobic conditions in landfill is very limited in comparison with the assumptions adopted in WRATE[2]. See Annex B, question 2 for listed sources.

One environmental interest group believes the issue of methane capture rates from landfill is controversial. Without robust monitoring data over the course of the lifetime of UK landfills, no direct determination of actually captured methane can be made. 75% capture rates are not necessarily excessive; however, these rates are high in comparison to rates in other European countries with Germany and Italy reporting

[2] WRATE – Waste and Resources Assessment Tool for the Environment: http://www.environment-agency.gov.uk/research/commercial/102922.aspx

recovery rates closer to 50%, and Sweden and Denmark reporting recovery rates closer to 25%.

One environmental interest group highlighted that many landfill sites burn the methane, which produces carbon dioxide. However it states that methane production is slow, particularly if the wood is treated with preservatives. This can be compared to the carbon dioxide emitted from a biomass incinerator. Carbon dioxide is a more serious greenhouse gas than methane. They state that burning wood produces 50% more carbon dioxide than burning coal and 330% more carbon dioxide than burning natural gas.

Question 3: Do you agree that approximately 0.6mt of wood waste is going to landfill in England?

Who responded?
20 responses. 6 wood trade associations, 1 other trade association, 4 LA bodies, 2 waste management company, 2 construction and demolition, 2 energy companies, 1 forestry industry, 1 others and 1 environmental interest group.

How they responded

Wood trade associations (2 responded yes, 1 responded no and 3 responded without indicating their preference)
One WTA estimates the figure to be 0.5mt for the whole of the UK, with between 350 and 400,000 tonnes for England. Much of what goes into landfill is Grade D (hazardous) which the wood recycling industry will not take, or is difficult to separate out from other materials, eg upholstered furniture. They are of the opinion that some research is needed first to establish how much wood is actually being land-filled and what it consists of.

One WTA has concerns about the statistics for the total quantity of wood in the waste stream if virgin timber is included in the calculations. There is a need to ensure the definition of waste wood corresponds to the data.

One WTA believes the estimate should be higher than 0.6mt but does not provide any further detail on this.

One WTA identifies that the UK timber industry contains a large number of small operators, which makes gathering accurate statistics on wood waste volumes difficult. However, based on the recently published WRAP report - The Business

Case for Wood Waste Collection Hubs (2012) believes 0.6 million tonnes per year of wood waste to landfill for England alone is a plausible figure.

Related to question 1, one WTA is of the view that sawmill products (wood chips, sawdust and bark), arising from primary conversion of logs should not be considered waste.

Other trade association (1 responded yes)
One other trade association is of the opinion that uncertainty exists in the estimation of quantities of wood waste being landfilled in England. The uncertainty of the estimate should be stated so that policy decisions can take this into account (lower and upper bound analysis).

LA bodies (1 responded yes, 1 responded no)
One LA body suggested that the figure could be an overestimate as there is no evidence or data to base the exact figure on. It was suggested that the definition of wood waste could have an impact.

One LA body estimates that their collected residual wood waste is around 2% of household waste (equivalent to approximately 230K tonnes if extrapolated nationally). This is higher than the figure of 150K presented for household waste.

Waste management companies (2 responded yes)
One WM company believes the tonnages mentioned are accurate whilst the other is unable to provide any information that suggests otherwise.

Construction and demolition (2 responded no)
Two C&D companies refer to various studies on wood waste going to landfill (see Annex B: question 3 for listed studies). They believe a figure of 62, 778 tonnes show a significant amount of mixed waste going to landfill with approximately 20% of this is likely to be wood. If this is taken into account this would mean that the wood waste going to landfill in 2010 is around about 200,000 tonnes.

Energy companies (1 responded yes, 1 responded no)
One energy company believes the figure is unreliable. They are also of the opinion that there are significant quantities of “unreported” wood waste used or tipped in unregulated and un-monitored applications, either fly tipping or informal usage.

One energy company agrees with the assessment that there is 0.6mt of wood waste going to landfill. They are of the opinion that there is not sufficient data available on the nature of this waste wood. This makes it difficult to assess how practical the application of the restriction would be and what sources of demand there will be for the diverted material.

Others (1 responded no)
One organisation from this category believes that the assessment appears to be an overestimate and includes informal markets.

Environmental interest group (1 responded no)
One environmental interest group is of the opinion that whilst the estimates vary upwards from 0.6mt, the uncertainty as to the actual tonnage is not a reason for not banning wood from landfill.

Question 4: Do you agree that wood waste is going to informal markets?

Who responded?
22 responses. 5 wood trade associations, 2 other trade associations, 4 LA bodies, 3 waste management companies, 2 construction and demolition, 1 forestry industry, 2 energy companies, 1 environmental interest groups, 1 professional body and 1 "others".

How they responded

Wood trade associations (5 responded yes)
Four agreed that informal markets exist. One WTA suggested informal markets include export and off-cuts given to employees and others in the community. Two suggested Bonfire Night with one of these providing an estimate of about 200,000 tonnes of waste wood burned on Bonfire Night in England. Other markets included unregulated chipping and spreading on land as bedding or compost and unregulated landfill.

One WTA was of the opinion that wood waste is increasingly likely to go to informal markets to supply the increased demand for domestic fuel and small-scale biomass. It also noted that the timber processing industry is recovering co-products for manufacture of wood pellets. Another is of the opinion that the quantities involved in informal markets are relatively low. It considered that the burning of waste on-site and the use of waste wood in land recovery likely to account for the vast majority of wood being diverted to "informal markets".

Other trade associations (2 responded yes)
One other trade association outlined informal disposal routes including: consumed at source (burning in domestic and non-domestic boilers); burning in gardens, on farms and at "events"; and know of approximately 200,000 tonnes of waste wood burned on bonfire night in England; unregulated chipping and spreading on land as bedding or compost; and unregulated landfill.

One other trade association believes that the burning of waste on-site and the use of waste wood in land recovery is likely to account for the vast majority of wood being diverted to “informal markets”.

LA bodies (3 responded yes, 1 didn’t indicate a choice)
One LA body stated that evidence suggests that small quantities of wood e.g forestry residues are left in situ or used as land spread to reduce disposal costs.

One LA body believes that without a clear definition of informal markets it is impossible to offer a definitive list of these markets. They are of the opinion that informal markets include a certain amount of reuse, in and between organisations, as well as reuse at home, home composting and home burning.

One LA body believes that some waste wood is being used as landfill engineering or cover – this appears in national statistics as landfilled MSW rather than separately identified as wood waste.

One LA body is of the opinion that there is no evidence to support the statement that wood waste is going to informal markets.

Construction and demolition (2 responded yes)
One C&D company has used a third party who either sells, re-use for furniture or if in poor condition sends to energy recovery. Over a period of three year they collected over 1000 tonnes of onsite waste wood. None has gone to landfill.

One C&D company gave examples of the destinations of their wood waste as community wood recycling projects such as (www.communitywoodrecycling.org.uk)(www.educationforall.com); Greenworks (www.green-works.co.uk); and Emmaus (www.emmaus.org.uk)

Energy companies (1 responded yes, 1 did not indicate a choice)
One energy company is of the opinion that informal markets exist in the form of on and off site combustion either for process heat or simply disposal, paving and localised land recovery, composting, domestic fires and stoves fly tipping, and in mixed loads to landfill.

One energy company believes that volumes of wood waste going to informal animal bedding markets (such as cattle rearing) and land reclamation has not been accounted for because it is an area that is not closely monitored. They believe other disposal routes that can explain the unaccounted volumes includes Guy Fawkes celebrations, gate fee avoidance by burning of waste wood on demolition and construction sites and the incorporation of waste wood with sewage sludge for

agricultural fertiliser. In addition, some wood waste will be lost in mixed waste loads which will be difficult to quantify.

Forestry industry (1 responded yes)
One forestry industry representative believes that clean solid wood are given away as “wood off-cuts for fuel” similarly, shavings from small joineries/furniture producers are occasionally given for free to poultry smallholders. These are small in volume and typically supplied by small scale companies, mostly in the rural areas.

Others (1 responded but did not indicate a choice)
One organisation in this category is of the opinion that it is likely that informal markets do exist but there is no evidence as to the extent of the initiatives.

Environmental interests group (1 responded yes)
One environmental interest group stated that there are numerous adverts for the sale of second-hand wood. They refer to the BWF’s (2010) 'Joinery, a Resource Efficient Action Plan' which offers some relevant data on the deployment of off-cuts and machine waste.

Professional bodies (1 responded but did not indicate a choice)
One professional body would be interested in an explanation of how the remainder is used in land recovery as stated in the Call for Evidence.

Question 5: What other sources of evidence on a) wood waste arisings and b) wood waste management routes are there?

Who responded?
14 responses. 3 wood trade associations, 5 local authority bodies, 2 “others”, 1 energy company, 2 construction and demolition and 1 environmental interest group.

How they responded

Wood trade associations (3 responses)
Related to question one. One WTA was concerned that sawmill by-products is defined in the Call as wood waste but it should not be considered waste. They are of the view that if this type of wood was counted in the wood waste arisings figures then it will not provide a full picture of the state of this market. They are not aware of any of this type of wood going to landfill.

One WTA provided data on the tonnages collected by their network across the UK. They collect nearly 10,000 tonnes a year (20% of which is made available to the

public as second hand timber and timber products. This waste arises largely from the construction industry.

One WTA is content that the main sources of data on wood waste have been identified.

LA bodies (5 responses)
Three of the LA bodies gave wasteflowdata as their source of information. One LA body supported their response with some other evidence such as the compositional analysis of residual waste conducted between autumn 2009 and summer 2010. The compositional analysis showed;

- Average proportion of wood waste in kerbside residual waste across all four seasons: 3.5% (or ~4,500t wood / 130,000t total residual)
- Average proportion of wood waste in Recycling and Household Waste Sites residual waste across all four seasons: 15.8% (or ~3,200t wood / 20,000t total residual). See note[3]

In addition to using WasteFlowData, one LA body provided evidence gathered through a composition study (residual and recycling collections) which identified estimated treated wood (any painted or treated wood) arisings of 0.11kg/hhld/wk with 0.09kg/hhld/wk from residual waste. Untreated (untreated recyclable wood, DIY off cuts, boxes, fencing, shelves) arisings were 0.02kg/hhld/wk and mainly found in residual waste with a smaller amount in garden waste collections. As a proportion untreated wood made up 0.14% of total kerbside collected household waste. Over the 2010 study waste wood arisings made up 3.7% of HWRC residual waste including MDF and chipboard material. For 2010/11, residual HWRC arisings were 62,223 tonnes, so an estimate of 2010/11 HWRC residual waste wood arisings for Merseyside and Halton can be made of ~2,300 tonnes. Waste furniture arisings made up 9.4% of arisings in the HWRC study but there are no separate estimates for wooden furniture.

Others did not comment further.

Energy companies (1 response)

One energy company believes that existing data is unreliable but that setting up more energy recovery markets will lead to better recovery and better data management.

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[3] **Note:** Mixed wood separation was already being undertaken at the time of the survey. These figures include wood and cork (packaging and non-packaging), kitchen units, furniture (reusable and non-reusable), and green and woody garden waste from residual waste only.

Construction and demolition (2 responses)
C&D companies are likely to have national agreements with other organisations that will collect all types of wood waste either to be sold on or used to make new furniture. Any waste wood found to be poor condition is sent for energy recovery thereby avoiding it going to landfill. NCWRP have collected 1000 tonnes of waste wood from various sites over a period of three years.

Others (2 responses)
One respondent cited a study by BRE for Defra (2012) which needs to be validated.

Question 6: Will planned facilities be sufficient to deal with wood waste diverted from landfill?

Who responded?
20 responses. 4 wood trade associations, 1 other trade association, 3 local authorities, 3 waste management companies, 2 energy companies, 2 environmental interest groups, 2 construction and demolition, 1 forestry industry and 2 “others”.

How they responded

Wood trade associations (3 responded no, 1 did not indicate a choice)
Three WTA responded no and did not provide further comments. One responded and was of the opinion that it is unlikely the UK demand for waste wood will exceed supply for at least 5 years because the number of biomass plant projects completed in recent years is small. In addition, they believe that the expected 2014 level of demand is sufficient to consume all waste wood generated north of the southern Midlands. However, Southern England remains heavily reliant on export to mainland Europe. The response flags that there are a number of proposed facilities in the planning and financing stages of development, and should these all become operational there would be a large excess demand for waste wood, easily consuming any material which may be land-filled today. The response mentions that the number of biomass plant projects which have come to fruition in recent years is small and believes that changes in the ROC regime combined with the challenges of raising project finance mean that is highly unlikely that UK demand for waste wood will exceed supply for at least 5 years, perhaps more.

LA bodies (2 responded yes, 1 responded no)
No further detail provided

Waste management companies (1 responded yes, 2 did not indicate their choice)
One WM company indicated yes whilst 2 others stated they believe that there won't be enough capacity if a landfill bans where to be put in place in the future. Moreover, the specifications for future plants should be able to handle a more diverse range of wood grades including lower grade wood streams.

Construction and demolition (2 responded no)
Energy companies (1 responded yes, 1 responded no)
Forestry industry (1 responded yes)
No further details provided from these groups

Environmental interests group (1 responded no, 1 did not indicate its choice)
One environmental interest group responded no to this question because it felt that the data gaps do not give it the confidence to respond. However, they believe that the diversion of wood from landfill will result in further capacity and possibly export opportunities. Conversely, if additional capacity is brought online to handle waste wood then existing capacity could cease operation to avoid overcapacity and inefficient recovery.

One environmental interest group believes that wood waste diverted from landfill will create opportunities to ensure that already projected renewable heat installations can provide the necessary infrastructure. They are of the opinion that opportunities will be created for WID compliant heat only biomass boilers which could use a wide range of feedstocks including all treated timber. This would take away the need for sorting of C&D waste and could also process wood from civic amenity sites that contain a higher proportion of contaminated (treated) wood waste. In addition, they believe this type of plant could be an important element in an energy centre serving a site wide power and hot water system in larger new developments as they reduce emissions towards zero carbon and reducing cost.

Others (2 responded but no indication of their choice)
One respondent was of the opinion that planned facilities won't be sufficient to deal with wood waste diverted from landfill. The other was of the opinion that planned facilities could take most of the wood waste in the UK moving waste down the hierarchy from reuse and recycling as the market price for energy recovery could dominate the marketplace without similar incentives that value embodied carbon as well as those that incentivise lower carbon electricity generation.

Question 7: Is it likely that export supply will be diverted to UK facilities?

Who responded?

21 responses. 5 wood trade associations, 2 other trade associations, 3 local authority bodies, 2 waste management companies, 2 construction and demolition, 2 energy companies, 1 forestry industry, 1 environmental interest group, 1 professional body and 2 “others”.

How they responded

Wood trade association (5 responded yes)

Although all the WTA responded yes to this question, one of which was of the view that getting the logistics right is vital. Most of the biomass capacity, existing or planned, is in the North. A high percentage of the wood waste is generated in the South. It makes more commercial sense to export from the South to Europe than to haul it to the north of the UK. Processed wood will usually go “where the money is.” One WTA responded yes to this question but did not provide supporting comments.

Other trade associations (1 responded no, 1 did not indicate their choice)

One other trade association is aware of a significant number of facilities for sorting and processing wood waste into refuse derived fuel (RDF) for UK and overseas use. This network is growing to support new supply contracts. However, they believe that the UK market is currently immature and not able to accept the variety of wood wastes to be recovered or recycled in the UK.

LA bodies (1 responded yes, 2 responded no)

No additional comments to support their answer.

Waste management companies (2 responded yes)

One was of the opinion that Government and the industry should discourage the export of wood waste.

Construction and demolition (2 responded yes)

No additional comments to support their answer.

Energy companies (2 responded no)

One energy company was of the opinion that as demand increases from the growth of the waste incineration sector the export supply market may be squeezed. However, increased UK demand will not necessarily reduce the export demand of c. 600k/t p.a. due to the logistical costs of moving waste wood within the UK. Also, it may well be that the additional wood reclaimed from landfill has a disproportionate

volume of low grade (C/D) that it is best suited to European markets where regulation is less stringent (for example biomass content requirements are lower).

Forestry industry (1 responded yes)
No additional comments to support their answer.

Environmental interest groups (1 responded yes)
One environmental interest group responded yes and was of the opinion that export diversion will depend on the commercial opportunities for UK exploitation and incentives.

Professional body (1 responded yes)
No additional comments to support their answer.

Others (1 responded but did not indicate its choice)
One respondent was of the opinion that evidence supplied shows that export supply will be diverted to UK facilities.

