

Title: Impact Assessment of the Recast Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) IA No: BIS 0382 Lead department or agency: Department for Business, Innovation and Skills (BIS) Other departments or agencies: Defra, Environment Agencies, WRAP	Impact Assessment (IA)
	Date: 22/01/2013
	Stage: Consultation
	Source of intervention: EU
	Type of measure: Other
Contact for enquiries: Ricardo.Bowman@bis.gsi.gov.uk Charmaine.Philips@bis.gsi.gov.uk	
Summary: Intervention and Options	RPC Opinion: AMBER

Cost of Preferred Option			
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, Two-Out? Measure qualifies as
-£4m	-£6.9m	£0.65m	No NA

What is the problem under consideration? Why is government intervention necessary?

The Recast of the European Waste Electrical and Electronic Equipment (WEEE) Directive was published in the Official Journal on 24th July 2012. The recast aims to improve the efficiency and effectiveness of the original WEEE Directive by further reducing the negative externalities (with respect to the environment as well as human and animal health) caused by the disposal of electrical and electronic equipment (EEE) when it becomes waste. The WEEE recast has been negotiated between Member States with the UK contributing towards the analysis and final decisions/details. Government intervention is necessary to ensure that the UK continues to conform to EU law and to avoid infraction proceedings against the UK.

What are the policy objectives and the intended effects?

The policy objective is to transpose the additional EU regulations resulting from the WEEE recast in to UK regulation in an effective and efficient manner with regards to both costs and benefits. The European Commission recast of the WEEE directive is a package of changes to improve the workings of the directive, which affects a variety of companies as well as the wider public. The Commission's objectives for the recast were twofold. Firstly to develop "[...] a better regulatory environment" as part of the Lisbon strategy for growth and jobs. Secondly, to review certain aspects of the original WEEE directive as required under the directive itself.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Two main policy options and a 'do nothing' option are considered in order to meet the WEEE collection targets arising from the WEEE Recast. Option 2: The UK meets the Recast WEEE collection targets by including non-obligated WEEE into the official producer financed system; 3. The UK meets the Recast WEEE collection targets through establishing a protocol to arrive at a substantiated estimate of un-obligated WEEE. The preferred option is option 3. According to our best estimates, this option delivers a lower net/gross cost overall and to business relative to option 2. This option allows estimates to be established of the volume of WEEE flows outside of the official WEEE system. The main costs are developing , testing and implementing the methodology and updating the estimates at regular intervals.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 01/2019

Does implementation go beyond minimum EU requirements?			No		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	Micro Yes	< 20 Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: 0.01	Non-traded: 0.003	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: Michael Fullon Date: 28/03/2013

Summary: Analysis & Evidence

Policy Option 1

Description: 'Do nothing' option

FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2012	Time Period Years 13	Net Benefit (Present Value (PV)) (£m)		
			Low: -	High: -	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	-	-	-
High	-	-	-	-
Best Estimate	-	-	-	-

Description and scale of key monetised costs by 'main affected groups'

Other key non-monetised costs by 'main affected groups'

Cost of separate collection, transportation, treatment and data collection/reporting of WEEE in line with 4kg per capita Member state target. Cost of registration with Environment Agencies. Cost of recovery and recycling in line with targets from the 2002 Directive. Cost of producers joining a PCS. Cost of retailers offering in store take-back of WEEE on a 'like for like' basis. Main affected groups: Treatment facilities, producers of EEE, Distributers of EEE, PCSs DCFs.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	-	-	-
High	-	-	-	-
Best Estimate	-	-	-	-

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

CO2 avoided and landfill gate fees avoided from diverting WEEE from landfill. Value of recovered materials from WEEE recycling. Reduction in human and eco-system toxicity. Positive contribution to resource productivity and sustainable consumption and production, including the reduction in energy use as well as water and air pollution compared to the production of virgin materials. Main affected groups: general public, producers of EEE

Key assumptions/sensitivities/risks

Discount rate (%)

Figures for WEEE collected via all collection routes and EEE pom are estimates.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: -	Benefits: -	Net: -	No	NA

Summary: Analysis & Evidence

Policy Option 2

Description: 45 - 65% of EEE put on market target achieved through inclusion of non-obligated WEEE through official registration

FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2012	Time Period Years 13	Net Benefit (Present Value (PV)) (£m)		
			Low: -£79.3	High: -£44.2	Best Estimate: -£58.2

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	£8.9	£85.5
High	-	£6.2	£59.1
Best Estimate	-	£7.2	£68.7

Description and scale of key monetised costs by 'main affected groups'

Additional costs of making unobligated WEEE obligated including collecting, reporting and auditing data costs. Additional costs recycling and recovery of WEEE due to a higher targets. Additional costs of inclusion of solar PV panels in scope. Costs of additional retailer obligations. Main affected groups: Producers of EEE, Distributors of EEE, Treatment Facilities and Reprocessors of WEEE.

Other key non-monetised costs by 'main affected groups'

Enhancement of the scope to include in principal all EEE. The number of companies affected cannot be estimated without in-depth knowledge of the products available but other evidence suggests that the number would be small. Proposed changes to registration requirements, monitoring and inspection, and new export reporting requirements were also not monetised; other evidence suggests that the numbers are likely to be small. Main affected groups: Producers, Distributors and Exporters of EEE/WEEE.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	£0.7	£6.3
High	-	£1.6	£14.9
Best Estimate	-	£1.1	£10.6

Description and scale of key monetised benefits by 'main affected groups'

Reduction in CO2 emissions from increased recycling of WEEE (including PV panels). Value of the recovered material from WEEE recycled. Main affected groups: general public and recovery and recycling facilities.

Other key non-monetised benefits by 'main affected groups'

Reduction in human and eco-system toxicity from less landfilling and incineration of WEEE. Positive contribution to resource productivity and sustainable consumption and production, including the reduction in energy use as well as water and air pollution compared to the production of virgin materials. Potential reduction in illegal exports of WEEE and associated benefits for other countries than the UK. Main affected groups: general public, Producers of EEE.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
--	--------------------------	-----

Figures for WEEE collected via all collection routes and EEE pom are estimates. Costs are calculated using average costs, and are assumed to remain constant. The amount of CO2 emissions avoided per tonne of WEEE is assumed to remain constant for the whole period. The value of the recovered materials is assumed to remain constant over time as is the material composition of WEEE. See page 68 for assumptions.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 6.1	Benefits: 0.4	Net: - 5.6	No	NA

Summary: Analysis & Evidence

Policy Option 3

Description: Protocol- substantiated estimate of un-obligated WEEE

FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2012	Time Period Years 13	Net Benefit (Present Value (PV)) (£m)		
			Low: -£8.7	High: -£0.4	Best Estimate: -£4

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.3	£1.1	£11.4
High	0.1	£0.5	£5.7
Best Estimate	0.2	£0.8	£8

Description and scale of key monetised costs by 'main affected groups'

Additional costs of developing and testing the methodology for accurately estimating the amount of unobligated WEEE recovered through AATFs, ATFs and any other identified routes which is not recorded in the obligated WEEE system. Additional costs of implementing methodology and updating every three years. Additional costs of inclusion of solar PV panels in scope. Costs of additional retailer obligations. Main affected groups: Producers of EEE, distributors of EEE, Treatment facilities, reprocessors and Government

Other key non-monetised costs by 'main affected groups'

Enhancement of the scope to include in principal all EEE. The no. of companies affected cannot be estimated without in-depth knowledge of the products available, evidence suggests that the no. would be small. Potential cost from higher standards of treatment. Proposed changes to registration requirements, monitoring and inspection, and new export reporting requirements were also not monetised. Main affected groups: Producers, Distributors and Exporters of EEE/WEEE.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	£0.3	£2.7
High	-	£0.6	£5.4
Best Estimate	-	£0.4	£4.0

Description and scale of key monetised benefits by 'main affected groups'

Reduction in CO2 emissions from recycling and diversion of PV panels from going to landfill. Value of the recovered material from PV panels recycled. Main affected groups: general public and recovery and recycling facilities.

Other key non-monetised benefits by 'main affected groups'

Reduction in human and eco-system toxicity from less landfilling and incineration of WEEE. Positive contribution to resource productivity and sustainable consumption and production, including the reduction in energy use as well as water and air pollution compared to the production of virgin materials. Potential reduction in illegal exports of WEEE and associated benefits for other countries than the UK. Main affected groups: general public.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
<p>Figures for WEEE collected via all collection routes and EEE pom are estimates. Costs are calculated using average costs, and are assumed to remain constant. The amount of CO2 emissions avoided per tonne of WEEE is assumed to remain constant for the whole period. The value of the recovered materials is assumed to remain constant over time as is the material composition of WEEE. All estimates of costings for are based on Wrap estimates. See page 68 for assumptions.</p>		

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:	In scope of OIOO?	Measure qualifies as
Costs: £0.7	No	NA
Benefits: £0.1		
Net: -£0.6		

Evidence Base (for summary sheets)

Executive Summary

1. The most significant changes as a result of the Recast WEEE directive are more ambitious targets for the collection and recycling and recovery of WEEE and changes to scope and distributor take back. See paragraph 48 for a list of all amendments as a result of the Recast. Given that the Recast is an EU measure, it is necessary for Government intervention to ensure Member State compliance.
2. This impact assessment assesses the business as usual scenario of 'do nothing' against two options which could allow the UK to meet a more ambitious collection target – this is given that the way we implement the WEEE directive is at the Member States' discretion. It is assumed that the current UK WEEE system remains as it is now over the period of the analysis apart from the changes explicitly outlined by the text of the Recast. After reviewing the evidence and conducting internal analysis, the preferred option is option 3 which presents the lowest net cost in the central scenario. This is in terms of overall net costs and direct net impact to business, which is estimated at -£0.6m per annum (2013 – 2025). This option meets the WEEE recast collection targets by establishing a protocol which generates substantiated estimates of WEEE being treated outside of the official system. This tonnage data would be captured and included within UK target.
3. The costs for the preferred option are mainly related to data collection and monitoring and data reporting. A summary of the monetised impact for both options are presented in tables 28 and 31.
4. As part of the UK's Environmental themed 'Red Tape Challenge' (RTC), BIS has committed to examining the current UK WEEE system with the aim of reducing the costs of compliance for UK businesses. BIS issued a call for evidence in May 2012 to support the analysis of any potential changes that are proposed out of this commitment and it is envisaged that the changes arising from the Recast will be implemented alongside changes to the WEEE system. The overall impacts are not expected to change as a result of RTC proposals which are presented in separate Impact Assessment (no. 0393) published alongside this one. The RTC WEEE systems IA (no 0393) includes the WEEE Recast IA costs and benefits, as presented in option 3 in its baseline.