Question 8: Is there any risk that higher grade wood would be displaced from higher up the waste hierarchy to meet the 90% biomass required for ROCs?

Who responded?
16 responses. 4 wood trade associations, 1 other trade association, 2 LA bodies, 1 response from the waste management companies, 2 construction and demolition, 2 energy companies, 1 forestry industry, 1 environmental interest groups and 2 “others”.

How they responded

Wood trade associations (3 responded yes, 1 did not indicate its choice)
None of the three that responded yes to this question provided comments to support their choice.

One WTA is of the opinion that higher grades are unlikely to be diverted from high waste hierarchy applications specifically because of the 90% ROC limit on dedicated waste wood projects. However, diversion of material to biomass is a major concern for the panel-board industry, which sees an uneven playing field: panel-board grade wood being diverted into energy generation because of the financial impact of the government subsidy (RO). Wood from clean origins generally commands a higher market price and therefore is best considered as a substitute for virgin wood.

Historically most large biomass plants have purchased part of their feedstock from chipped round-wood to blend in to maintain the biogenic content. Most new large facilities are looking to be based around 100% Grade C waste wood. However, a potentially significant market for grade A exists in smaller scale non-WID facilities where fuel prices are more likely to be competitive with animal bedding and surface applications.

Other trade associations (1 responded yes)
LA bodies (2 responded yes)
Waste management companies (1 responded yes)
These groups provided no additional comments to support their answers.

Energy companies (2 responded yes)
One was of the opinion that if practices are poor, generators will be forced to increase their intake of higher grade materials to mitigate the risk of missing ROC eligibility criteria. The biomass content purity threshold for ROC eligibility should be revised down as 90% is a very high benchmark that may limit the most efficient use of biomass resource in the future. The percentage of low grade timber products such as MDF, which is difficult to recycle, will continue to grow and dominate the waste wood stream as more furniture products reach the end of their useful life. They believe that as demand for waste wood rises, and more contaminated fractions are recovered, biomass plant operators could be driven to use increasing proportions of virgin wood to ensure the purity threshold is met. They conclude that the Government needs to revisit the case for lowering the threshold to 85%. 85% is well clear of the biomass content for unsorted municipal solid waste (on average MSW in England contains 68% BMW (Defra, 2007)). This threshold would enhance efficiency and enable the industry to maximise use of waste-fuel grade wood.

Forestry industry (1 responded yes)
Provided no additional comments to support their answer.

Others (1 responded yes, 1 did not indicate their choice)
One was of the opinion that if the demand for wood exceeds supply then it would seem feasible that the higher grade wood would be displaced from higher up the waste hierarchy to meet the biomass required for ROCs.

One respondent refers to various studies and quotes (see annex B question 8)

- BigREc surveys (1998, 2007) and MiniREc survey completed for Defra (2012) which shows that the level of reuse of timber has fallen already.

Question 9: Do you agree with the 'business as usual' assessment above?

Who responded?
17 responses. 5 wood trade associations, 1 other trade associations, 4 LA bodies, 1 waste management companies, 2 from construction and demolition, 2 energy companies, 1 forestry industry and 1 environmental interest group.

How they responded

Wood trade associations (2 responded yes, 2 responded no and 1 did not indicate a preference)
One WTA did not indicate a choice but felt the assessment underestimated the impact of recession on wood waste arisings. They believe it should perhaps be in the region of 600,000 tonnes per annum in England. They concluded that it is likely that arisings will increase when the economy recovers.

Of the two WTAs that responded yes, one raised concerns that planned facilities may have an impact on the price of clean wood (because of a short fall in wood waste created by planned facilities). Virgin wood could become a source of electricity generation. In addition, they felt that exports of wood waste could continue especially in areas with no planned facilities. They believe the markets may become regionalised as it is not cost effective to transport wood waste over long distances. The other was of the opinion that any rise in Landfill tax and as the economic downturn continues companies are likely to look for the cheapest route to dispose of their waste.

Two WTAs responded no to the BAU assessment. One was of the opinion that in order for all wood to be diverted from landfill, the appropriate processing facilities/infrastructure needs to be in place for the lower grade material. This would likely be in the form of a network of WID compliant energy from waste units, with the capacity to accommodate a range of low grade combustible material locally. They concluded that establishing this infrastructure will require government support. The other felt that the economic growth and rate of development of WID compliant energy plant will significantly impact the rate of reduction. In addition they felt the recycling rates need to be protected from the move towards incineration of uncontaminated wood waste.

Other trade associations (1 responded yes)
One other trade association is of the opinion that the total quantity of waste wood disposed off via landfill is projected to decrease with time, with the rate of decline variable for different sectors that produce waste wood. They note that there are currently 159 operational installations (33 in planning stages) in the UK that fall

within WID. In 2011, 9 operational plant used recycled/waste wood as feedstock. They concluded that due to the existing incentives in place for renewable energy generation and landfill tax drivers, it is clear that demand for high quality waste wood shall exceed supply as they could potentially be burnt in either dedicated biomass plant or converted power plant which co-combust fossil fuel that do not need to be WID compliant. The demand for lower grades of wood waste is likely to be lower than supply (particularly Grade D) which could result in future problems for this waste stream, unless additional WID compliant incineration plant (with energy recovery) is built.

LA bodies (3 responded yes, 1 responded but did not indicate a choice)
One LA body believes that facilities planned in the UK are likely to be sufficient to deal with the volumes of waste wood diverted from landfill as the quantity of wood is small compared to the amount of planned waste capacity. Export of waste to countries such as Germany and Sweden can be prevented by uplifting the price paid for electricity/heat generated so that it is equivalent to that paid there. Some wood wastes have biomass energy content as low as 80%, so the 90% threshold cannot be met without mixing with higher grade wood. In addition, it was thought that government attention should be better focused on tackling biodegradable waste more widely.

One LA body was of the opinion that although waste production from household sources has been on the decline over recent years, there may be a reverse in this trend after the recession. It would therefore be dangerous to assume the continued decline in waste production without factoring in a 'boom rather than bust' scenario.

One LA body felt that the assessment appears robust, but landfill restrictions may not be the most effective additional policy instrument available. The merits of such available 'instruments' need to be assessed on the basis of specific materials within the wood waste and the sources of these.

One LA body did not indicate a choice but felt that clarity on the long term changes to landfill tax after it achieves the £80 per tonne level in 2014/15 is urgently needed to have any degree of confidence when estimating future wood waste levels (and indeed other waste streams). They concluded that uncertainty in the market place may make it difficult to procure medium or long term waste treatment options leading to a stagnation of diversion.

Waste management companies (1 responded yes)
One WM company responded yes and was of the opinion that there are likely to be end market problems in the short term. They have found that gate fees for grade C are being raised or recyclers are refusing grade C material and taking more of the

higher grade but the completion of the planned facilities should help redress the shortfall.

Construction and demolition (2 responded no)
Two C&D organisations disagree with the BAU assessment. Their view is that the industry has reduced the amount of wood waste produced/sent to landfill and this has been through adopting offsite construction and using wood recyclers to take away waste wood and using the pallet take-back scheme.

Energy companies (2 responded no)
Two energy companies are of the opinion that landfill tax, the end of LATS and a reduction in the ROC support levels for biomass generators are policy changes that could alter the BAU. Whilst they believe that a restriction could send a positive message to the sector, they also felt that monitoring and incentives would help enforce the value of wood waste as a commodity.

Environmental interest groups (1 responded yes)
One environmental interest group agreed with the assessment but believed that commercial incentives should drive the spread of highly efficient energy recovery in practice. They are of the opinion that if a ban is confirmed and implementation timescales set, planning for these developments can commence. They are of the opinion that there is uncertainty over the actual tonnages going to landfill and the BAU assumptions may be based on an under-estimate of benefits in some cases and over-estimates of benefits in others.

Forestry industry (1 responded no)
The respondent believed decline has been driven by reduced waste arising due to recession, export, the energy sector and RO subsidies.

Question 10: How do you see the wood waste producing sectors evolving to 2020 without further policy intervention? Please comment on sectors and treatment routes.

Who responded?
21 responses. 5 wood trade associations, 2 other trade associations, 5 LA bodies, 3 waste management companies, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (5 responses)

A number mentioned that as the economy improves so will the C&D and C&I industries and wood waste arisings will increase. One believed that segregation of wood waste will improve whilst another thought that improving procedures at Civic Amenities sites and MRFs will reduce the percentage of wood waste going to landfill via that route. Two mentioned the increase in plastic pallets replacing wood , more optimisation of packaging and the likelihood that more wood waste will be burnt on site to generate heat all contributing to a reduction in arisings. One organisation commented that the amount of wood waste will decrease on account of better procurement and wood waste management. One stated that the quality of some wood waste, demolition waste in particular, is likely to decline, reflecting the increasing levels of particleboard and CCA-treated wood in construction. They also believed that Municipal levels will continue to fall as LAs work towards Landfill Directive targets. However, there will remain a need for suitable outlet for the lowest grade material. For the Joinery and furniture manufacture sector their view is that wood waste arisings are likely to fall due to a combination of the Renewable Heat Incentive, general demand for local biomass, increased resource efficiency and possibly better collection techniques that increase the viability of collection and consolidation of wood from scattered small-scale producers of high grade wood waste.

Other trade associations (2 responses)
One gave an analysis of the different sectors. In construction they suggest a linear decline in wood waste produced. The landfill tax will continue to incentivise the recycling of wood waste produced from this sector with lower grade wood waste being disposed of via landfill or sent to WID compliant combustion plant facilities whichever is the most cost-effective. For packaging they suggest that waste wood is likely to decrease with time resulting in increased recycling. For municipal waste they suggest that waste wood is also likely to decrease which may result in increased facilities for recycling, sorting and increased emphasis on segregation at source.

One was of the opinion that larger companies tend to recycle their waste wood while a smaller company will fill a general skip with their waste wood.

The other considers that landfill tax continues to be the main driver for the diversion of wood and the economics of recycling. The waste hierarchy is also a key waste legislation driver for diverting wastes such as wood from landfill however, for many producers this is a “tick box” exercise with no significant enforcement.

LA bodies (5 responses)
Some were of the opinion that activity in the construction and demolition sector is likely to decrease in the short term as the housing market struggles. It is likely that some activity will pick up in the medium term once large scale government backed

infrastructure projects get underway. The volume of high quality wood waste suitable for recycling is likely to decrease in the medium to long term reflecting the increased use of MDF and chipboard over recent years.

Others were concerned about the likely increase in the level of on-site burning of wood waste but more information will be required to ascertain the exact impact on the economy and environment. The use of low grade wood (chip board etc.) in furniture with a short lifespan to reduce manufacturing costs was also a concern. They are of the opinion that this use of low grade wood would place additional cost burdens on local authorities. Local authorities will continue to manage wood waste in line with the waste hierarchy and will seek to identify the best-value for money solutions available. They believe some HWRCs already segregate wood waste and are engaging proactively with furniture reuse services.

Waste management companies (2 responses)
Two of the WM companies believe that landfill tax and the waste hierarchy continue to be the driver for diverting waste from landfill. Of the two, one was of the opinion that a review of the landfill tax would be advisable.

Another stated that they expected wood waste from packaging to fall up to 2020, municipal wood waste to remain the same over the next few years and wood waste from joinery to fall up to 2020.

Construction and demolition (2 responses)
The C&D sector believes the amount of waste wood produced as a result of new construction work will decline. This is because the need for companies to meet their environmental objective to reduce waste and increased waste disposal costs. They are working with their suppliers to move away from “one use” pallets and provide branded reusable pallets returned to the supplier directly, through a third party or take back schemes. They believe clear targets will help reduce waste in the sector.

Energy companies (1 response)
The energy company was of the opinion that without policy intervention to incentivise source segregation and/or penalise landfilling no change is likely to take place in the volumes of material collected from Civic Amenity sites or separated from black bin waste. They also believe that for smaller quantities of waste a reliance on the disposer to take it to a Civic Amenities site or to dispose by burning will not change either without intervention that enables these waste producers to realise the value of waste wood.

Forestry industry (1 response)
The forestry industry representative believes that the increased use of wood products in construction industry is driven by low carbon incentives and that more emphasis is needed at resource efficiency and segregation at source. This will help to minimise the waste management costs for large companies.

It is thought that increasing the focus on re-use, recycling and repair of pallets would be good and a decline in waste arising can be expected. In the municipal sector there is an expectation that more furniture will be re-used. They are of the opinion that any increase in economic activity is likely to be off-set by waste prevention and reduction measures, as well as greater resource efficiency.

Environmental interest group (1 response)
The environmental interest group are of the opinion that evidence seems to be showing that waste volumes in general looks to be declining and that this predates the recession.

Others (1 response)
A respondent from the others category would like to think that the relevant sector would be able to provide a better managed, more reliable quality defined "product".

Question 11: What evidence do you have regarding any potential for further diversion of wood waste over and above the BAU trend?

Who responded?
13 responses. 1 wood trade association, 3 LA bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 3 "others" and 1 environmental interest group.

How they responded

Wood trade associations (1 response)
One WTA is of the opinion that unless specific disposal routes are monitored there is no incentive to separate the waste wood from general waste.

LA bodies (3 responses)
One LA body is of the opinion that further diversion over and above the BAU trend will depend on diversion of biodegradable waste from landfill to energy from waste facilities. They believe that the volume of wood waste that will be recovered from a

landfill ban will not be sufficient to financially drive the development of facilities. They urge the Government to consider an increase in landfill tax beyond £80/tonne or a complete ban on biodegradable wastes. However, the LA body is of the view that the relatively small volumes of wood waste landfilled means that a landfill ban on its own will be ineffective in driving changes. Government should instead consider increasing landfill tax beyond £80/tonne in the immediate future (from 2014/15) and announce a phased introduction of a complete ban on biodegradable wastes.

Another expects further developments in the reuse sector which would affect a relatively small tonnage of wood waste but it is appropriate to recognise its importance as a high-profile and growing diversion route.

Energy companies (1 response)
The response mentioned research by Npower which suggests that between now and 2016 there will be 800~1200k/t of increased demand for UK waste wood from UK and EU waste wood power plants under construction.

Forestry industry (1 response)
The forestry industry representative is of the opinion that landfill bans need to be accompanied by regulations on wood waste segregation at source, clear regulations not guidelines on assignment of different types of wood to appropriate grades, regulations on preferred management/disposal routes for different grades, that would take into the account the waste hierarchy, where energy recovery and incineration should be ranked below re-use, recycling and recovery into material products i.e. panel board, animal bedding, mulch etc.

Waste management companies (1 response)
The WM company stated that any growth in MBT in England may help divert more wood waste from landfill. They expect an EFW plant capable of taking low grade wood to be built in their area in approximately two years, but feel that localised public opposition to new incinerators and the current economic situation may impact the development of biomass energy facilities and it may not be possible to build even 25% of planned facilities thereby reducing the availability of this route to replace landfill.

Construction and demolition (2 responded)
One C&D company believes that there are clear target/measures are already in place to reduce packaging waste through the use of more reusable packaging. Both mention that manufacturers are using more branded reusable pallets, which are collected and reused in their current form. This trend is likely to increase with industry pressure.

Another is also of the opinion that the amount of waste wood produced in the sector will decline. This is a result of increased waste disposal costs and the need for companies to meet environmental objectives to reduce waste.

Others
One respondent in this category believes that wood waste can be utilised in land restoration (to ecological but non-agricultural status) on closed mineral (china clay) extraction sites. They state that shredded and chipped wood is a key constituent of the soil manufacture and structure. They are of the opinion that the lack of practical and pragmatic guidelines on the suitability of specific wood waste streams and the lack of traceability of these streams in the wood recycling sector seriously restricts the availability of material and restricts the use of this resource. They believe that suitable wood for their use is frequently sent to other disposal and recycling routes including landfill.

Another respondent states that a considerable quantity of waste woods can be chopped and combined with cement to make a very strong and lightweight building block.

Question 12: Are there any other costs and benefits to consider?

Who responded?
14 responses. 4 wood trade associations, 4 LA bodies, 1 waste management company, 2 construction and demolition, 1 forestry industry, 1 environmental interest group and 1 “others”.

How they responded

Wood trade associations (2 responded yes, 1 responded no and 1 did not indicate a choice)
One WTA added a cost benefit of improved processing to remove ferrous and non-ferrous metals will be a revenue stream for the processor. They state up to 3% metallic content in processed wood, 60% of which is generally aluminium that trades at around £800 per tonne.

Another WTA suggests the economic benefit and job creation facilitated by recycling wood waste should be considered. They say using waste to produce wood products generates more jobs than using that wood for energy and this should be incentivised.