Background

5. The WEEE Directive (Directive 2002/96/EC) ('the 2002 Directive') of the European Parliament and Council) was adopted on 27 January 2003 and came into force on 13 February 2003 on the day of its publication in the Official Journal of the European Union. Transposition of the Directive was required by Member States into national legislation by 13 August 2004. Directive 2003/108/EC amended the 2002 Directive with respect to the financing of WEEE from non-household users (8th December 2003) and it was further amended by Directive 2008/34/EC (11th March 2008).
6. The UK transposed the 2002 Directive into UK law as 'The Waste Electrical and Electronic Equipment (WEEE) Regulations' (SI 2006 No. 3289). These Regulations were amended by 'The WEEE (Amendment) Regulations 2007' (SI 2007 No. 3454) and 'The WEEE (Amendment) Regulations 2009, No 1 & 2 (SIs

2009 No. 2957 and No. 3216) and 'The WEEE (Amendment) Regulations 2010, (SI No. 1155). Government Guidance Notes (URN 07/1631 and URN 09/ 1446) support these Regulations. The UK's WEEE Regulations were supported by a full Regulatory Impact Assessment in 2006 ((RIA), URN 06/2206) when they were made in Parliament.

7. Overall the 2002 Directive, as minimum requirements 'Environmental Protection Directive' was adopted in pursuit of the objectives set out Article 175 of the Treaty establishing the Community, aims "to contribute to sustainable production and consumption by, as a first priority, the prevention of waste electrical and electronic equipment, and in addition, the reuse, recycling and other forms for recovery of such wastes so as to reduce the disposal of waste and contribute to the efficient use of resources". In addition it intends to "improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment".
8. The 2002 Directive sets a minimum targets for the separate collection of household WEEE from other forms of waste, as well as requiring the subsequent treatment, re-use, recycling and recovery of separately collected WEEE. To achieve this, distributors (usually retailers) of electrical and electronic equipment (EEE), the producers of EEE, treatment facilities and re-processors dealing with WEEE, have to fulfil obligations set out by the Directive.
9. The 2002 Directive applies to EEE listed under a number of categories in the Directive. This includes: Category 1- Large household appliances, Category 2 – Small household appliances, Category 3 – Information technology and telecommunications (ITC) equipment, Category 4 – Consumer equipment, Category 5 – Lighting equipment, Category 6 – Electrical and electronic tools, Category 7 – Toys, leisure and sports equipment, Category 8 – Medical devices, Category 9 – Monitoring and control equipment and Category 10 – Automatic Dispensers. The UK collects and reports three additional categories which are sub-sets of the EU categories: Category 11 – Display equipment (sub-set of EU categories 3&4), Category 12 – Cooling Equipment (sub-set of EU category 1) and Category 13 – Gas Discharge Lamps (sub-set of EU category 5). Excluded from the scope of the 2002 Directive are: EEE that is used exclusively to protect the essential interests of the security of member states, arms, munitions and war material, EEE which is part of another type of equipment which is outside the scope of the WEEE Directive, large scale stationary industrial tools, filament light bulbs, household luminaires and implanted and infected medical devices.
10. A recast of the WEEE directive has been negotiated and in January 2012, the European Parliament adopted a compromise text to conclude the second reading of the text. The final recast text (Directive 2012/19/EU, 'the WEEE Recast') was published in the Official Journal of the EU on 24th July 2012 and will enter in to force 20 days after this date. The UK must implement the Recast Directive by 14th February 2014.

Problem under consideration – objectives

11. This IA assesses the impact on the UK of the WEEE Recast which will become European law on 13th August 2012. The UK was involved in European negotiations in advance of finalising the text and contributed towards the analysis behind the new requirements.
12. The purpose of the WEEE Recast was:

- “to contribute to sustainable production and consumption by [...] the prevention of WEEE and [...] by the re-use, recycling and other forms of recovery of such wastes”
 - “to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials”
 - “to improve the environmental performance of all operators involved in the life cycle of EEE” (Electrical and Electronic Equipment)
13. The rationale and purpose for the WEEE Recast are discussed in greater detail in the section below entitled: Rationale for the WEEE Recast’

Rationale for the 2002 WEEE directive

14. The overall rationale for Government intervention in the case of WEEE is market failure in terms of negative externalities. Externalities arise where the actions of one party affect or impose costs (or benefits) on a third party but the person causing these costs (or benefits) does not take this effect on others into account in their production or consumption decisions. Government interventions in this case can change behaviour and incentives so that costs (or benefits) that were previously ignored are taken into account. This means that the costs (or benefits) would have been ‘internalised’ by this party, leading potentially to improvements in the functioning of markets and in the well-being of individuals as well as social welfare in general.
15. In the case of WEEE, negative externalities arise due to waste and pollution from discarded EEE. These can lead to environmental damage by affecting soil, air and water quality, as well as having a negative impact on human and animal health. The European Commission outlined in its explanatory memorandum to the 2002 Directive that “...as more than 90 per cent of WEEE is landfilled, incinerated or recovered without any pre-treatment” (EU IA, 2008, p.18). The WEEE Directive requires the treatment of WEEE prior to recovery and disposal, which should lead to a reduction in pollution. This in turn could lead to improvements in the environment, in human and animal health as well as an improvement in the well-being of individuals and in social welfare in general. The internalisation of costs also provides producers with an incentive to minimise these by changing design and production decisions, potentially reducing the negative externalities caused further.
16. The recycling and recovery of energy from waste materials can also produce positive impacts on greenhouse gas (GHG) emissions. Less energy is being used during the recycling and recovery with energy from waste materials compared to the production or extraction of virgin materials. This can lead to a relative reduction in carbon dioxide (CO₂) and carbon dioxide equivalent (CO_{2e}) emissions, potentially contributing to mitigating the harmful effects of climate change in the long-run (EU IA, 2008, p.19).
17. Through the provision of information about EEE and WEEE (for example on ways to increase lifespan, improve sustainability in material composition and design etc.) there could also be an improvement in myopic (i.e. short-term) behaviour by producers, distributors and consumers. This in turn might lead to benefits in terms of a more sustainable use of resources and energy in the long-run.

Rationale for the WEEE Recast

18. The Commission outlined that a review of the WEEE Directive has taken place for three specific reasons. First, the 2002 Directive did foresee a review based on the experience of the application of that Directive. It also allowed the Commission to propose a new mandatory WEEE collection target by 31 December 2008 and new targets for recovery and re-use/ recycling. Experience in the years since the implementation of the 2002 Directive indicates that technical, legal and administrative problems have sometimes resulted in unintentionally costly efforts from participants in the market and administrations; continuing environmental harm; lower levels of innovation in waste collection and treatment; a lack of a level playing field or even distortion of competition and unnecessary administrative burdens. In addition to this the Commission would like to improve the efficiency and effectiveness of the Directive and provide a strategy for the simplification of the regulatory environment (EU IA, 2008, pp. 5-7).
19. The following problems, which the WEEE Recast seeks to address, were identified by the Commission in relation to the application of the 2002 Directive (EU Explanatory Memorandum, 2008, p.3):
- Member States and stakeholders were interpreting the existing provisions differently due to a lack of clarity regarding which products were covered by the WEEE Directive and the correct categorisation of different products.
 - The current collection rate of 4kg/ inhabitant per year of WEEE from private households is considered to lead to sub-optimal collection targets for some countries and too ambitious for others due to a 'one-size-fits-all' approach. Furthermore, the Commission believes that around 65% of EEE put on market (pom) is currently separately collected albeit not all reported as such. The amount of WEEE that the Commission believes is separately collected treated and reported as required by the Directive is less than half of EEE pom. This could imply that still a large share is not properly treated and potentially illegally exported.
 - There are currently no targets for the re-use of whole appliances.
 - In some Member States there is no process of enforcement of the requirements of the 2002 Directive.
 - Various producer registration schemes/ requirements exist in the Member States, leading to international participants in this market having to comply with the requirements of several schemes in different States causing unnecessary administrative burdens.
 - There are indications of improper treatment of WEEE in the EU and of illegal exports of WEEE to countries outside of the EU. A study conducted by the UN on the WEEE Recast highlights the issues around illegal exporting citing for example studies conducted by REUSE and the OECD.

20. One of the primary reasons for HMG intervention following the recast of the WEEE directive at EU level is to abide by EU regulations. Member state non-compliance can result in infraction proceedings being brought in front of the European Court of Justice under Article 258 of the Treaty on the Functioning of the European Union. Non-compliance with EU regulation is an option that is not considered.

Rationale for changing the WEEE collection target and the Commission's IA

21. The 2002 directive imposes an EU wide target of 4kg of WEEE to be separately collected per head of the population in each Member state. The obligations arising from the WEEE Recast make several changes to the collection target over time. The analysis in the Commission's IA (EU IA, 2008) comes to the conclusion that the collection target needed to be changed from the target in the 2002 directive in order to improve the recovery and recycling of WEEE. The EU IA outlines that a "collection target of 85% of WEEE arising would be set as a target of about 65% of EEE sold in the previous year: (85% of 80% of EEE sold.)" (EU IA, 2008, p.13).
22. The Commission's IA highlights that 85% of the WEEE arising is already collected but only 20-33% is reported as 'separately' collected i.e. not mixed with other waste. The Directive also requires that all WEEE that is collected separately needs to be treated. The IA though highlights that in practice 50% of what is collected is not being treated in line with the Directive's obligations (EU IA, 2008, p.5). The collection rate of 85% noted in the EU IA seems to be based on recycling and recovery percentages achieved by the Belgian and Dutch producer responsibility organisations as well as the European Electronics Recycling Association (EU IA, 2008. p.111).
23. The EU IA argues that a collection target set lower than 85% of WEEE arising would lead to a lower collection rate than the current target, leading to a higher level of sub-standard treatment and illegal exports (EU IA, 2008, pp.64-65). If the current true collection rate was lower than 85% in some countries then the new target (set at a higher rate) would encourage them to separate more WEEE from mainstream household waste, leading to further environmental benefits (EU IA, 2008, p.68). The EU IA also outlines that given that only the amount of WEEE would change but not the type under this target, it assumes that the treatment costs would either remain the same or fall due to economies of scale (EU IA, 2008, p.63). Having a target which is higher than 85% could lead to more separate collection of WEEE but also implies that treatment costs would be higher given that a larger amount of smaller WEEE items would need to be collected (EU IA, 2008, p.69).
24. The EU IA outlines that there seems to be a stable relationship between the electronic goods put on the market in one year and the WEEE arising in that market in the following year for the EU15 Member States. It highlights that compared to the current target (kg/ inhabitant) it would take "into account the differences in WEEE arising in each Member State" (EU IA, 2008, p. 67), due to its dependence on the individual level of sales of EEE in each country. It also claims that levels of WEEE arising for both household and non-household EEE are about 80% of the EEE sold in the previous year and a collection rate of 85% of WEEE arising could then be set as a target of approximately 65% of EEE sold in the previous year (in the EU15 states) (EU IA, 2008, pp.67-68).