One suggested the cost and benefit of the locking up of carbon, and the use of wood as a raw material for products including joinery, timber frame buildings, furniture, flooring, fuel, and paper.

One WTA believes that there are benefits to local wood recycling organisations who can operate at a level of lower cost and make wood recycling financially viable. Benefits include the reduction of waste going to landfill, the reduction of fossil fuel used in power stations and to the economy in small scale incinerators used for generating local power.

LA bodies (4 responded yes)
One LA body suggests the relative benefit of banning other biodegradable wastes should be considered. Another suggested other benefits from alternative approaches, including many social, environmental and economic benefits resulting from reuse as identified in the WRAP report "Benefits of reusing and recycling bulky waste". They state this would support the view that reuse should play an important role in wood waste diversion from landfill.

The third was of the view that any alternative facilities to landfill provided need to be equitably spread so that the financial burden to find alternatives to landfill (particularly if economic or legal drivers are introduced or enforced) is not unfairly attributed. As the provision of such alternatives will be driven by the industry, they thought some form of additional Government incentive may need to be introduced to encourage development in those areas of the UK not currently well provided with alternatives.

The fourth proposed the costs of dealing with mixed waste loads arriving in landfills but rejected due to containing a wood waste fraction should be considered.

Waste management companies (1 responded yes)
One WM company stated that local outlets for wood waste have increased their gate fees and/or stopped taking lower grades altogether. A major cost would therefore be a dependence on outlets that may increase prices or stop taking material at short notice, with no other recourse than to stock pile if there is no landfill or local biomass energy facility. This stock piling would also create a fire hazard. A benefit would be an increase in employment in the wood recycling and biofuel sectors with no reduction of employment within landfills.

Construction and demolition (2 responded yes)
Both are of the opinion that there will be increased management and labour costs on site in order to segregate wood waste from other waste streams.

Forestry industry (1 responded yes)
The response suggests benefits include: preservation of natural resources thus minimising habitat destruction and the loss of biodiversity and soil erosion; increased availability of domestically sourced wood for various users; sustainable use of available resources, and wood waste segregation and recycling infrastructure will create new jobs. Costs include: increased transport costs if local supply of wood waste is limited, and developing the infrastructure and training.

Environmental interests group (1 responded yes)
The group stated whilst the benefits of banning wood from landfill may be overestimated there was an underestimation in the potential environmental benefits achievable by best use of the diverted wood. They believe if more wood waste is recycled then wood imports will fall. A landfill ban/restriction is not the only way to reduce (waste) wood import. Any approach that internalises the externalities of waste management/ energy generation would promote more efficient management of waste and more environmentally responsible energy generation.

They are of the opinion that a ban on the landfilling of waste wood could also result in more energy recovery capacity (e.g. due to increased certainty with regards to domestic feedstock) which, in turn, could result in more imports (especially if the domestic feedstock volumes end up not being as much as anticipated). Additional incineration would bring with it additional environmental and social costs.
They also state that consideration should be given to evidence that burning treated waste may result in more harmful emissions than burning virgin wood. The environmental and social cost of both incineration and policies that promote incineration should not be underestimated.

Others (1 responded but did not indicate a choice)
One respondent from this category is of the opinion that if wood waste becomes too expensive to utilise in the land restoration activity then more environmentally damaging material (eg commercial manufactured fertilisers) will be used or the land restoration activity will totally cease leading to environmental degradation of the mineral site. The life cycle of each use would ideally be considered in the Cost and Benefits Analysis.

Question 13: Is this a reasonable representative cost (and range) for collection, sorting and onward transportation from HWRCs?

Who responded?
12 responses. 1 wood trade association, 1 other trade association, 6 LA bodies, 1 energy company, 1 forestry industry, 1 waste management company and 1 environmental interests group.

How they responded

Wood trade associations (1 response)
The WTA responded that variations in onward management costs are wide so the reliability of the statistics should be questioned. They suggest an approach that differentiates between the various end markets to take account of different prices and production costs.

Other trade associations (1 response)
The other trade association agreed that the cost ranges appear to be reasonable.

LA bodies (6 responses)
All the LA bodies broadly agreed with the figures quoted. However, 3 of them also provided some additional information.

According to One LA body the figures are historically similar to the gate fees they pay (including transport) however gate fees have recently increased due to a supply and demand mismatch with the current gate fee around £65-£70/tonne. The waste counts as recycling, with 30% recycled into new wood products and 70% prepared as RDF for export abroad. Transport costs are paid in addition.

Another One LA body believes that there may be some hidden contractual costs associated with the diversion of wood waste up the hierarchy. Some contracts have an incentive to recycle or recover. Any contractual costs are bound to have an impact on any decision to introduce a policy instrument.

One also pointed out that in many cases further diversion of this waste from HWRC Residual Waste streams will shift some costs from one stream to the other which should result in savings through reduced disposal fees (although the extent should be estimated with caution).

One LA body believes the costs ranges are likely to be representative of treatment of wood waste to recycling and/or biomass facilities. However, if local composting facilities are available then the costs of treatment and haulage are likely to reduce

the lower end of the range by between £10 and £15 per tonne. The range also assumes no costs have been taken into account for management of the HWRCs and that all types of wood are mixed into one container or area. If separation of wood grades is required then this is likely to have a significant increase in revenue cost for managing the separation as well as increasing the capital costs of providing additional storage areas. In such circumstances the range proposed is likely to be too low.

Energy companies (1 response)
The respondent agrees with the cost range for the management of timber from HWRC's as this reflects their experience. However, they disagreed with the range quoted for gate fees paid for end markets.

Waste management companies (1 response)
The WM company disagreed with the costs cited. They currently pay a higher than cited gate fee of £45/t to two outlets, which they do not expect to fall and have not come across any negative gate fees. They also outline transport costs in the region of £30/t (£300 per lorry holding 10 tonnes of shredded timber waste) which means a higher management fee than the range quoted. They also state that even if the cost of collection, sorting, transport and gate fees combined are less than landfill charges (with tax), if wood reprocessors are unable to accept certain grades as is currently happening, then this material will have to be landfilled.

Forestry industry (1 response)
The respondent disagreed and provided figures. As collection of wood waste is typically within 30 miles from the processing facility transport costs are approximately £10/t. The processing costs range from £7-25/t depending on the quality of the input material. Transport to end-users is usually about 100 miles with transport costs £10-15/t paid by either end-user or either wood recycler.

Environmental interests group (1 response)
One environmental interest group is of the opinion that these costs appear to reflect gate fees for incinerators. If this is the case, they disagree with the assumption that diverted wood waste in general is to be incinerated.

Question 14: Do the cost and benefits estimates in table 6 look reasonable from your knowledge? Please also comment on the variability of costs across and within sectors

Who responded?
12 responses. 3 wood trade associations, 1 other trade association, 4 LA bodies, 2 construction and demolition, 1 waste management company and 1 environmental interest group.

How they responded

Wood trade associations (2 responded yes, 1 did not indicate a preference)
One WTA questioned Defra's preferred model (where the benefits of diversion are lower) to the Eunomia model.

Another WTA supported the analysis that there is an environmental case for recycling wood waste into wood products, ahead of energy recovery, and believes that measures to increase and incentivise recycling must be prioritised.

Other trade associations (1 responded yes)
No additional comments to support their answer.

LA bodies (2 responded yes, 1 responded no and another did not indicate their choice)
One LA body was of the opinion that some waste wood is separated and taken for composting from HWRCs as this is more is cost effective than landfilling; hence the additional cost highlighted is correct. If the figures were to include all wood waste currently landfilled or composted then there is likely to be an overall cost increase, but they have no information as to whether the additional cost proposed is reasonable.

One LA body was of the opinion that the estimates were reasonable, although the wood waste costs via household sources may be slightly underestimated.

Construction and demolition (2 responded)
Both C&D companies are of the opinion that waste disposal costs are higher in the South compared to the North.

Environmental interests group (1 responded)
The group disagreed with the assumption and stated that the Government should be ensuring that we get the most energy out of waste and not the most waste into

energy recovery. They want to see the Government put into place systems to prevent or disincentivise energy recovery processes that fail to recover a significant portion of the energy.

Question 15: Is it right to assume that most of the additional landfill diversion is likely to come through energy recovery via incineration, suggesting that most of the available tonnage is likely to be of low grade?

Who responded?
18 responses. 6 wood trade associations, 1 other trade association, 5 LA bodies,1 response from waste management companies, 1 construction and demolition, 1 energy company, 1 forestry industry, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (3 responded yes, 2 responded no and 1 did not indicate their choice)
Three of the responding WTAs felt this was a fair assumption. Of these One was of the opinion that there is a lack of information and data collection on the quantity of wood waste generated by joinery and wood products manufacturers. Higher quality wood waste is rarely taken to landfill, although in summer some manufacturers lack adequate storage space and will be unable to use it for heating. Significant volumes of solid wood have been replaced with wood-based panels and engineered wood products, so panels will feature more prominently in future waste streams. As panels are not readily recyclable back into similar products, incineration is likely to feature strongly in their diversion from landfill. There may be potential to re-use some engineered products.

One felt that there are no ready recycling markets for the lowest grades of wood waste, so incineration is likely to be the main option. They also stated that the quality of the wood waste stream is likely to deteriorate during the next few decades with greater use of panels and engineered products. In addition hazardous CCA treated wood waste is likely to enter the waste steam in growing volumes in the next few decades.

One did not actually state whether they agreed but did respond that they believe there is scope for greater recovery of waste wood from the waste stream and its use as a renewable fuel, for heat and/or power generation purposes.

Of those who responded no, One agreed that most diversion for lower grade wood is likely to come through energy recovery but that there is room for growth in the wood panel market, if suitable wood waste is made available. They also mention non WID biomass plants using higher grade wood waste which has been diverted from recycling.

Another mentioned their experience of construction industry waste since 1998 which showed that 20% of wood waste being thrown away has re-use potential. They believe that there is a large volume of timber that is suitable for recovery and re-use from the construction industry. With the creation of local wood recycling units in every major conurbation this could recover over 20,000 tonnes per year.

Other trade associations (1 responded yes)
One other trade association was of the opinion that additional diversion may come through recovery via incineration assuming that sufficient capacity already exists or will be in place to deal with the quantities of low grade waste wood produced.

LA bodies (3 responded yes, 2 did not indicate their preference)
Most of the LA bodies are of the opinion that incineration will play an increasingly important role in landfill diversion, particularly where wood waste is contaminated or cannot practically be separated into different grades.

One mentions sorting of wood waste can be extremely challenging for particular sectors, and where sorting capacity is not available, this could lead to the waste being incinerated as the quality cannot be guaranteed. However, care must also be taken over assumptions made around available incineration capacity.

One LA body trialled wood only loads to a municipal Energy from Waste (EfW) facility, but this was not successful as the facility was not able to accommodate the high calorific value of the separated mixed wood waste. The trial indicated pre-treatment and mixing with other waste would be required in order for this option to be workable.

Energy companies (1 responded yes)
The company agreed that more wood waste will be diverted to incineration but stated that there is not sufficient data available on the nature of the wood materials going to landfill. They believe that the energy recovery facilities which is planned to come on line should cope with increased volume of low grade timber caution will however need to be exercised if the current 90% biomass threshold is to be maintained. They are of the view that the UK and European market will see considerable new demand created over the next 2 years via energy generation. It consume around 550kt/annum when operational providing a recovery route for the majority of harder

to sort low grade timber waste currently going to landfill. Therefore a restriction would as per The Waste Hierarchy prevent a resource going to landfill, forcing producers to act responsibly.

Forestry industry (1 responded yes)
The forestry industry representative agreed stating that most Grade A and B wood waste is already consumed by panelboard manufacturers, energy, and agricultural users. Some of Grade C is consumed for energy either in the UK or exported to Europe. Some Grade D is incinerated in the UK.

Waste management companies (1 response)
The company agrees with the assumption. For them Grade C material poses the greatest problem as end markets are almost non-existent and it's difficult to separate. It is of the opinion that grade D material will present even greater problems of disposal if there were a landfill ban. They compost large amounts of their wood waste. Municipal wood waste goes to an MBT eventually ending up in landfill although they are investigating its use as an RDF. They know of a contractor who composts all wood waste to produce a material specifically for the restoration of landfill.

Question 16: Do you have any comments on the GHG estimates in table 7?

Who responded?
7 responses. 1 wood trade association, 1 LA body, 1 forestry industry, 1 waste management company, 2 environmental interest groups and 1 "others".

How they responded

Wood trade associations (1 response)
The WTA was of the opinion that recycled wood used in construction products may extend the period of carbon sequestration further by several decades and will still be available for energy recovery at end of life. It believes there is no clear understanding of how wood behaves in UK landfill, although degradation is likely to be low, and further research is needed. Whilst agreeing that wood waste has a clear role to play in the UK energy generation mix, it states that the relative merits of off-setting against fossil fuels will decrease as the UK grid becomes decarbonised.

LA bodies (1 response)
The responding LA body stated that the table presented in the call suggests that wood recycling is more beneficial. They believe the energy benefits of energy from waste and wood recycling are similar.

Forestry industry (1 response)
The respondent stated that too much importance is placed on GHG emissions from landfill and there should be focus on capturing carbon storage benefits from material recycling and/or GHG benefits from avoiding harvesting virgin materials.

Waste management companies (1 response)
One WM company said they were unable to answer this question because they were unable to estimate the GHG emissions from biomass energy facilities versus wood recycling.

Environmental interests group (2 responses)
One of the respondents felt that the AEA assumptions (on behaviour of wood waste in landfill, emissions factors and energy recovery), should be questioned. They believe the benefits from offset imports do not appear to have been considered.

The other is of the opinion that the estimates have ignored the use of wood fuel for heat, believing that using wood for heating is more efficient than using wood to generate electricity. Each tonne of wood used for heat displaces 57 per cent more CO_2 per useful unit of energy than if wood is burned to produce electricity. A table summarising implications for CO_2 savings is available at annex B.

Others (1 response)
The response states that increased recovery to land would not significantly reduce the gross methane production headlined in the table provided in the call but it could alter the rate of production of the gas and it has significant additional environmental benefits by supporting increased vegetative cover and biodiversity – the former serving to potentially offset some of the global warming potential.

Question 17: Can wood waste mixed with other waste streams be separated? Please comment on a) practicality and b) cost

Who responded?
22 responses. 6 wood trade associations, 2 other trade associations, 5 LA bodies, 3 waste management companies, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (4 responded yes, 2 did not indicate a preference)
Most of the WTAs responded yes stating that in most cases it is technically possible to separate out the bulk of wood waste from other waste streams. A couple flagged the potential extra cost (One mentions needing more specialist staff and training to do so) although two also mentioned that segregation at source is the cheapest route.

One respondent noted that social firms with low overheads can collect and recycle smaller volumes which are not of interest to large commercial skip hire companies or cost prohibitive to the producer.

One respondent provided details of the recycling process where metals can be removed, and the use of picking stations or density based separation systems to remove other waste materials such as plastics. The degree of separation will depend on volumes, cost, perceived benefit and resources (e.g. a recycler will probably decide that it is not worth dismantling upholstery, where the wood element is very difficult to separate out). The respondent also flagged that most end markets for waste wood have tolerances for non-wood contamination under 1-2%.

Other trade associations (1 responded yes, 1 did not indicate a preference)
One other trade association agrees in principle however, it believes that additional costs are associated with undertaking additional sorting and segregation activities. Tests will need to be undertaken to identify different treatments and therefore allow better separation of the grades. It did not provide any comments on the costs associated with different separation options.

One other trade association felt that clarity on what is included in Defra ‘s definition of wood waste is key to avoiding significant difficulties at the various stage of collection, sorting and processing phase.

LA bodies (2 responded yes, 2 responded no, and 1 did not indicate a preference)
The LA bodies had concerns around the practicality and cost of segregating wood waste. three mention the need for source segregation.

One LA body flagged the bulky nature of wood waste meaning it needs to be shredded before a degree of separation can be achieved. It is common to separate metals from wood, and fairly easy to separate wood from grit/stones using trommel screens. They concluded that shredding waste increases the consistency by reducing differences which allow wastes to be mechanically separated.

Another notes that the extent of the challenge to the industry will depend on the nature of any restriction. Garden waste placed in residual bins will pose challenges

in separating ‘woody’ material from foliage or grass. It suggests a restriction does not require kerbside collected municipal waste to be sorted, as this will require a significant investment in infrastructure and an on-going cost to local authorities to extract only a very small tonnage of wood waste. Another challenge is the lack of space which will make on-site sorting impractical in many cases. The LA body believes a complete landfill ban on wood waste will result in having to pre-treat all residual household and commercial waste collected or managed by local authorities; this is likely to significantly increase costs to such authorities.

One LA body was of the view that it would not be practical or economic because the majority of waste wood not separated at Household Waste and Recycling Centres (HWRCs) will make up part of the residual waste stream. The residual stream should be used to create solid recovered fuel (SRF) which can be sent to an energy recovery facility, thereby maximising diversion of waste wood to landfill. Under the Renewables Obligation Order (2011), this proportion of fuel would be considered to be biogenic in nature and would therefore contribute significantly towards meeting the UK’s renewable energy ambitions.

Another LA body is of the view that some separation of wood waste will always be achievable, and is already being encouraged through drivers such as the landfill tax, minimising treatment fees, and s legislation. For them separation will be limited where wood forms part of bulky items such as furniture, not all which can be re-used. Alternative treatment options will be required if total landfill diversion of wood waste is to be achieved.

Waste management companies (1 responded yes, 2 did not indicate a preference) One WM company had the view that furniture items, whilst primarily metal or material, had small amounts of wood which would be difficult to separate. When wood waste is contaminated with such other materials this may make it impractical to re-use, recycle or recover. They believe an absolute ban on wood waste going to landfill would provide significant difficulties and increase the cost to UK businesses in comparison to those within the EU and elsewhere in the global economy.

Another was of the opinion that separating wood waste from other waste streams is complex and dependent on a range of factors including volumes, size and types of wood and other materials, and intended end-use. Their view is that apart from being impractical, the environmental, social and economic benefit of applying a restriction to mixed loads is unclear.

One WM company notes that it is only worthwhile separating wood from other wastes if there is a ready market for the material and if it is cost effective.

Construction and demolition (2 responses)
C&D industry respondents are of the opinion that wood waste segregation onsite is bound to incur additional labour and supervisory costs and noted the difficulties of doing so where there is constrained space. Whilst mentioning the increase in segregation of wood waste to meet recycling targets. In addition One flagged the large number of wood composite products that will be extremely difficult and time consuming to separate into different components, meaning that disposal of these items may become very expensive, leading to illegal disposal.

Energy companies (1 response)
The energy company's view was that the current re-processing infrastructure used by the waste and wood recycling industry can be further utilised and expanded to meet the proposed restriction and fresh demand. They believe a restriction is a good idea as it would either force the waste producer to segregate at source or rely on the service of a waste management company to sort on their behalf. Both these options will increase costs but the producer will realise a saving from a decrease in landfill costs. For the purpose of energy recovery, Grade D wood waste needs to be extracted but there is no need for further segregation.

Forestry industry (1 response)
The forestry industry respondent stated that separation at source is the best management option and easily achieved by manufacturing, packaging and construction industries of any scale. Separation of wood from mixed streams would require more manual labour, thus labour costs would rise. They conclude that other industries would not require additional labour but there may be training costs.

Others (1 response)
An organisation from this category felt that there is room for improvement.

Environmental interest groups (1 response)
One environmental interest group is of the opinion that it should be practicable to separate wood from other building/construction waste, dependant on the size(s) of the wood concerned. They believe it is reasonable to expect 100% recovery of waste wood in some industries, in others, such as demolition, a small % loss will have to be accepted as inevitable and this will be 'recycled' in many cases as aggregate. Any mixing of waste streams inevitably brings contamination and loss of value even if it is possible to mechanically separate. Their view is that wood waste must be segregated at source and not mixed with other waste streams. They believe that mechanised detection/separation technologies will develop in due course.

Question 18: Can different grades of wood waste be separated? Please comment on a) practicality and b) cost

Who responded?
19 responses. 6 wood trade associations, 1 other trade association, 5 LA bodies, 1 waste management company, 1 energy company, 1 forestry industry, 2 construction and demolition, 1 environmental interest group and 1 “others”.

How they responded

Wood trade associations (6 responses)
One WTA is of the opinion that it should be possible to separate visually identifiable grade D from other grades. Grade B and C material can also be visually identified and separated but much is dependent upon the practice of wood treatment companies in segregating material at source. Many wood treatments are uncoloured and identification is not easy once it is mixed with clean wood.

One WTA is of the opinion that currently there are no effective technologies to separate the different grades of waste wood on an industrial scale so separation is mainly manual. Differentially priced markets for different grades make it economically sound for either waste generators or wood recyclers to segregate grades. In their opinion as the price differentials between grade B (panel-board) and Grade C (biomass) markets are often small when demand is strong segregation tends to reduce, and when demand is weak (and panel-board mills tighten up their specifications) segregation increases. However, if, as predicted, demand in the market for biomass grade material increases, the degree of segregation is likely to fall unless a significant price differential between panel-board feedstock and biomass fuel is established.

One WTA is of the view that separation depends on the material. If the majority is packaging then it is readily identifiable, but if the wood waste has been through a shredding station then it is impossible to further segregate it. They conclude that in some cases once consolidation has taken place, identifying ‘treated’ wood consistently is virtually impossible.

One WTA writes that whilst there is scope for on-site segregation through provision of specific collection vessels for different grades of wood waste, the effectiveness of segregation depends on available space, training and the capacity to enforce segregation. They noted that whilst manual picking lines provide further opportunities manual segregation is prone to error and some treatments are difficult to distinguish as many modern organic-based wood preservatives are visually undetectable. Although, there are indicator dyes and scanning technologies that

may be able to detect both metal-based and organic-based treatments as wood passes on a conveyor, there is no system that will fully meet the requirements of the UK wood recycling sector without further development.

One WTA described how they separate manually as they deal with small quantities a van load at a time. This allows higher value, re-usable timber to be separated. For them the cost of separation performed as low skill employment creates opportunities within the local economy.

Other trade associations (1 response)
One other trade association is of the opinion that the different grades of waste wood can be separated. However, this is not always straight forward and not undertaken on a consistent basis by all producers or processors. Downstream users of the material need to have confidence in the quality of the waste they receive.

LA bodies (5 responses)
Three LA bodies raised difficulties with separating wood waste grades at HWRC including lack of space.

One LA body is of the view that uncontaminated wood can be separated. It mentions that the problem is separating contaminated wood (Grades C and D) from uncontaminated wood.

One LA body was of the opinion that it may be technically feasible (but expensive) to separate different grades of wood waste if undertaken at treatment facilities; but is unlikely to be feasible at kerbside or at HWRCs (where the public are unlikely to correctly separate wood waste into grades requiring LAs to undertake the separation). If a restriction applied to kerbside wood waste this would result in significant cost and could compromise the efficiency of bulky waste collections.

One LA body outlined their own practice where they do not separate waste wood into different grades because very small quantities of high grade wood waste are collected at HWRCs, the key wood reprocessors in the region do not accept high grade wood waste from HWRCs due to potential contamination. One LA body states significant resources including additional trained staff and the provision of additional space would be required.

One LA body feels that greater choice of outlets available for higher grades of wood waste is already encouraging separation by grade, although this is always dependent on a balance of financial benefits versus the additional practical requirements of separation; containerisation, transportation and available space.

Waste management companies (1 response)
The WM company undertakes minimal sorting of mixed wood waste loads to remove any contaminants of high grade wood waste or remove obvious grade A wood from household material (mainly grade C). They believe this is cost effective since it maintains the value of the high grade wood. After sorting they shred the wood ready for transport to the end processors. They are not aware of any specific machinery that will separate different grades from mixed wood loads.

Construction and demolition (2 responses)
One C&D company state that separating different grades of wood on a construction project can be difficult as operatives may not have the knowledge to segregate high and low grade wood waste. They are of the opinion that it is almost impossible from a visual inspection to separate treated and untreated wood waste off cuts. As some organisations will collect wood waste and sort and stack it on a flat bed truck this is cheaper than using a skip which results in void space which the C&D company ultimately pay for. Disposal costs are normally per skip, rather than per tonne.

The other C&D company is of the view that separation would be very difficult to achieve on construction sites in most cases. The only area of success has been segregating pallets for reuse in their original form.

Energy companies (1 response)
The respondent is of the opinion that separating different grades of wood is technically and commercially feasible. The grading system developed by the wood recycling industry is commonly accepted by producers and end users. Each grade has a commercial value and is priced accordingly throughout the chain. On a practical level for the purpose of energy recovery, Grade D wood needs to be extracted but there is no need for further segregation. In reality this makes the sorting process easier in order to divert the remaining lower grade wood going to landfill.

Forestry industry (1 response)
The respondent is of the view that separation is feasible especially in manufacturing, packaging and construction. The main requirement is segregation at source, as grades can be attributed to wood types and end-use application, similar as in Germany. In case of demolition and municipal waste, some volumes can be separated based on visual inspection, while others may require some sort of testing with hand-held devices (spectrometer). Large volumes of wood waste arising from these streams could automatically be described as grade C. This requires training on wood types, testing methods and recognising contaminated and hazardous wood waste. There will be training and container costs.

Environmental interest groups (1 response)
The respondent is of the opinion that whilst the separation process may not be an exact science, it appears to be well established in many areas, except perhaps with SMEs. Additional training will be required but the advantage of a ban will come from diverting wood from landfill rather than grading of the diverted wood. Detection of treated wood is a key issue. Producers of waste wood will need to install the appropriate procedures at their workplaces.

Others (1 response)
The respondent states that it will make no difference to a [construction] site agent whether he instructs his labourer to put wood in a separate bag or in the skip.

Question 19: Is the grading system effective for identifying suitability for different end uses?

Who responded?
18 responses. 5 wood trade associations, 1 other trade association, 3 LA bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 environmental interest group, 1 professional body and 2 “others”.

How they responded

Wood trade associations (5 responses)
Four of the five WTA agree that the grading system is effective, although three responded yes, one states it could go further.

One WTA refers to the quality protocol on wood waste and the idea of taking a de minimis approach to non-visible preservative. They state that materials such as pallets are at risk of being excluded from ongoing discussions on a quality protocol and this is likely to add to the pressure on other disposal routes.

One WTA is of the view that the WRA grading structure is widely although not universally accepted as the best available grading structure.

One WTA is of the opinion that the potential end-uses need to be better highlighted and wood waste grading must be made as easy as possible, with particular emphasis on treated wood , which is often categorised as hazardous due to lack of information. It believes that clear guidance will better incentivise technologies that overcome emissions problems, enabling the UK to find a sustainable use for even the lowest grade of wood waste.

One WTA is of the view that whilst the grading system gives an indication of quality, many purchasers have their own individual specifications which may not be fully aligned with the standard grading system. In addition, high grade recycled wood fibre may be suitable for several applications hence concern from the UK particleboard sector that they may be competing for material with a biomass sector which is supported by the Renewables Obligation.

The WTA which disagreed stated higher grade material can frequently be found mixed with lower grades and that the WRA grading system doesn't on its own meet the purchasing specifications of downstream processors, who have to further process the material to prepare it for use in products.

Other trade associations (1 response)
The other trade association stated that identifying treatment and applying grading is not straightforward due to the different chemical compounds used because visual observation cannot identify them and because some end markets cannot take them. They stated that users need to have confidence in the quality of the waste and in this context the respondent is of the opinion that the development of end-of-waste criteria for selected wood waste streams would be beneficial and would improve alternative non-landfill options to landfill. They believe the EA's Position Statement on the environmental regulation of wood is in contrast to the statement in the Waste Framework Directive (WFD).

LA bodies (3 responses)
Two LA bodies believe the grading system is simple and clear.

One LA body is of the opinion that the system is largely unused for municipal wood waste, with HWRCs using basic separation of either one or two wood waste streams; often referred to as 'wood/timber' and 'chipboard'. This is usually based on a combination of available outlets, cost and available space on each site.

Waste management companies (1 response)
The respondent believes the grading system is suitable.

Construction and demolition (2 responses)
Two C&D companies agreed but didn't provide any comment to support their choice.

Forestry industry (1 response)
The respondent is of the opinion that the grading system needs to be accompanied by regulations on end-use hierarchy. Also subsidies to energy generation could be available to those who use lower quality wood that is not suitable as an industrial raw material.

Environmental interest groups (1 response)
The respondent suggested that customers for waste wood are those who should influence the grading system.

Professional bodies (1 response)
The respondent is of the opinion that the inconsistency of the PAS system is hampering the market. They believe a PAS developed by the industry association will be accepted and resolve the lack of consistency.

Others (1 response)
The respondent is of the opinion that Grade 'A' wood waste should be classified as wood for re-use.

Question 20: What are the key issues in separating wood waste in addition to those mentioned above?

Who responded?
18 responses. 6 wood trade associations, 1 other trade association, 4 LA bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 environmental interest group and 1 "others".

How they responded

Wood trade associations (6 responses)
Most of the WTA agree that cost, identification of wood treatments and an effective supply chain are key issues in separating wood waste. Also identified by some were, waste regulation bureaucracy and confidence in the quality of waste. Some others identified, space to sort waste, seasonality meaning that at some times of the year there was an over-supply of wood waste resulting in lower rates of separation, and developing techniques that are commercially viable for the UK. One outlined that materials that could be re-used are being damaged by extraction or storage.

Other trade associations (1 response)
One other trade association was of the opinion that downstream users of wood waste need to have confidence in the quality of waste that they receive otherwise market confidence is undermined which may deter future investment in infrastructure. They state that it is important that robust, risk based, cost effective solutions can be implemented to separate the waste wood into different fractions which are appropriate for the proposed down-stream uses of this material.

LA bodies (4 responses)
Three of the four LA bodies identified source separation as a solution.

One LA body is of the opinion that the main issue is contamination of higher grade wood waste by lower grades. Once contaminated that usually means it is only suitable for the lower grade applications.

One LA body concludes that the main issues are around practicality and cost, although the extent to which these are an issue will depend on the nature of any restriction. A full restriction on mixed municipal waste will be particularly challenging. Consideration needs to be given to the inherent challenges in sorting waste of a composite nature, the provision of infrastructure for separation, as well as of the on-going costs of utilising these facilities. If producers continue to provide products that include wood that is prohibitively difficult to separate then the burden of cost and management of the waste will fall on the eventual holder of the waste. It believes the current treatment and processing infrastructure could not cope with a complete ban on landfilling of wood waste.

One LA body was of the opinion that clear guidance and grading is needed in order to separate the wood waste fractions effectively. The LA body believes that in the municipal sector separation of wood waste from the residual waste steam is already commonplace encouraged by fiscal and legislative drivers.

Waste management companies (1 response)
The respondent cited the key issues as being around practicality, cost effectiveness and the availability of suitable end markets for the different material being separated.

Construction and demolition (2 responses)
The respondents outlined organisations key issues will be space, cost of labour, and expertise of wood types (quality and treatments, disposal route and the practicality of separating composite materials).

Energy companies (1 response)
The respondent was of the opinion that timing is one key issue simply because the nature of wood waste will change as more MDF and particleboard/lower C grade material enters the waste stream. This material cannot be recycled in such volumes and will need to be used for energy generation if it is to be diverted from landfill. Secondly, they believe regulation of storage limits is another key issue because proposals are currently being considered regarding wood waste disposal fines and storage limits, these regulations should not contradict the restriction policy.

Forestry industry (1 response)
The forestry industry representative believes that labour intensity and cost are the key issues. Wood must be separated at source to ensure the quality of the recyclate.

Environmental interest group (1 response**)**
The respondent believes that the key issues are: instituting source separation; the potential for additional levels of reclamation for reuse (e.g. for building); the reuse / recovery requirements (e.g. size) for individual customers, particularly those requiring clean wood (Grade A); and the judgement of personnel involved in separation.

Question 21: How practical would it be to apply a restriction to mixed loads?

Who responded?
17 responses. 3 wood trade associations, 1 other trade association, 5 local LA bodies, 2 waste management companies, 2 construction and demolition, 1 forestry industry, 1 energy company, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (3 responses)
One WTA was of the opinion that a restriction would encourage segregation at source but this is already practiced where it is easy. It would probably have the effect of increasing pressure on less acceptable disposal routes.

One WTA was of the view that it would be easy provided there is a market. As the majority of loads are mixed, if there were any processing problems downstream then material would back up and there would be a delay before material could be redirected to export.

One WTA concluded that it is practical where recovery routes/facilities are in place and that the existence of local schemes makes it easier.

Other trade association (1 response)
The respondent is of the opinion that it won’t be difficult to apply a restriction to mixed loads but it may prove difficult to regulate and enforce.

LA bodies (5 responses)
One LA body stated that it would be very hard to apply a restriction to mixed loads because of the difficulty of making accurate visual checks. However a wider ban on biodegradable waste would be more practical to enforce and deliver.