25. The EU IA acknowledges that in some countries there are some issues with this relationship, which might not be stable. In particular this could be the case in newer member states, where saturation rates might not be as high as in 'older' member states (i.e. there is still high demand for EEE), implying that the quantities bought could exceed the WEEE arising (EU IA, 2008, pp.67-68). However, there are also a number of other reasons that the amount of EEE sold does not necessarily reflect the total amount of WEEE arising. For example: Not all new EEE is bought as a replacement for old EEE; the weight of new EEE may not be the same as the EEE that it may be replacing; new EEE can have different lifespans to EEE that is currently available. This may especially be relevant with some of the additional EEE that will be included resulting from the WEEE Recast.
26. A study by the United Nations University (UNU) on WEEE, commissioned by the EU in 2007, indicates that household WEEE arising is broadly equivalent to 80% of household EEE sold in any year by estimating EEE pom and WEEE arising (although the figure is rounded upwards). The UNU estimates of WEEE arising are based on a very simple relationship between GDP and WEEE per head which is found to be relatively weak. The study acknowledges an error margin of about 20% at the member state level and around 5% for the total EU figure of WEEE arising. The method is further weakened by the extrapolation that is needed for some countries but is not unusual given the lack of data in this area.
27. A 2010 update to the UNU study finds an improved relationship and uses more reliable data and filters out currency effects by using Purchasing Power Parity (PPP) values. The paper however does not clarify whether it is looking at household EEE only or all EEE pom. Furthermore, the improvements do not address the underlying issue that the correlation between GDP and WEEE at EU wide level is not necessarily as strong in each member state as suggested. Therefore, estimates may be inaccurate for some countries.
28. The Commission's IA suggests that to achieve a collection target of 85% of WEEE arising (the amount of WEEE that is disposed of at a given point in time), a target could be set at about 65% of EEE sold in the previous year (EU IA, 2008, p.68). Nevertheless, the IA seems to be making a conservative assumption of the relationship between EEE sold and WEEE arising. It assumes that a decrease in the proportion of WEEE arising compared to EEE pom might be possible. Therefore, the target could be set at 65% of EEE - calculated as 85% of 77% of EEE sold in any year (EU IA, 2008, p.69), where the 77% of EEE are also closer to the value estimated by the UNU Report. This figure is calculated as follows. If we assume that there are 100 tonnes of EEE that are sold in a Member State then the 65% target would mean that 65 tonnes of EEE need to be collected. The Commission assumes that 85% of WEEE arising is collected (although not necessarily reported) i.e. 85 tonnes. Therefore, 77% of EEE sold is being collected (i.e. $65/85 = 77\%$). Furthermore, the IA highlights that "the recycling industry would welcome a rate of no less than 65% in function of amounts put on the market" (EU IA, 2008, p.12).
29. The WEEE Recast also includes Business-to-Business (B2B) appliances in the collection target. The financing for the collection of the historic B2B WEEE depends on whether the product is being replaced or not. The current reporting obligations for a member state take in to account B2B WEEE collection and this implies that the administrative costs for reporting will not necessarily increase (EU IA, 2008, pp.65-66). The amount of non-obligated WEEE separately collected but not reported under the current system can also be included under the WEEE Recast, since it applies to all separately collected WEEE. Article 7 provides that the collection rate is calculated on the basis of the total weight of WEEE collected in accordance with Articles 5 and 6 in the WEEE Recast. Articles 5 and 6 provide

that both household and non-household WEEE must be separately collected. This increases the volume of WEEE that counts towards the target that needs to be achieved under the new proposals.

Legal Implementation/Copy out

30. The 2002 Directive (2002/96/EC) was adopted by the EU in 2003 and the provisions of the 2002 Directive came into effect on 13th August 2005. Following the coming into force of the 2002 Directive, the UK created a system of WEEE collection, implemented by means of the WEEE regulations (SI 2006/3289) to ensure that all WEEE separately collected at Designated Collection Facilities (DCFs) was treated and disposed of in line with the requirements of the 2002 Directive. The UK system requires that Producers of EEE join a Producer Compliance Scheme (PCS) to offset their WEEE obligations, by financing the collection and environmentally sound disposal of an amount of WEEE which is equal to the amount of EEE which that producer has placed onto the market during the same period. A PCS must have free access to WEEE at any DCF which they are contracted to clear. They must then treat the WEEE they have collected for which, they are granted evidence notes. If a PCS does not have enough evidence notes to discharge its members WEEE obligations under the 2002 Directive or, has more evidence notes than are required to exactly offset the obligations of its members, it can 'trade', the surplus evidence with other PCSs. In this system, all WEEE separately collected at DCFs is treated and therefore the Member state collection targets are not passed on to producers or PCSs.
31. The current UK regulations (and the amending regulations) will be repealed and new regulations put in place to implement the changes brought about by the recast, using the copy-out principle. Where the provisions of the original directive are unchanged by the recast, the language in the new regulations will remain unchanged from the current regulations.
32. However, we are aware that the transposition of the WEEE Recast will require careful consideration in respect of the new obligation upon distance sellers to appoint an authorised representative (Article 17 of the WEEE Recast) and the possible creation of new criminal offences (Article 22 of the WEEE Recast).
33. The Environmental Red Tape Challenge announcement, in Budget 2012 committed BIS to "rationalise environmental regulation, including by....consulting on preventing excessive compliance costs for business from the Waste Electrical and Electronic Equipment Regulations." The consultation of which this Impact Assessment is part seeks to address the necessary changes to the UK WEEE system. This commitment will not prevent us from adhering to the principle of "copy out" but will necessitate the imposition of new regulatory requirements which are not part of the current UK WEEE Regulations and that are additional to those required to meet the requirements of the Recast Directive.