One LA body is of the view that there is not sufficient infrastructure in place for a complete ban without incurring an unreasonable level of cost. A complete ban would require a network of processing facilities available nationally to sort the waste. They question whether complete separation will ever be achievable as a restriction might only be practically applied to mixed loads where alternative treatment is available.

One LA body was of the opinion that if a restriction was to be implemented a sensible de minimis for waste wood in residual waste should be set.

One LA body concluded that any unjustified restriction on the use of mixed waste wood loads would likely force it (for economic reasons) to landfill, thus defeating the objective.

One LA body believes that a restriction to mixed loads will be an issue primarily for landfill operators, with implications for producers of the waste in terms of the need to separate or divert more mixed load materials from landfill. Thus a restriction can only be practically applied to mixed loads where alternative treatment is available.

Waste management companies (2 responses)
One WM company concluded that it would not be practical to apply such a restriction. They cited that some sites which generate wood waste may be too small to have separate containers for the different grades of wood which is the case for a lot of HWRCs. The other referred to their answer to question 17.

Forestry industry (1 response)
The forestry industry representative is of the opinion that restriction on mixed loads might be feasible if separation is applied at source. A potential for exceptions in some particularly difficult streams should also be explored.

Energy companies (1 response)
One energy company states that a ban would produce more low grade material, the mixed load would still have treated wood extracted from it, but when used for generation would not have to be categorised/processed further.

Others (1 response)
One organisation in this category is of the view that mixed loads will always be defined to the lowest common denominator and would therefore most likely end up currently in landfill and or incineration.

Question 22: Are there any sectors where sorting wood waste would be particularly difficult and why?

Who responded?
11 responses. 3 wood trade associations, 5 LA bodies, 1 energy company, 1 forestry industry and 1 environmental interest group.

How they responded

Wood trade associations (3 responses)
One WTA is of the opinion that demolition and civic amenity waste streams cannot be sorted visually. Instead a de minimis approach to contaminants should be used for mixed waste.

One WTA believes that upholstery is a particular challenge but feasible provided shredding has not taken place.

Another WTA states that limited space (e.g. on urban construction sites) can hinder segregation and sorting capacity. The WTA also believes that the demolition sector will uncover wood containing a wide range of treatments, many of uncertain origin, and which may no longer be sold on the market. In addition, wood will have to be separated from other building materials, and some may be combined with other materials as part of a product. It states that the packaging sector may use visually undetectable organic treatments to prevent mould/stain on wood and packaging material.

LA bodies (5 responses)
All 5 LA bodies are of the view that municipal waste is likely to prove particularly challenging due to its diverse nature and the fact it's often mixed with other materials (furniture). One LA body had conducted trials which showed that separating high grade wood from other wood and mixed waste is a challenge as they are frequently contaminated by a variety of other materials, such as nails and paint – it was costly for the HWRC to manage the quality of the wood waste and so the trial stopped.

One LA body believes that the relatively small quantities of wood waste produced by households and some businesses are impractical to separately collect, and even where recycling services are provided these may be poorly used due to time/space constraints of businesses. For this reasons, mixed residual waste pre-treatment options are the most practical and deliverable solutions.

One LA body pointed out that providing a comprehensive sorting process for municipal wood waste would be constrained by available site space and financial and operational limitations.

Energy companies (1 response)
The respondent is of the view that source segregation is the most effective method but may not be possible at some HWRC's or other businesses due to lack of space.

Forestry industry (1 response)
The representative felt there could be some difficulties in sorting municipal and demolition waste. For municipal waste they believe there is little awareness of wood types and treatment methods among general population, therefore staff at CA sites would need to sort the wood. For demolition waste they are of the opinion that some wood is combined with other materials e.g. windows (glass), or has been treated with hazardous chemicals that cannot be detected by visual inspection due to weathering of wood.

Environmental interest groups (1 response)
The respondent is of the opinion the demolition sector will face difficulty sorting waste wood between grades B, C and D. Identifying wood that should be assigned to grade D depends on identifying CCA etc treated wood, whilst sorting between grades B and C must presumably at present depend largely on individual judgement.

Question 23: Please provide any additional evidence on the nature of wood waste disposal by small businesses.

Who responded?
9 responses. 5 wood trade associations, 2 LA bodies, 1 waste management company and 1 environmental interest group.

How they responded

Wood trade associations (4 responses)
One WTA referenced their response to question 4.
One WTA is concerned that the requirement on small businesses to sort and dispose of wood does not become so burdensome that it disincentives the use of wood in future projects. Wood is an extremely environmentally sustainable construction material (as recognised by the Committee on Climate Change)and the environmental

benefits of this policy would be lost, if complex rules around wood waste disposal lead to wood being replaced by more energy intensive building materials.

One WTA runs a network of local wood recycling organisations that assist small companies dispose of low volumes of wood waste.

One WTA working with SMEs provided information outlining what happens to wood waste based on a 2009 questionnaire of its members.
Off cuts:

- 28% Used by employees for fuel
- 16% Sold as fuel
- 22% Burnt to provide heat for factory
- 8% Put in skip and sold as fuel
- 22% Other uses

Machine waste:

- 56% Used for animal bedding
- 12% Selling for pellet or briquette
- 6% Provide heat for factory
- 4% Used for particle board
- 23% Other uses

One WTA provided information from a variety of studies. Disposal routes identified included landfill; waste management companies; wood recyclers; animal bedding; particleboard manufacture; compost/mulch; on-site energy/power; and off-site energy/power. One of the studies[4] provided figures on joinery yield of 50%, of which off-cuts are typically used for fuel (28% from company employees) and for machinery waste, 56% is used for animal bedding, with other routes including fuel and particleboard manufacture. Unidentified percentages for both off-cuts and machinery waste were identified as destined for landfill.

LA bodies (2 responded)
One LA body provided a link the following website: London Energy Partnership

One LA body is of the opinion that an improved collection and sorting infrastructure by way of expanded local authority 'trade waste' services for SMEs will be critical to diverting small amounts of wood waste from landfill.

[4] *Fletcher (2010) Joinery Resource Efficiency Action Plan*

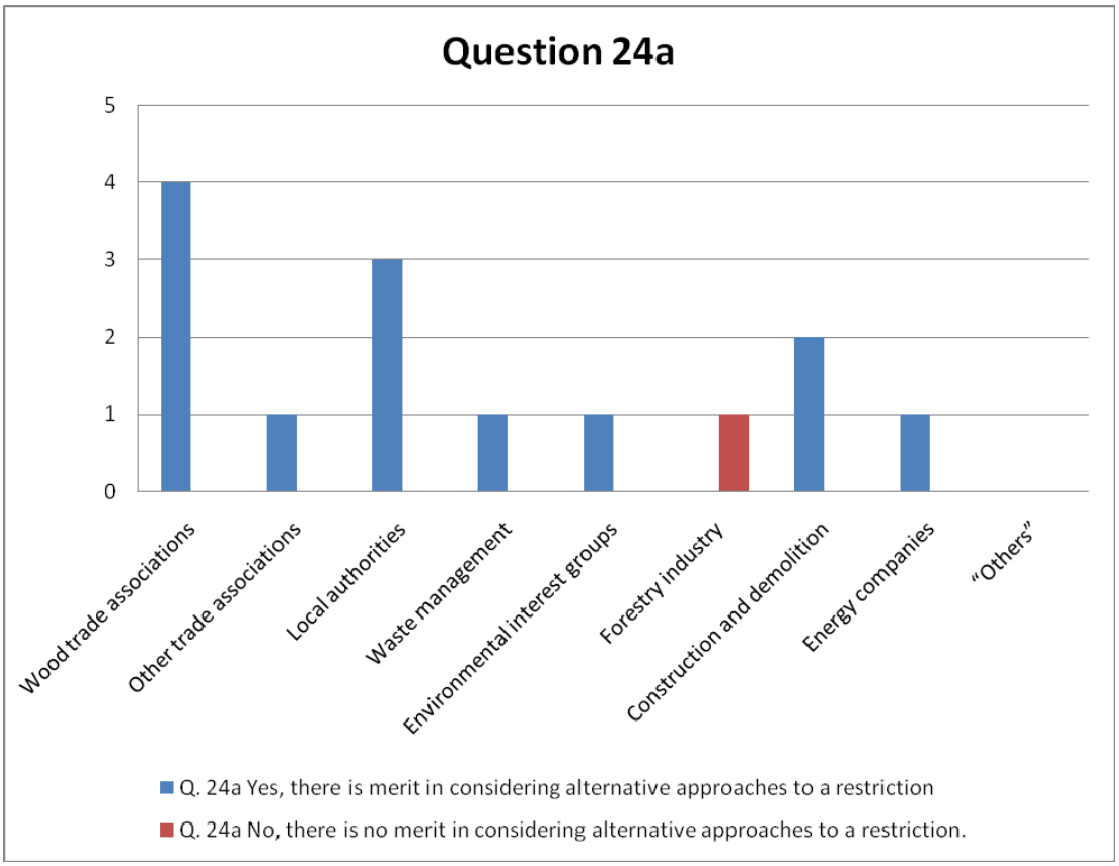
Waste management companies (1 response)
The respondent offers waste transfer facilities for small businesses. Small builders and house clearance companies can drop off wood waste and furniture in a contained area. Grounds maintenance and tree surgeons can drop wood waste off in a different area for composting. This is unlikely to happen if waste was collected in a skip or bins where it would be contaminated before collection.

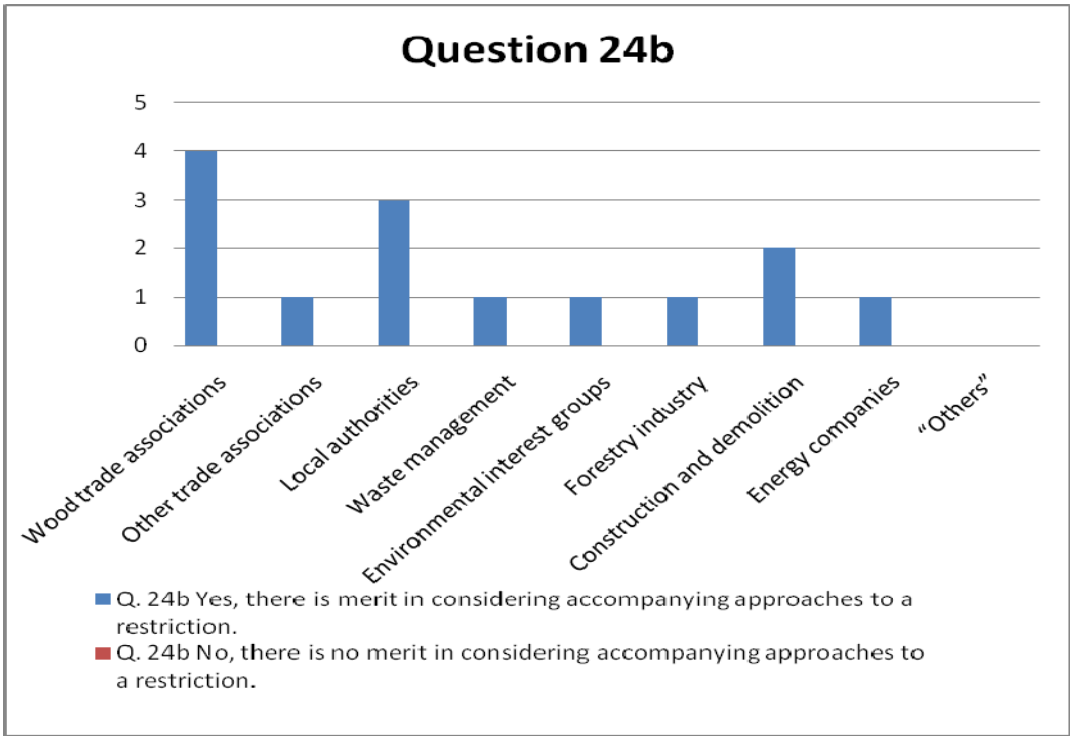
Environmental interest groups (1 response)
The respondent cited the British Woodworking Federation's September 2010 'Joinery, a Resource Efficient Action Plan which provides figures on joinery yield of 50%, of which off-cuts are typically used for fuel (28% from company employees) and for machinery waste, 56% is used for animal bedding, with other routes including fuel and particleboard manufacture. Unidentified percentages for both off-cuts and machinery waste were identified as destined for landfill.

Question 24: Is there merit in considering a) alternative approaches to a restriction? Y/N b) accompanying approaches?

Who responded?
19 responses. 4 wood trade associations, 1 other trade association, 4 LA bodies, 2 waste management companies, 2 construction companies, 1 energy company, 1 forestry industry, 2 "others" and 2 environmental interest groups.

How they responded





Wood and other trade associations (5 responses)
All five Wood and Other trade associations agree Government should to look at alternative and accompanying options.

LA bodies (4 responses)
All four LA bodies agree Government should to look at alternative and accompanying options.

One LA body also stated that diversion of waste wood from landfill is already encouraged by the biodegradable municipal waste targets under the Landfill Directive and by the ongoing increase in landfill tax contributing to the ongoing decline of wood waste to landfill. They are also of the opinion that the administrative burden of additional restrictions and costs may not be sufficient environmental value for money relative to other environmental actions that Government could legislate for at this time.

Waste management companies (2 responses)
Both respondents agree. One company believes the alternative approach is to allow current drivers and incentives to fulfil their function and to review at an appropriate time post 2014. Any restriction should not be imposed until there is sufficient wood processing capacity in the UK – this will be dictated by both the number of facilities and their ability to handle a diverse wood waste feedstock.

Others (2 responses)
One organisation from this category is of the opinion that without additional capacity in the recovery sector, a restriction on landfill will merely drive increased illegal disposal, perhaps fly tipping. They provide the example of tyres and fridges when they were banned from landfill.

Another from this category suggested a carbon credit system.

Environmental interest group (2 responses)
One environmental interest group is in favour of a ban rather than a restriction with complementary accompanying approaches. It wants appropriate support and incentives aimed at optimising recovered value. It believes these measures should be phased with different sectors potentially allowed different timescales. Simply restricting waste wood to landfill would not be sufficient to ensure that waste wood is treated in line with the waste hierarchy, to best environmental benefit, or without efficiency being impeded by market failures. Improvements would be necessary for collection and sorting infrastructure. It believes that collection authorities should provide recycling services to small businesses'. Additionally, the Government should be working towards reducing contaminants on wood products, although this is not a short-term solution.

Another was of the opinion that whilst it is worth considering alternative approaches, a landfill restriction is likely to be superior to a voluntary agreement because it offers certainty of outcome and a level playing field for businesses. They believe that a focus on reducing contaminants for wood waste is likely to be a strong complementary policy for a landfill restriction, as this will remove a major barrier for wood reuse, potentially opening up opportunities to capture greater value. It provides an opportunity to highlight the importance of 'design for recovery' and encourage the phasing out of paints and other coatings that make recovery difficult. Similarly, increased collection may address potential barriers to support for landfill restrictions, and may reduce the cost of such restrictions. The response urges Defra to consider how diversion of low-grade wood waste into heat recovery might affect the economics of, and support for, a wood landfill restriction, especially if coordinated with the renewable heat incentive for CHP installations.

Question 25: What would be the benefit in these approaches?

Who responded?

18 responses. 5 wood trade associations, 1 other trade association, 5 LA bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (5 responses)

One WTA stated that improving the collection and sorting infrastructure is a good idea and that whilst individual company amounts of wood waste may be small they can be aggregated. It also believes that there would be benefits in reducing contaminants. However, they are of the opinion that many of the treatments are harmless, but the regulators are reluctant to accept this. In their experience voluntary schemes don’t work.

Another WTA also mentioned improved collection and sorting infrastructure for a more coordinated approach. They believe that producer responsibility is worth exploring but only if the cost drives recovery for recycling.

Another WTA was in favour of producer responsibility which they believe will lead to less waste and continued re-use of packaging. They are of the opinion that improved collection, sorting and recycling facilities will aid the local economy in terms of employment and income from the sales of both recovered and waste wood as would improving facilities.

One WTA states that their membership are in general supportive of a restriction but that infrastructure for wood waste collection and disposal would need to be improved with assistance required from government in exploring routes to improve segregation at source and to encourage diversion to recycling ahead of energy.

Another WTA was of the opinion that the right technology and infrastructure for a network of small-scale WID compliant energy from waste plants would help to find an outlet for the low-grade wood waste for which no ready markets exist. They also mentioned hazardous wood waste which would have restricted disposal options.

Other trade associations (1 response)

The respondent states that regulation should be a last resort and may not be the most cost effective option. It believes that alternative / accompanying approaches may result in greater flexibility for joint working between industry, Government and other key stakeholders to help develop and implement innovative solutions for a lower overall cost within a reduced timeframe.

LA bodies (5 responses)
One LA body is of the opinion that a better approach would be to introduce a complete ban on biodegradable wastes, together with a requirement to separate paper, card, garden, food, textiles and wood wastes from mixed wastes. This would enable a risk based approach where waste could be monitored for biodegradability at landfill sites, and those exceeding biodegradable waste limits can be traced and proportionate sanctions taken. It states that the evidence from Europe is clear that a wider ban including biodegradable waste is required to deliver a Zero Waste Economy. However, the LA body is of the view that the relatively small volumes of wood waste landfilled suggests that a landfill ban on its own will be ineffective in driving changes. Government should instead consider increasing landfill tax beyond £80/tonne in the immediate future and announce a phased introduction of a complete ban on biodegradable wastes.

One LA body believes prevention of wood waste should be the first response followed by reuse because these measures limit the amount of waste to be managed and disposed of, whereas a restriction may not. It feels that a more holistic product based approach, where all elements of the supply and waste treatment chain take a share of the obligations, would be beneficial. For example:- A producer responsibility scheme (similar to WEEE) for furniture, should encourage better design both for reuse and recycling. Treatment facilities would then be more confident of the supply of suitable material. By targeting individual product types (e.g. furniture) it also ensures that there are no perverse incentives to changing from wood materials to other material types (e.g. plastics) to avoid responsibilities. This approach also supports the waste hierarchy.

One LA body is of the opinion that the government could provide support that would stimulate further market developments including simplifying the current planning regime and providing certainty on green subsidies available for facilities recovering energy from the treatment of wood waste. It considers these to be far more positive measures than simply implementing a restriction.

One LA body believes alternative approaches (such as producer responsibility and collection hubs) will engage with the greater community and would make alternatives to landfill a more viable option for organisations not currently well provided for – this would also reduce the temptation to find other means (fly tipping etc) of disposing of small scale wood waste.

One LA body states benefits as improved collection and sorting infrastructure and the support of LA trade waste services for SMEs. They believe much of the necessary infrastructure is already in place in the form of HWRCs and WTSs, with new facilities able to be configured to accommodate the services from the start.

Such local services can be convenient and cost effective. They are of the view that producer compliance which has proven to be effective with other waste streams could be successfully applied to wood waste. The benefit would be ensuring sufficient funding available to ensure necessary diversion from the outset.

Waste management companies (1 response)
The respondent believes that a restriction will not be enforceable or practical. They are of the opinion that evidence shows that wood waste to landfill is projected to reduce further, landfill tax being a major incentive. Government could do more to promote and support the increased reuse of wood and furniture. More can also be done to improve the collection infrastructure of council bulky waste collections and transfer facilities for small businesses, while packaging recovery targets for wooden packaging should be increased to reflect current levels of recycling. In the longer term restrictions should be implemented on the use of hazardous substances to treat wood or make MDF. The benefits will include increases in the amount of wood reused, potential revenue generation for charities and community groups and ease of use for businesses not currently recycling wood waste. Higher targets will increase PRN[5] values, encouraging more collections of wood packaging, and a RoCs approach (as with WEEE) will make wood easier to reuse and recycle.

Construction and demolition (2 responses)
One C&D company believes all of the approaches listed will benefit the industries involved. Another is of the opinion that these approaches will limit cost to the industries involved.

Energy companies (1 response)
The respondent believes the UK needs to drastically reduce dependence on landfill to meet the challenge of declining landfill space and EU Landfill Directive Targets and that England lags behind its neighbours in dealing with the issue citing the Green Alliance report as evidence that landfill restrictions are successful. Alternative measures such as high landfill tax rates in conjunction with the ban are also effective. Healthy levels of demand and a strong, visible market for waste wood should minimise fly tipping and on site burning.

Forestry industry (1 response)
The forestry industry representative is of the opinion that these approaches would increase awareness of wood as a resource. Producer responsibility schemes accompanied with reverse logistics would be especially helpful for small businesses. Similar schemes could be considered for construction industry where wood suppliers are responsible for wood waste collection, large construction companies could

[5] PRN=Packaging Waste Recovery Note

benefit although it would be more difficult to apply to small projects. Reducing contaminants on wood products could potentially allow greater recycling and re-use, along with minimised environmental pollution through service life e.g. chemical leaching into soil in outdoor applications.

Others (1 response)
The respondent is of the opinion that benefits will include increased recovery and improved environmental performance with reduced risk.

Environmental interest group (1 response)
The respondent is of the opinion that taking wood waste out of landfill should be seen as part of a wider evolution in biogenic waste disposal and resource management. They believe if a restriction were to be by way of taxation rather than prohibition, this could potentially be achieved by charging waste potentially containing wood at the 'higher rate', thus incentivising the segregation of such waste wood but allowing for circumstances where this is not possible.

Question 26: What are the barriers to these approaches?

Who responded?
18 responses. 4 wood trade associations, 1 other trade association, 5 LA bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 2 "others" and 1 environmental interest group.

How they responded

Wood trade associations (4 responses)
Two WTAs believe that clarification is required on the issue and definition of 'contaminants'. They state there are some treatments in wood panel production which are an essential part of the production process. They do not believe it is realistic to expect an industrial process such as wood panel production to be possible with no wood treatment at all. One believes that the producer responsibility packaging scheme is a good model but the value of PRNs is so low that it's stopped driving new material.

One WTA states that cost is a barrier. The producers do not want the cost of recovering their material but suffer the cost of empty return journeys by their vehicles. The suppliers do not want the cost of disposal whereas if they separate their waste streams it has proven to be a cost benefit. Local authorities do not want the cost of disposal, yet by outsourcing their waste management they do not appear to receive the benefits from the sale of their waste products. The cost of transport to

major recycling facilities could be alleviated by the creation of more local 'social enterprise' initiatives.

Another WTA was of the view that barriers include lack of funding and government support, government establishing an appropriate infrastructure network, planning resistance and investor uncertainty over long-term continuity of government policy.

Other trade associations (1 response)
The respondent is of the opinion that the principle barriers include co-ordination across a large and diverse range of industrial sectors which produce waste wood and have different interests in the management of waste materials.

LA bodies (5 responses)
One LA body is of the opinion that a restriction is a blunt instrument requiring sorting, collection and treatment infrastructure to be in place. It is difficult to accurately project waste arisings, and therefore to plan the corresponding capacity to prevent either over capacity or an oversupply of feedstock.

One LA body states that a key barrier will be encouraging manufacturers to develop products with reduced contaminants that are designed to allow for reuse as a primary focus, prior to them being recycled or treated. They suggest options to incentivise industry to make changes will have to be considered by the Government.

One LA body is of the opinion that planning could be a barrier citing current difficulties in achieving permission for waste treatment facilities due to the requirements of the Localism Act and National Planning Policy Framework. This has been recently highlighted by the permanent closure of the Sonae waste wood chip recycling facility which has been subjected to planning delays and local opposition. They noted green subsidies as another barrier. Although these subsidies (such as ROCs, RHI and FiTs) increase the financial viability of projects, there is a concern over the uncertainty of these subsidies post 2017 when the Electricity Market Reform (EMR) is due to be implemented.

One LA body believes producer responsibility would be time consuming to implement and enforce. Although collection hubs would work, these would have to represent the cheapest viable option for small scale wood producers. The LA body gave a local example of recycling centres providing a service to commercial organisations on a 'pay per throw' basis, which although cheaper than other legitimate disposal/treatment routes, are significantly underused.

One LA body was of the view that implementation would be complex due to the different grades of wood waste and incorporation of wood within products containing other materials, e.g. furniture.

Waste management companies (1 response)
The respondent did not feel there are any barriers to the approaches, particularly in promoting more reuse and recycling and encouraging councils and companies to work more closely with the community/charity sector. The main difficulty is turning the encouragement into practical action by the public, SME's and large businesses.

Construction and demolition (2 responses)
Both the C&D companies were of the opinion that the desired outcome will take some time. One was of the view that replacing current wood treatment with ones with a lower environmental impact may have an impact on the durability of timber structures. If the replacement treatments are less effective timber may have to be replaced more frequently, resulting in more wood waste.

Energy companies (1 response)
One energy company believes the budget limits for the ROCs is the main barrier to maintaining support levels. The costs of applying the restriction/any alternative measure are unclear. Costs will need to be weighed against the volume of wood that could be diverted from landfill and corresponding environmental benefits.

Forestry industry (1 response)
The forestry industry representative is of the opinion that improved collection and sorting infrastructure for small business may not lead to greater collection if there are alternative outlets, an increase in business costs or a need to need to purchase a vehicle to take wood waste to collection hubs. As they believe voluntary producer responsibility schemes are likely to be less effective, there should be an obligation to sort wood by grade and source. Lastly, they are of the opinion that reducing contaminants on wood products would require participation not only from wood product producers but also from chemical suppliers.

Others (2 responses)
One respondent is of the opinion that it could bring about inactivity (through resource limitations) in the wood recycling sector.

The other respondent believes that the big wood producers need to give their support as if wood in the retail sector is recycled to the detriment of large companies, the construction industry will suffer.

Environmental interest groups (1 response)
The respondent is of the opinion that change in existing practices is required.

Question 27: Are there any other approaches we should consider?

Who responded?
15 responses. 3 wood trade associations, 5 LA bodies, 1 waste management company, 1 construction and demolition, 1 energy company, 1 forestry industry, 2 "others" and 1 environmental interest group.

How they responded

Wood trade associations (3 responses)
One WTA believes that while measures to increase re-use and improve collection infrastructure are positive and should be developed, they do not provide an adequate replacement for a restriction on sending wood to landfill.

One WTA felt that research work on segregation of re-usable wood from high volume waste transfer stations was needed, believing that with a bit of innovation in processing machinery at least 20% of all wood waste could be reused.

Another WTA thought there may be scope to capture high grade wood not collected by the wood recycling sector (because it's produced in low volumes) by encouraging matching of deliveries to businesses, with collection services to back-haul the wood waste to central consolidation points. There may also be scope to consolidate wood waste from small timber businesses whose wood waste production is too low for skip collection. This would require a sufficient concentration of participating businesses within a restricted area to allow the establishment of a viable collection network. They also thought that as many wood treatments are becoming more difficult to detect, there may be a case for introducing regulation to ensure that future treatments can be made more readily identifiable, so that end of life options can be more readily determined.

LA bodies (5 responses)
One LA body would like more support for the reuse sector. They provide examples from a WRAP report on wood reuse in Wales which could be promoted. They believe in Government intervention to encourage manufacturers to develop wooden products that take recycling into account as part of their design. This would reduce the amount of composite wood products that become waste as a result of being difficult to process.

One LA body believes there should be a continued increase in landfill tax beyond 2014/15. Another would like to see incentives to separately collect wood waste at the kerbside.

Another LA body agrees that the landfill tax is successful in encouraging increased reuse and recycling for a large number of materials. They agree that alternative approaches that encourage diversion of waste from landfill further up the hierarchy should be considered.

One LA body agreed with others that the continuation of the landfill tax will be successful in encouraging reuse and recycling. It agrees that the alternative approaches suggested should be prioritised however, at HWRC where space is an issue such approaches must allow for co-collection of clean and dirty wood. The LA body also states that increased support and promotion of reuse facilities will have impacts beyond the wood sector and should be an important part of all waste initiatives. They believe SMEs would benefit from effort to make it easier for them to recycle, but this should not just be restricted to wood. Paid access to HWRCs or 'collection clusters' which are able to accept a wide range of materials for recycling would be beneficial and increase recycling and recovery rates. This would complement any producer responsibility schemes and, depending on the location of the collection clusters, may also allow for establishment of return logistics. It believes reducing the contaminants in wood to aid recycling is a long term solution and this should be explored.

One LA body suggested the enhanced design of furniture and other bulky multi-material products to enable easier separation of constituent materials to enable a reduction of wood waste in mixed loads and contaminants on wood products. It sees this as a long-term aspiration that would need buy-in (and possible incentives) in the manufacturing sector. There should be continued support for generating treatment capacity for mixed wastes, whether or not they contain a fraction of wood waste.

Waste management companies (1 response)
The respondent thinks that promoting reuse should be considered giving the example of charities it works with who sell a range of second hand furniture and other wood products. Their HWRCs sell on furniture in good condition to the public.

Forestry industry (1 response)
The forestry industry representative gave the idea of introducing extended producer responsibility whereby producers of wood products would have a responsibility for the entire life-cycle of the product especially for the take-back, recycling and final disposal. This idea could be extended to wood product importers/distributors (first placement on to the UK market) as around 60% of wood products are imported.

Producers could support the development of necessary infrastructure for wood waste collection and sorting by grade and source.

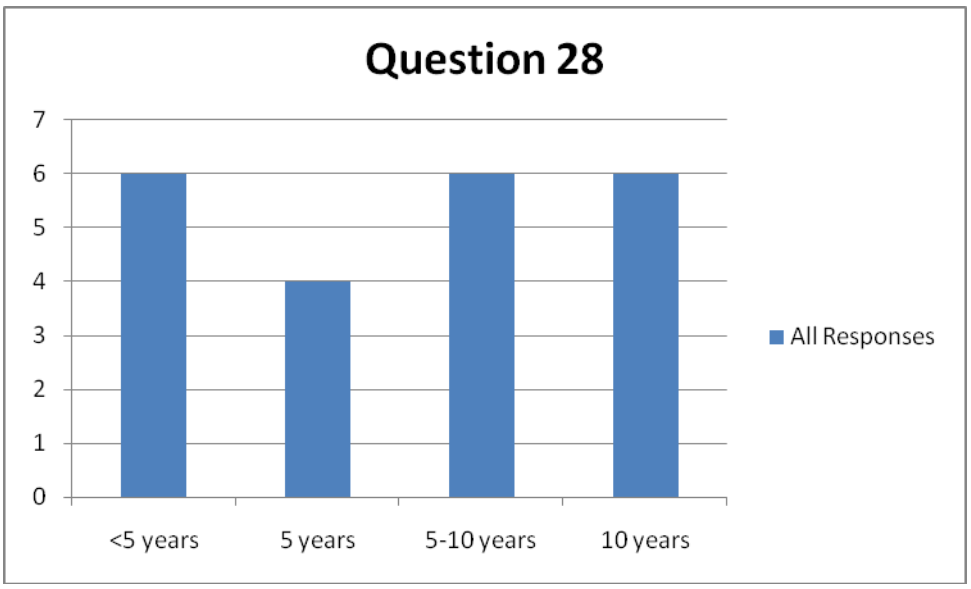
Others (2 responses)
One respondent believes in the improved flexibility in the legal response to pragmatic wood recovery and that the Environment Agency position can be overly conservative and restrictive.

One respondent is of the opinion that companies in the UK who sell low quality furniture which are then discarded should be taxed reflecting their true environmental costs leading to people valuing products more highly and being more likely to look after them and repair them if they become broken. This approach treats the cause rather than the symptoms.

Environmental interest group (1 response)
The respondent does not want alternatives considered for wood waste. It feels that the supporting evidence is not strong enough to ban arboricultural and green garden waste. It also wants to see the introduction of an incineration tax.

Question 28: What should be the lead in time for any restriction on wood waste to allow time for the necessary infrastructure to develop? < 5 yrs, 5 yrs, 10 yrs, > 10 yrs

Who responded?
23 responses. 5 wood trade associations, 2 other trade associations, 5 LA bodies, 3 waste management companies, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others”, 2 environmental interest groups and 1 professional body.



How they responded

Wood trade associations (5 responses)
Two WTA believe less than 5 years is a sufficient lead in time. Whilst another concludes that less than six months should be sufficient lead-in time for necessary infrastructures to develop. One other WTA stated more than 5 years and one stated 10 years.

Other trade associations (3 responses)
One other trade association stated less than 5 years whilst two other trade associations thought that 10 years is sufficient lead-in time.

LA bodies (5 responses)
One LA body is of the opinion that less than 5 years is sufficient. Two LA bodies suggested 5 years, whilst two other LA bodies thought 10 years lead-in time is sufficient.

Waste management companies (3 responses)
All the WM respondents stated 5-10 years.

Energy companies (1 response)
The respondent stated less than 5 years.

Forestry industry (1 response)
The forestry industry representative thought 5 years lead-in time.

Others (1 response)

The respondent stated 5 years.

Environmental interest group (2 responses)
One respondent suggested 5-7 years the other 5-10 years.

Professional bodies (1 response**)**
The respondent suggested 5 years.

Question 29: What infrastructure is necessary?

Who responded?
19 responses. 5 wood trade associations, 1 other trade associations, 6 local authority bodies, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others” and 1 environmental interest group.