Regulation

Alternatives to Regulation

34. Alternatives to regulation that could be considered for the implementation of the re-cast of the WEEE Directive include the introduction of voluntary targets for

producers and guidance on the proper treatment of WEEE households and treatment facilities.

35. A voluntary target in terms of the amount of WEEE to be collected in tonnes, expressed as a percentage of EEE pom as suggested in the EU proposal could be agreed with particular sectors of the EEE industry to ensure that collection targets are met. Furthermore, voluntary targets could be set with the recycling industry to meet the increased recycling objectives of the WEEE Directive. The producers and the recycling facilities would need to record the amount of WEEE collected and treated and provide this to the Government to ensure that the UK can provide evidence that it is meeting the targets as required by the EU in the set timeframe.
36. Guidance issued by the Government could help producers to ensure that WEEE is properly treated and recycled to meet the additional recycling and reuse target as well. Furthermore, information provided to consumers could also increase awareness of their role to ensure that WEEE is recycled to ensure its proper treatment.
37. To include additional EEE in the UK WEEE system as a result of the inclusion of PV panels and open scope, Government could advise the new producers that would be brought within scope of the WEEE Recast and provide them with information about joining the WEEE system to promote voluntary involvement.
38. These options are possible but would be rather difficult to implement and may not be effective in achieving the aims of the directive. The market is fragmented given that some companies are located in the UK and others sell EEE online from other locations in the EU. It would be difficult to achieve a voluntary target in the UK that all companies and in particular companies operating from outside the UK would be willing to agree to.
39. Furthermore if companies (either in the UK or in other EU countries) do not sign up to the voluntary target then this could raise a serious competition issue. Companies that have agreed to the target will be at a disadvantage and could start legal proceedings against the UK for this reason if it affects them significantly and in particular if the target is set at a very high level. In addition to this, due to the large number of producers of EEE registered in the UK, monitoring of activity may be difficult.
40. The companies that do not sign up to the voluntary target have less of an incentive to collect and recycle WEEE properly and do not bear any of the externalities of less WEEE being collected. More WEEE could end up in incineration facilities or in landfills, leading to environmental damages, which can also cause harm to the wider public. Therefore, one of the main objectives of the current WEEE Directive would not be met, since the costs are not internalised by these companies.
41. In terms of the inclusion of new EEE products in scope, it is unlikely that producers from within the UK would join the WEEE system voluntarily unless the private benefits from doing so outweighed the costs, in which case they would be members already. Furthermore, if there were net costs of being part of the system after joining, it is likely that producers of EEE that were not bound by regulation would leave the system. This is because remaining a member could also decrease competitiveness compared to other firms (UK and foreign) that are not part of the system.
42. There may also be cases of free riding in which producers voluntarily mark their EEE with the WEEE symbol without contributing towards the net costs of separate collection and treatment of their WEEE. This will encourage end users

to dispose of it via the official WEEE system without incurring the costs of proper treatment to the producer. This would create an additional burden on producers that are bound to be members of the UK WEEE system by the 2006 UK WEEE regulations.

43. Companies that volunteer to participate in the UK WEEE system or voluntary increased targets would not be affected if the UK failed to comply with the WEEE Directive. Fines under any infraction proceedings would need to be borne by the UK government, without any possibility to pass on any of these costs to the producers of EEE.
44. For these reasons an alternative to regulation is not considered to be sufficient to meet the targets and to ensure compliance. Failure to comply could mean that the UK faces infraction proceedings from the EU in the future.

Sectors and groups affected

45. The sectors that are affected by the current WEEE Directive include EEE Manufacturers, including professional importers, EEE distributors (e.g. retailers), used EEE exporters, Producer Compliance Schemes, Consumers and Businesses using EEE, Waste companies that deal with WEEE, secondary metal merchants who deal with WEEE, Shredders who deal with WEEE, Reprocessors, recyclers and exporters who deal with WEEE, and Landfill and incineration operators. Local Authorities and Charities and Voluntary Organisations who are involved with WEEE are also included indirectly affected. The new UK regulations will potentially affect additional groups such as manufacturers, importers and re-branders of EEE through the expansion of the scope of the directive.
46. Data provided by the Environment Agency shows that in the 2011 reporting period 5,957 businesses were registered as producers of B2C (business to consumer) and B2B (business to business) EEE under the UK WEEE Regulations, showing an increase from the 5,527 businesses registered in 2010. It also shows that there were 37 approved producer compliance schemes (PCS) in 2012, compared with 41 in 2008. There were over 200 Approved Authorised Treatment Facilities (AATFs) in the UK and 74 companies were on the Approved Exporter (AE) register in 2011. The total number of Designated Collection Facilities (DCF) including Local Authority sites and commercial and charity sites was 1,874 as of March 2012 (Valpak). According to Valpak, which is officially operating the Distributor Take Back Scheme (DTS) in the UK, it has now over 2,850 members.