How they responded

Wood trade associations (5 responses)
All five WTA are of the opinion Energy from Waste (EfW) infrastructure is necessary, with two specifically mentioning WID compliant EFW.

One WTA also mentions the need for market information to filter through to SMEs and infrastructure to identify treatments and another mentions space on waste transfer stations. Collection is also mentioned by more than one respondent.

Other trade associations (1 response)
The respondent mentions infrastructure to help sort/segregate waste wood and additional WID compliant combustion facilities with energy recovery are likely to be required.

LA bodies (6 responses)
Three LA bodies mention EFW infrastructure, with one specifically stating WID compliant. One alludes to EFW infrastructure in referring to biomass markets and flags up the need for capacity across the UK to reduce haulage costs and reliance on export.

One LA body states re-use infrastructure is necessary whilst two refer to recycling facilities. Collection and sorting were mentioned by three LA bodies.

One LA body believes that treatment capacity for mixed wastes, whether they contain wood fractions or not, is vital.

Waste management companies (1 response)
The respondent is of the view that infrastructure for the treatment of low wood grades (C and D) and WID compliant biomass incinerators which can take mixed waste are necessary.

Construction and demolition (2 responses)
Both C&D companies believe that MRFs (with a capability to separate high and low value wood waste), space and WID compliant incineration plants would be required.

Energy companies (1 response)
The respondent is of the opinion that a restriction may lead to a need for additional storage of processed and unprocessed wood so it is important legislation in this area is not too restrictive.

Forestry industry (1 response)
The forestry industry representative believes there is need for energy-from-waste facilities.

Others (1 response)
The respondent is of the opinion that an improved legal framework that supports varied recovery activity would assist in widening the end use for any material.

Environmental interests group (1 response)
The respondent mentions space.

Question 30: What would be the practical difficulties and issues in implementing a restriction on wood waste? Please outline

Who responded?
21 responses. 5 wood trade associations, 1 other trade associations, 5 local authorities, 3 waste management companies, 2 construction and demolition, 1 energy company, 1 forestry industry, 1 “others”, 1 environmental interest group and 1 professional body.

How they responded

Wood trade associations (5 responses)

One WTA believes a restriction would require effective policing at landfill sites, and sufficient aggregation and storage capacity. In addition the seasonality of wood waste should be considered including the impact of this on regulatory requirements.

One WTA believes it would be more difficult to implement for domestic users than businesses, and there will be a cost impact.

One WTA is of the opinion that the infrastructure needs to be ready first.

Another WTA highlights barriers identified in a report[6] which include: little integration along the supply chain, lack of data on quantities of wood waste and its disposal, inefficient procurement practices, scant knowledge of markets for wood waste, lack of business models for wood waste collection schemes and, confusion over the legislative and regulatory framework surrounding the disposal, transport and use of wood waste

One respondent states monitoring and verification issues especially where there is a culture of informal disposal.

Other trade associations (1 response)

The respondent identifies practical difficulties in implementing robust, cost effective waste acceptance procedures and believes that irrespective of the segregation process adopted it is likely that some fraction of waste wood may be present in mixed wastes which would neither be practical or cost effective to remove. The respondent also notes that sufficient infrastructure will need to be available.

LA bodies (5 responses)

One LA body flagged up local supply and seasonal issues as the current spread of wood sorting and treatment facilities does not reflect the geographical population.

One LA body is of the opinion that a complete landfill ban will in effect require pre-treatment of all the residual waste arisings even though this waste is comprised of only limited amounts of wood waste. There are also concerns around market preparedness and stability. Also, restriction of a material (rather than a ban of certain items i.e. WEEE) will be much more challenging to implement, and could lead to significant levels of bureaucracy and red tape.

[6] The Joinery Resource Efficiency Action Plan

One LA body is concerned with monitoring and enforcement flagging the need to reduce costs and that it may be unhelpful to introduce the requirement for additional reporting

One LA body is of the opinion that a restriction would place a significant burden on the landfill operator and that sharing the responsibility through the duty of care process would help. Inspections at landfill would provide only a snapshot view and be unlikely to uncover misuse. There would need to be some form of 'acceptable' level of wood waste landfilled.

One LA body is of the view that segregation of wood waste presented as a fraction in mixed loads is likely to be the primary barrier. Other barriers may be; different applications in terms of separation categories; limited space available for additional separation; cost of additional containerisation; and current treatment capacity available - both for mixed wastes and source separated low grade wood.

Waste management companies (3 responses)
One WM company is of the opinion that the requirement will need to be enforced at the producer end. Once mixed into the residual waste stream it is very difficult and costly to extract.

One WM company is of the view that any difficulties would depend on de minimis levels set. With risk-based regulation of landfills, there is little on-site inspection. It is likely that responsible operators would assist, but ultimate enforcement should be directed at producers unregulated practice may be encouraged.

One WM company believes that a major difficulty will be enforcement and whose responsibility it will be to separate wood from other waste destined for landfill. It also flags up the potential for 'hiding' wood waste in mixed waste and fly-tipping. There will also be problems if wood processors refuse to take certain grades of wood if markets are flooded, as has happened recently. Waste management companies cannot afford to stock pile wood if other outlets are not available.

Construction and demolition (2 responses)
One C&D company mentions onsite space for segregation, disposal of contaminated and painted timber if suitable local incineration plants not available, and increase disposal costs.

One C&D company believes that there will always be a need for mixed waste disposal from construction sites therefore the onus needs to be on segregating the wood from these mixed waste skips at MRFs.

Energy companies (1 response)
The respondent is of the opinion that an oversupply of low grade material may be an issue, however the demand from biomass plants is likely to minimise this issue. It also flags overly burdensome storage restrictions.

Forestry industry (1 response)
The forestry industry representative is of the opinion that enforcement and monitoring are likely to be issues.

Others (1 response)
The respondent believes increased fly tipping will occur if there is no legal route for disposal. A better understanding of limiting factors on use in individual recovery operations – the regulators need to work with end producers as well as wood recyclers.

Environmental interest group (1 response)
The respondent believes that the responsibility should be shouldered upstream. Ensuring compliance is bound to be the greatest practical difficulty. The establishment of the grading process will require training. They are concerned about issues surrounding arboriculture and green garden wastes and are of the opinion that any restriction be undertaken as a separate initiative. There will be segregation issues at household level that will require resolution.

Professional bodies (1 response)
The respondent mentions enforcement and that the experience gained from the enforcement of existing bans on liquids, tyres etc will provide valuable guidance in considering the enforcement of any wood waste restriction. The suggested mixture of measures may well be sufficient to provide the necessary enforcement.

Question 31: Where should burden of proof/ responsibility lie (producer, waste management company)?

Who responded?
18 responses. 4 wood trade associations, 2 other trade associations, 4 local authority bodies , 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 2 “others” and 1 environmental interest group.

How they responded

Wood trade associations (4 responses)
Two WTAs stated with the producer and two stated with the waste management company.

One WTA mentioned partnership working between industry, regulators and government is a preferred approach but the waste collector responsibility appears most sensible. They feel the greatest challenge will be to avoid fly tipping where a significant increase in cost to disposers leads to a rapid growth in illegal disposal rather than a shift to legitimate landfill diversion.

Other trade associations (2 responses)
Both stated the producer.

LA bodies (4 responses)
Two LA bodies are of the opinion that the burden of proof should lie with the producers of waste and two believe it should lie with both the producers of waste and the waste management companies.

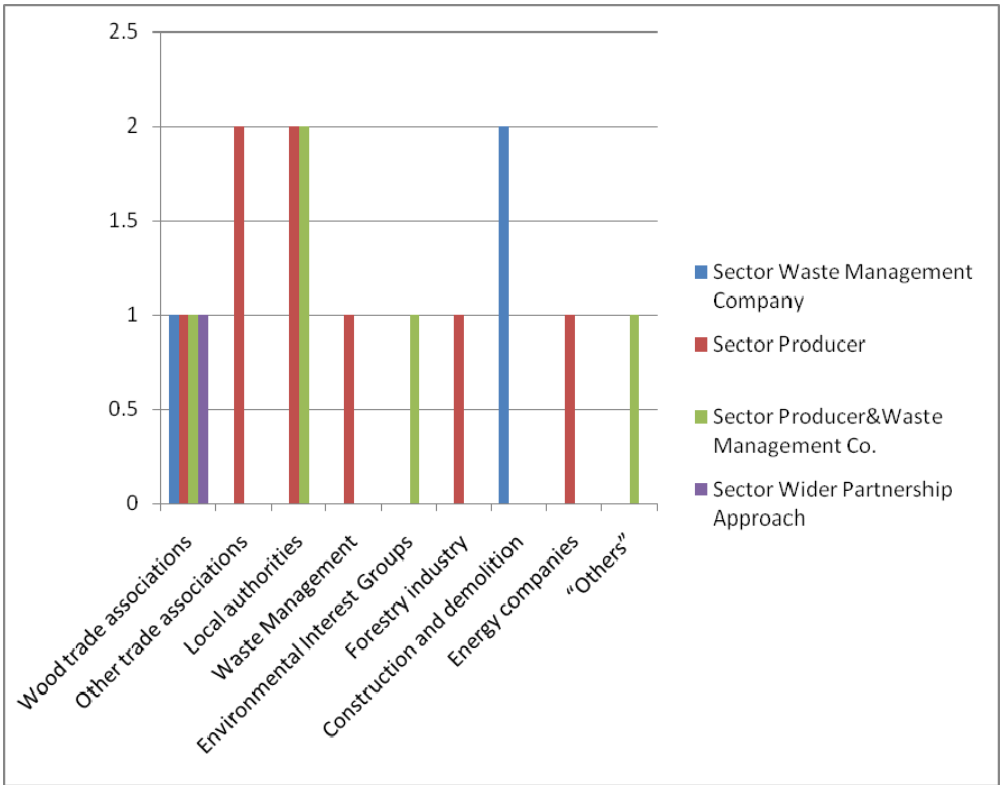
Waste management companies (1 response)
The respondent is of the opinion that the burden of proof should lie with the producers of the waste.

Construction and demolition (2 responses)
Both are of the opinion that the burden of proof should lie with waste management companies.

Energy companies and forestry industry (2 responses)
The respondents states it should lie with the producers of the waste.

Others (2 responses)
Both respondents conclude that responsibility should lie with the producers of the waste and the waste management companies.

Environmental interest group (1 response)
The respondent believes the burden of proof should lie with both the producers and waste management companies. The producer (business or domestic) should be responsible for segregation and the waste management company for ensuring that non-segregated waste, including wood, is not accepted.



Question 32: How much would the additional administration activity associated with compliance of a restriction cost you?

Who responded?
11 responses. 3 wood trade association, 3 LA bodies, 1 waste management company, 2 construction and demolition, 1 "others" and 1 environmental interest group.

How they responded

Wood trade associations (3 responses)
One WTA is of the opinion that quantities of materials landfilled by wood recyclers are extremely small therefore the cost impact on wood recyclers would be minimal. For general waste operators the challenges could be more serious. Load inspections to identify wood in mixed loads would be considerable in terms of cost. Depending on the penalties for process failure the additional costs could be sufficient to make certain sectors and waste streams non-viable.

One WTA is of the view that everybody should have responsibility and that waste management companies already have procedures in place for separation of other materials so it should not be a burden.

One WTA wood trade association believes it is difficult to state a general administrative burden across the wood processing sectors as there are a variety of business models. This will vary from business to business

LA bodies (3 responses)
One LA body believes the additional cost will depend on the nature of the restriction and is therefore not possible to quantify although significant cost could be accrued.

One LA body is of the opinion that cost will depend on the degree of separation required for household waste wood – if marginal separation is required then the additional admin cost would be nominal.

One LA body is of the view that actual cost is difficult to quantify although the potential for some costs to be transferred to other waste streams rather than wholesale increases, and the potential for savings, should be considered. It believes that costs are likely to be more excessive, for any sector, where wood waste separation infrastructure is not already in place.

Waste management companies (1 response)
The WM company believes that without a defined minimum level, the cost of sorting mixed waste to remove all wood would be prohibitive.

Construction and demolition (2 responses)
One C&D company states there will be an increase in costs for mixed waste skip and disposal costs for timber treated or coated with hazardous substances.

One C&D company is of the opinion that if the segregation was carried out at a MRF there would likely be an increase in gate fees to these facilities for mixed loads.

Others (1 response)
The respondent is of the view that there will be a significant cost (practically and administratively) in dealing with the increased fly tipping.

Environmental interest group (1 response)
The respondent notes that the diversion of wood waste from landfill will bring new business opportunities, particularly if the diverted wood is used to best advantage.

Question 33: Are there any possible unintended consequences of a restriction on wood waste?

Who responded?
20 responses. 5 wood trade associations, 1 other trade associations, 5 LA bodies, 1 waste management company, 1 construction and demolition, 1 energy company, 1 forestry industry, 2 "others", 2 environmental interest group and 1 professional body.

How they responded

Wood trade association (5 responses)
One WTA believes that wood will end up being disposed of illegally, through burning, fly-tipping etc. All stakeholders must bear in mind that a convenient option will now have been removed. There is no point in restricting landfilling of wood unless something can be done about "difficult" wood like upholstery furniture.

Two WTAs was of the view that current energy policies (namely the Renewables Obligation) undermine the waste hierarchy by subsidising energy generators to outbid wood recyclers in purchasing waste wood which could be recycled. Increased fly tipping and the use of informal markets for the disposal of wood waste is likely to lead to inaccurate data on the quantity of wood waste arising and the disposal route.

One WTA believes a possible unintended consequence is unlicensed disposal routes for contaminated/treated timber.

One WTA believes that unintended consequences may include; fly tipping, disguising low grade waste by mixing with higher grade material, stockpiling of wood waste which may include hazardous material and stockpiling of wood which may cause a fire risk.

Other trade associations (1 response)
One other trade associations is of the view that there won't be sufficient capacity to manage lower grade waste woods which is likely to result in increased costs for managing this material.

LA bodies (5 responses)
One LA body is of the opinion that an unintended consequence is likely to be the oversupply of wood waste in some areas which will lead to the displacement of other wastes (that can be landfilled) from treatment facilities.

One LA body is of the view that there is to be a diversion of extra waste (including municipal waste) to incineration. This will potentially be very expensive could lead to

a huge amount of waste with no available end destination. A potential side-effect could also be that more wood waste is either imported or exported. This will impact upon wood waste projections and will influence treatment and disposal costs. They also believe that this could lead to increased levels of fly tipping.

One LA body is of the opinion that this will discourage the development of facilities within England, but that the export of such material may increase to meet the restrictions as the cheapest outlet will be sought and there is the risk that the market may not be able to respond appropriately (due to planning restrictions, inability to secure long-term contracts and uncertainty of green subsidies). Local authorities are more likely to benefit from maintaining flexibility.

One LA body believes that a restriction may encourage small traders to find alternative outlets for their waste such as fly tipping, which is likely to have an impact on local authorities in dealing with such waste.

Waste management companies (1 response)
One WM company believe a restriction of wood waste to landfill could deprive some landfill operators of a ready supply of day cover.

Construction and demolition (1 response)
One C&D company is of the view that a restriction could bring about unintended consequences such as illegal disposal (fly tipping) and increased wood fires.

Energy companies (1 response)
One energy company believes that if the cap policy and the capacity ceiling on dedicated biomass in the UK which manages the risk of too many waste wood power generation plants being built are implemented poorly and deters all new plants this could lead to a shortfall in demand.

Forestry industry (1 response)
The forestry industry believes increased burning and fly-tipping will potentially be some of the unintended consequences in the event of a restriction.

Others (2 responses)
One organisation from this category is of the view that fly tipping will increase as a result of a restriction.

One buyer in this in category is of the opinion that a restriction could result in recyclers blending unwanted wood materials into the product used by board manufacturers, causing severe problems and costing millions.

Environmental interest groups (2 responses)
One environmental interest group believes that an unintended consequence of a restriction could be the long-term 'lock-in' into incineration, which is contrary to the ideal which is reduction, re-use and recycling of waste where possible. They raised concerns regarding the toxicity of emissions from the incineration of treated waste wood.

One environmental interest group believes there might be health risks associated with storing and burning waste wood as biomass.

Question 34: Given the evidence available do you think there is a case for a further government action on wood waste? If yes, should this be a) a restriction b) other measures c) combination of a restriction and other measures.

Who responded?
20 responses. 5 wood trade associations, 1 other trade associations, 5 LA body, 1 waste management company, 2 construction and demolition, 1 energy company, 1 forestry industry, 2 "others", 1 environmental interest group and 1 professional body.

How they responded

Wood trade association (5 responses)
One WTA association mentions the current market situation created by the coincidence of a number of events; the recession, mild winter in Europe, and the closure of the Sonae panelboard mill. They believe much depends on the emerging biomass market. They also believe that the landfill tax has helped to reduce the amount of wood going to landfill and strongly support the continuation of the landfill tax beyond 2014. They state that now is not the time for restricting wood waste, although that time may come again.

One WTA was of the opinion that a restriction should be placed on materials which can easily be identified and have markets. Routes to improve segregation at source and diversion to recycling ahead of energy should also be explored.

One WTA believes that alternative facilities for the re-use and recycling of waste timber can create employment and improve the local economy. UK could learn lessons from other European countries about keeping waste timber out of landfill.

Another states that the Government would need to be confident that action would not penalise manufacturers of timber products relative to providers of alternative and less sustainable or recyclable construction materials. They refer to the contribution such products can make to the UK in meeting targets for carbon reduction as well as the wider economic, aesthetic, biodiversity and community benefits of using wood, mentioning the growth and employment potential as the construction sector develops and potential for recycling and as a renewable.

One WTA stated a preference for a combination of a restriction and other measures but state that a viable market and infrastructure will be required before the wood waste can be diverted.

Other trade associations (1 response)
The respondent is, in principle, supportive of a reduction in waste wood being diverted to landfill. However, it is important this is a holistic, risk based approach requiring infrastructure and long lead in times. They state that additional legislation may not be the most cost effective option.

LA bodies (5 responses)
One LA body believes that a ban on wood waste alone is likely to be ineffective. There are low qualities of dispersed quantities wood which make it a difficult administration and enforcement task.

One LA body is of the opinion that other measures need to be considered as they see a landfill ban on wood waste as an 'end-of-pipe' solution which does not encourage resource efficiency higher up the chain. Given existing drivers such as landfill tax and the decline in wood waste to landfill restriction would be challenging and expensive to implement and may not be as environmentally beneficial as it would first appear, relative to other measures. They are particularly concerned about the processing capacity that would be needed nationally. They feel that the resources required could be better utilised elsewhere.

One LA body believes there will be a demand for waste wood for energy production but, given the reduction in ROC support from 2016, there may be a reduced number of biomass facilities being developed. Government needs to consider when a restriction may be implemented and needs to ensure that appropriate lead times are provided for the market to develop treatment options. They concluded that it would be difficult to meet a landfill restriction, until the new facilities are in place.

One LA body is of the opinion that a restriction should be implemented as part of a set of measures, including producer responsibility, financial incentives and encouragement and the provision of a viable network of alternative use such as WID

compliant Energy from Waste plants or stimulation of recycling and re-use markets (something akin to Recycling Credits).

Another LA body also believes that other measures need to be considered. Whilst a restriction has merits, implementation should be considered based on specific materials within the wood waste definition. Careful consideration may also need to be given to application on a sector specific basis, with the possibility of exemptions.

Waste management companies (1 response)
The respondent supports a combination of measures including supporting re-use of wood and furniture, improving the collection infrastructure of council bulky waste collections and transfer facilities for small businesses, Increasing packaging recovering targets for wooden packaging to reflect current levels of recycling and restrict the use of hazardous substances to treat wood. They want to see government support the development of more WID compliant biofuel incinerators.

Construction and demolition (2 responses)
Both companies were of the opinion that a combination of a restriction and other measures should be considered.

Energy companies (1 response)
The company supports diversion of wood waste from landfill either via restriction or an alternative regulatory tool. It cites evidence from the Green Alliance (2007) report.

Forestry industry (1 response)
The respondent believes there is a potential need to support development of energy from waste facilities,. In addition wood waste should be separated at source to ensure better quality recyclates and minimise the volume of mixed loads.

Others (2 responses)
One respondent believes that the appropriate support structure must be in place first or there will be environmental damage and economic costs.

The other believes that a restriction would be appropriate as it would provide legal certainty and drive innovation and investment in infrastructure. Although the available evidence may point to a gradual decline in the amount of wood waste sent to landfill in recent years, there is always the possibility that in the absence of a restriction, this trend might not continue.

Environmental interest group (1 response)
One environmental interest group believes a combination of a restriction and other economic measures should be considered.

Professional bodies (1 response)
The respondent questions whether it is really necessary to introduce landfill restrictions given the other drivers which are already in place and are effective. Analysis of the current and future state of the wood waste market, even without policy instruments, suggests that the business as usual approach is realistic as the market may already be moving towards the desired outcome without the need for additional policy interventions. The evidence in the document and from the wood processing industry is that the market is presently buoyant and the landfill restriction may not be necessary.

Question 35: Please outline further what government action you would like to see.

Who responded?
10 responses. 2 wood trade associations, 4 LA bodies, 1 energy company, 1 "others", 1 environmental interest group and 1 professional body.

How they responded

Wood trade associations (2 responses)
One WTA is opposed to take back schemes and believe they will only work if there are suitable recycling options available as they are costly and could put an intolerable burden on the product manufacturer. Voluntary take back schemes may have a place at a small scale local level.

One WTA is of the opinion that the role of Government is important and could be pivotal in creating greater awareness of wood waste markets, helping businesses to understand the opportunities that exist. Implementing a restriction before the industry is able to put a value on wood waste could be a burden for a number of SMEs. They also stressed the need for Government policy to be joined up.

LA bodies (4 responses)
One LA body is of the opinion that Government should introduce a complete ban on biodegradable waste, combined with a requirement to sort paper, card, garden, food, textiles, and wood. They would also like to see an increase in the of landfill tax beyond the current £80/tonne 2014/15. Together the two provide a medium and long term solution.

One LA body believes the reuse sector can play a crucial role in diverting wood waste from landfill (e.g. furniture), whilst simultaneously generating other social and economic benefits. They would like to see a greater emphasis on the reuse sector by

Government. They feel that further consideration should be given to producer responsibility as this would tackle waste generation holistically and align with the waste hierarchy. Finally, efforts to reduce contamination of wood would allow a greater proportion of wood to be reused or recycled at a higher grade.

One LA body is of the opinion that additional support required from Government includes achieving planning permission so that additional waste treatment capacity can be provided et at the right time as well as reassurance that financial support for energy generation will be available post-2017 when the Electricity Market Reform is implemented.

Another LA body is of the view that improved collection and sorting infrastructure, enhanced design of furniture and other bulky multi-material products to enable easier separation of constituent materials, and continued or enhanced support for generating treatment capacity for mixed wastes, whether or not they contain a fraction of wood waste.

Energy companies (1 response)
The respondent believes that biomass demand alone will not be a strong enough driver to divert wood waste from landfill, reducing the ROC eligibility threshold would mean that lower grade wood could be more easily diverted. The company also mentions storage and the need for guidance. Either instead of or in conjunction with a restriction the landfill tax should continue to increase.

Environmental interest group (1 response)
The respondent believes that benefits from a restriction depend on the implementation, incentivising the Waste Hierarchy and use of supporting economic instruments such as taxation, including on incineration. They believe that Government should progress a ban on wood waste to landfill within a holistic strategy for moving biogenic waste as a whole up the hierarchy.

Professional body (1 response)
The respondent questions why Defra is looking at wood waste restrictions rather than food waste.

Others (1 response)
One respondent in this category is of the view that there must be a common unity of purpose promoted by the government which transcends internationally within global markets.

Question 36: We have set out areas where we are particularly keen to receive evidence. If there are other areas you believe we have missed, or do not highlight sufficiently, please draw them to our attention.

Who responded?
7 responses. 1 wood trade association, 2 LA bodies, 1 energy company, 2 environmental interests group and 1 professional body.

How they responded

Wood trade association (1 response)
One WTA thinks that more evidence might be needed from landfill operators.

LA bodies (2 responses)
One LA body believes that the landfill tax has proved to be effective. Further incremental rises beyond £80/tonne in 2014 would drive wood and other biodegradable wastes out of landfill, and enable industry time to adjust to the change and make the necessary preparation.

One LA body is of the opinion that definitive data would be of benefit, including on a sector specific basis. Any future policy intervention mechanisms will need to consider the conditions of what is an increasingly fragile market with regards to wood waste treatment.

Energy companies (1 response)
The respondent provided a paper on landfill tax.

Environmental interest group (2 responses)
One respondent is in favour of a ban on sending waste wood to landfill and sees a requirement for complementary, supportive, measures. They believe that the benefits, environmental and economic, achievable exceeds those tabled by AEA. They wish to see proactive Government support geared towards the achievement of these benefits, alongside levelling the playing field.

The other believes in a “joined-up” Government with consideration for health implications. They believe there might be economic advantages of burning wood to create energy, but ignoring the health impacts will be a huge detriment to the economy.

Professional body (1 response)
The respondent questioned whether extension of wood waste to post consumer furniture may involve double counting.

Miscellaneous responses

One environmental interest group believes there needs to be joined up thinking with considerations for health implications.

One respondent from the "others" category is of the opinion that the pallet market is very developed in the UK- secondhand pallets, pallet repairs, pallet pools – all encourage the re-use of wood pallets. The pallet acts as a safe trapping for CO_2 until it ultimately gets recycled. Wood pallets are used more than once and can be in circulation of up to 20 years. In future, as a large consumer of wood, the organisation would be grateful if they were consulted from the beginning on similar policy reviews affecting their industry.

Stakeholder workshops

Alongside the call for evidence, Defra also held three workshops with key stakeholder groups, the wood recycling industry, timber and wood working industries and the construction and demolition industry. The workshops were used to discuss some of the questions in the call for evidence and to explore some of the practical issues in more depth. Some of the key issues and the messages we took away from the workshops are listed below and we will consider the more detailed comments as we look at policy options going forward.

Key Issues:

- Seasonality of markets
- Treatments on wood
- Composite products
- Changing waste streams with lower grade materials being used in products
- Collection, sorting and storing wood waste (space and regulations)
- Incentives such as ROCs and risks of distorting markets
- Geographical differences in infrastructure and economics

Key Messages included:

- A need to firm up the figures on how much wood is going to landfill.
- A need to clearly define wood waste.
- WID compliant energy from waste infrastructure and financing for it is needed, including small scale biomass and infrastructure to deal with bulky furniture waste. Although one workshop made the point that it was important to

consider how to ensure all wood waste does not end going to energy from waste.

- High level strategic/joined up thinking and consistency across the board (EU, UK, Industry) is needed to create a level playing field.
- Long lead in times needed to allow infrastructure to be in place.
- Be careful of both impact on SMEs and any unintended consequences of policies.
- Effort should be put into designing out waste in the first place.

Annex A: Who is included in each sector category?

Wood trade associations (WTA) in this document refers to Wood Recycler's Association (WRA), the Wood Protection Association (WPA), the Wood Panel Industry Federation/Association (WPIF/A), Trada, British Woodworking Federation (BWF) and Timber Trade Federation (TTF) {submitted a joint response}, , United Kingdom Forest Products Association (UKFPA) and National Community of Wood Recycling Project (NCWRP).

Other Trade Association (OTA) refers to Environmental Services Association (ESA) and Energy UK**.**

Local Authority (LA) bodies in this document refers to various local authority bodies such as Greater Manchester Waste Disposal Authority (GMWDA), Merseyside Recycling Waste Authority (MRWA), National Association of Waste Disposal Officers (NAWDO), Somerset Waste Partnership (SWP), North London Waste Authority (NLWA), West London Waste Authority (WLWA), Oxfordshire County Council, Leicestershire Waste Partnership.

Waste Management (WM) companies in this document refers to Viridor, AmeyCespa and Biffa.

Construction and Demolition (C&D) in this document refers to Kier Construction Group and United Kingdom Construction Group (UKCG).

Energy Companies (EC) in this document refers to RWE Npower Renewables Ltd and Dalkia.

Forestry Industry (FI) in this document refers to Poyry.

Environmental Interest Groups (EG) here refers to United Kingdom Without Incineration (UKWIN), The Breathe Clean Air Group and Green Alliance.
Professional Body (PB) here refers to Chartered institute of Waste Management (CIWM).

"Others" (OT) in this document refers to UK Environmental Law Association (UKELA), Imerys Minerals Ltd, Essex Bioregional (Sustainability consultant), Green Engineers and the general public.

Annex B: Websites, reports and journals cited in the responses

Question 2

Wood trade associations

• Ximenes, F.A., Gardner W.D and Cowiem A.L., (2008) "The decomposition of wood products in landfills in Sydney, Australia". Cooperative Research Centre for Greenhouse Accounting, Australia. Waste Management, Volume 28, Issue 11, November 2008, Pages 2344-2354.

• Micales, J.A and Skog, K.E., (1996) "The Decomposition of Forest Products in Landfills", USDA Forest Service, Forest Products Laboratory, One Gifford Pinchot Drive, Madison, WI 53705, USA.

• Skog, K. (2008) Sequestration of carbon in harvested wood products for the United States. Forest Products Journal Volume 58. Number 6, Pages 57-72.

LA bodies

EPA study on wood products (page 10)
http://epa.gov/climatechange/wycd/waste/downloads/wood-products-chapter10-28-10.pdf

Exhibit 18: Landfilling Emission Factors for Wood Products (MTCO2E/Short Ton) Material/ Product	Raw Material Acquisition and Manufacturing (Current Mix of Inputs)	Transportation to Landfill	Landfill CH4	Avoided CO2 Emissions from Energy Recovery	Landfill Carbon Sequestration	Net Emissions (Post□Consumer)
Dimensional Lumber	–	0.04	0.48	□0.04	□1.14	□0.66
MDF	–	0.04	0.48	□0.04	□1.14	□0.66

– = Zero emissions.
Negative values denote GHG emission reductions or carbon storage.
Note: The emission factors for landfill CH4 presented in this table are based on national-average rates of landfill gas capture and energy recovery. Avoided CO2 emissions from energy recovery are calculated based on the non-baseload GHG emissions intensity of U.S. electricity generation, since it is non-baseload power

plants that will adjust to changes in the supply of electricity from energy recovery at landfills.

A study on Protocol for the quantification of greenhouse gas emissions from waste management activites. L'enterprises pour l'environement (2010): http://www.epe-asso.org/pdf_rapa/EpE_rapports_et_documents20.pdf

UNEP's Global Trends and Strategy Framework study in 2010 which reports - "A high proportion of wood waste, for example, may be considered as carbon stored in landfills while anaerobic conditions prevail. It must be emphasised that, purely from a climate change perspective, burying wood in landfills may be part of the solution; however, there are myriad other reasons (i.e. ecological, resource use, land use) for not doing this." Other studies include a USDA Forest Service study (USDA Forest Service Gen. Tech. Rep. RMRS-GTR-59. 2000) into Carbon Sequestration in Wood and Paper Products and the USEPA's 2006 Solid Waste Management and Greenhouse Gases – A Life-Cycle Assessment of Emissions and Sinks.

Environmental interest group
1) Anaerobic Biodegradability of Wood: A Preliminary Review
Mark Milke, Yinglei Fang, Stephen John
2)http://ir.canterbury.ac.nz/bitstream/10092/5088/1/12628412_WANZ_milke_wood_v2.pdf
3)The Decomposition of Forest Products in Landfills - J. A. Micales & K. E. Skog
http://comenius.susgu.edu/biol/312/mical97a.pdf
4)Inventory Improvement Project - UK Landfill Methane Emissions Model
Eunomia Final Report to Defra and DECC
http://randd.defra.gov.uk/Document.aspx?Document=9887_WR1124Finalreportincludingappendices.pdf

Construction and demolition
Dr Andrew Pitman of the Timber Research and Development Association (www.trada.co.uk)

Question 3
Construction and demolition
The EA waste interrogator figures for 2009 and 2010 show the following:

2009	**2010**	
11	56	02 01 07 – Waste from forestry
7,681	1,932	03 01 05 – Sawdust, shavings, cuttings, wood, particle board and veneer
1,403	252	15 01 03 – Wooden packaging (assume pallets?)
42,408	5,200	17 02 01 – C&D Wood waste

69,326	4,984	19 12 07 – Wood waste from mechanical treatment	
5,496	0	20 01 37 – Wood containing dangerous substances	
78,182	50,354	20 01 38 – Municipal wood waste	
204,507	**62,778**	**Total Tonnes**	

Question 16
Environmental interest group (Green Alliance)

	gCO2 / kWh offset	kWh/t of waste wood	CO2 savings per tonne of wood (kgCO2)	CO2 savings from 300kt of wood (tCO2)
Gas CCGT vs electricity only wood incineration	400	933	373.2	111960
Gas heating vs wood heating	186viii	3500	651	195300
Additional savings	-	-	277.8	83340