Policy Options – Approach to Impact Assessment

47. The Commission considered several options in the Impact Assessment (EU IA, 2008) accompanying the proposal to achieve the objectives of the WEEE Directive and improve its working. Their IA looks at the additional costs and benefits of the options provided compared to the business as usual case (i.e. no changes to the current Directive) and analyses by comparison which option should be the preferred one. In total the Commission considered 12 options and the issues identified are divided into two types: problems with efficiency, which includes clarification of the Directive's scope and administrative burdens; and

problems with effectiveness, which includes inspection, enforcement and the collection target.

48. The final regulatory option in the WEEE Recast has been arrived at through negotiations between member states and the Commission, in which the UK has been involved. It presents a number of changes to the current directive which are listed below and are considered in this IA:

- Changes to the WEEE collection target. This includes a change from a 4kg per head target to a 45% of EEE pom in the preceding 3 years from 2016 and a 65% of EEE pom target in the preceding 3 years from 2019 (or 85% of WEEE arising from 2019).
- Recycling targets: This includes introduction of recovery and recycling targets to an additional category of WEEE and increasing recovery and recycling targets by 5% in 2015.
- Inclusion of solar PV panels as EEE.
- Additional requirements that distributors (retailers) of EEE with a sales area relating to EEE of over 400m² collect very small WEEE in store free of charge regardless of whether it is sold on a like-for-like basis.
- Additional requirements for international shipments of used EEE and WEEE.
- The appointment of a legal authorised representative in a country in which a producer sells EEE.
- Moving to an 'open scope' categorisation of EEE in 2018

49. These impacts are assessed throughout the Impact Assessment

50. The approach taken in this Impact Assessment is to assess the additional impacts of implementing as closely as possible a copy out of the WEEE Recast Directive in the UK assuming that the current UK WEEE system remains in place. There are areas in which the text of the WEEE Recast allows discretion with regards to how it may be implemented. This mainly arises around the WEEE separate collection targets and the method with which the UK meets these targets.

51. In the WEEE recast negotiations the UK favoured a WEEE generated target and this would appear to be available from 2019 (i.e. 65% of EEE pom in preceding 3 years or alternatively 85% of WEEE arising from 2019). The text in the WEEE Recast suggests that Member States may be able to apply some discretion as to which target they implement from 2019. Article 7 (5) of the text outlines that "the Commission shall, by 14th August 2015 [...] a common methodology for the calculation of the quantity of WEEE generated [arising] by weight in each member state". Given that a methodology for arriving at WEEE generated will not be formulated until 2015, it is not feasible to consider the option of setting the 85% of WEEE arising target from 2019 in this impact assessment due to the uncertainty around what quantities of WEEE should be collected under the target. With regards to collection targets, this impact assessment will therefore assess the impact of implementing a target of 65% of EEE pom in the preceding 3 years from 2019.

52. The WEEE Recast does not stipulate how Member States should raise the level of WEEE required to meet targets. Two key ways the UK could do this is through inclusion of non-obligated WEEE and using accurate estimates of unobligated WEEE. Both options are separately appraised in this IA.

- Option 2 : 45% - 65% of EEE pom target – achieved through inclusion of non-obligated WEEE
- Option 3: Achieve 45% and 65% WEEE targets by using accurate estimates of unobligated WEEE in addition to obligated WEEE

53. All other impacts of the WEEE Recast will be the same in both options. For this reason, the evidence for all other changes as a result of the WEEE Recast are explained in detail under the evidence pages for option 2 and are for brevity are not repeated for option 3. A full list of quantified costs and benefits for both options are outlined in the summary tables 28 and 31.

54. It is important to consider that this impact assessment assesses the costs and benefits of the Recast assuming that the current UK WEEE system remains unchanged up to 2025. As mentioned above, BIS has committed to consult on the current UK WEEE regulations in 2013 and intends to implement any changes along with the implementation of the Recast in 2014. This IA does not assess any of the potential options that may arise from this consultation and does not assess the costs and benefits of the Recast under any future UK WEEE systems that arise out of the Red Tape Challenge consultation.

Do nothing scenario

WEEE collection

55. To be able to establish the effect of the WEEE Recast regulations targets on the UK, we established a 'Do nothing' case first. This shows the amount of WEEE that would be collected if the current Directive still applied and no changes were to be made.
56. Under the current operation of the UK WEEE system, producers (via their respective PCSs) must finance 100% of WEEE that arises at a DCF. The cross-EU target of 4kg per head is not directly devolved to producers nevertheless the UK has consistently collected above this minimum EU requirement for all member states.
57. The UK currently collects data for household, business to consumer (B2C) WEEE (on which the target calculations are based) which includes all WEEE dealt with by PCSs. This is labelled "obligated WEEE". The Environment Agency (EA) also reports data for non-household, business to business (B2B) WEEE and non-obligated WEEE but only that which is reported at Approved Authorised Treatment Facilities (AATF) and Approved Exporters (AE). These additional WEEE streams do not count towards the UK's Member State target. The EA also reports data for EEE pom (put on market) for both B2C and B2B.
58. Table 1 below shows the historic total tonnes of obligated B2C WEEE between 2008 and 2011 from the EA's website. The annual growth of WEEE collected varies from 2% to 10%. This variability is partly driven by changes in WEEE protocol, but WEEE experts (e.g. WRAP) do not expect growth rates as high as 10% to persist. In order to establish a baseline scenario we have used a 2% per annum growth rate of B2C WEEE collected at AATFs from 2011 to 2025 – this is based on WRAP's (Waste and Resources Action Programme) WEEE flows model¹. Table 2 shows the projected 'business as usual' obligated WEEE collected between 2012 and 2025.
59. The period covered by this IA is 13 years starting from 2013. The main reason for extending the period under investigation beyond the normally used 10 year period was to establish what the situation might be five years after the implementation of the '65% target' in 2019 with respect to the changes considered by the re-cast WEEE Directive.

Table 1 – Historic WEEE data from the EA

	2008	2009	2010	2011
A: Total obligated B2C WEEE collected (tonnes)	414,238	454,282	462,682	499,024
As a % of household EEE pom	31%	37%	38%	44%

¹ For more information see page 20

	2008	2009	2010	2011
As a % of B2C and B2B WEEE	24%	29%	30%	34%
% Growth on previous year		9.7%	1.8%	7.9%
4kg per capita target	245,593	247,168	249,048	252,975

Table 2 – Estimates of projected obligated B2C WEEE collected (tonnes)

2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
509,005	519,185	529,569	540,160	550,964	561,983	573,223	584,687	596,381	608,308	620,475	632,884	645,542	658,453

60. Under the baseline scenario, we will assume that all WEEE that is not separately collected by PCSs either goes to landfill as mixed waste or is collected via unobligated sources, mainly ATFs (Authorised Treatment Facilities). WEEE that is not separately collected at DCFs is not subject to the treatment requirements outlined by the WEEE directive and can be disposed of by other means. WEEE that is disposed of by consumers as household waste for kerbside collection is assumed to go to landfill as mixed waste. WEEE collected by ATFs is treated in line with the treatment requirements of the directive but data on collection rates is not collected under the 'do nothing scenario' and therefore this WEEE is not counted towards the UK's Member State target.

WEEE Recycling and Recovery

61. Under the current directive, there are also recycling and recovery targets applying to all categories of obligated household WEEE excluding category 8 – Medical Devices. Treatment facilities do not report on whether they have met their recycling and recovery targets in relation to the amount of WEEE that they have treated. However, each year when an AATF applies for its licence from the relevant Environment Agency it must demonstrate that it is able to meet the recycling and recovery targets by category. Furthermore, this is checked by the Agency during compliance/monitoring visits. Under the 'do nothing' scenario it is therefore assumed that the UK currently meets its Member State Recovery and Recycling targets for WEEE and will continue to do so until at least 2025. Recycling and Recovery targets are outlined in table 7.

62. Applying these recycling and recovery targets to the projections for total obligated B2C WEEE collected in table 2 above gives the total baseline level of recycling that would occur under business as usual. These are shown in table 3 below.

Table 3 – baseline level of recycling (tonnes)

2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
219,425	223,814	228,290	232,856	237,513	242,263	247,108	252,051	257,092	262,233	267,478	272,828	278,284	283,850

Option 2 - 45% - 65% of EEE pom target – achieved through inclusion of non-obligated WEEE into existing system

63. This option considers the case in which the additional WEEE needed to meet collection targets outlined by the WEEE Recast is achieved by making non-obligated WEEE, obligated. This option also considers all other impacts of the WEEE Recast.

Costs

WEEE separate collection targets

Current Target

64. Under the current WEEE Directive the target that needs to be achieved by each Member State is to collect 4kg of household WEEE per inhabitant in each year. There is currently no target for non-household WEEE but a certain amount is nevertheless collected. A previous UK IA (June 2009) shows that the 4kg target was set as 25% separate collection target of WEEE.
65. In 2011, 7.9 kilograms per head of household WEEE were separately collected and recorded in the UK (as required by the regulations) based on ONS population projection of 63.2million². This amounted to around 499,000 tonnes of separately collected household WEEE, equivalent to collection rate of 44% of household EEE placed on the market (pom) or 33% of all EEE pom in 2011. The UK is therefore collecting around double the target set by the 2002 Directive.

New targets

66. The main change to the WEEE collection target is a move to a more ambitious target based on an average % of EEE pom from the three preceding years. The WEEE Recast was published in the Commission's Official Journal on 24th July 2012. The UK will have 18 months to transpose the WEEE Recast in to UK law meaning that the impacts will be applicable in the UK in 2014. Four years after the year of entry in to force (2016), each Member State will have a minimum target of 45% of the average weight of EEE pom in the preceding three years (referred to in this IA as the '45% target') applied to all WEEE that is separately collected. This target will evolve to a minimum collection rate of 65% of the average weight of EEE pom in the preceding three years (referred to in this IA as the '65% target') in 2019 (7 years after entry in to force); Alternatively, the Recast text suggests Member States may adopt a minimum separate collection of 85% of all WEEE generated in the UK (referred to as the '85% target'). However, this would not be possible unless a methodology was established at a European level. Given that such a methodology has not yet been agreed, and data does not exist for any Member State, it is not considered as an option in this IA as we would consequently not be able to implement a WEEE generated target at this stage. During the transition period from the date of UK transposition of the WEEE Recast until 31st December 2015, the UK must collect the "same amount of

² <http://ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcn%3A77-229866>

average weight of WEEE that was collected [...] in the preceding three years” (Article 7 (1)).

67. Three years from the entry into force, the European Parliament and the Council will re-examine the ‘45% target’ outlined above and the related deadline to potentially set separate collection targets for one or more categories (Article 7 (7)). The objective of this option is mainly to improve the collection rate and thus the recovery and proper recycling of WEEE.
68. Projected estimates of EEE pom (not including open scope EEE/WEEE or PV panels) were provided by the latest model by the Waste and Resources Action Programme (WRAP), which predicts material flows of EEE from end of use through to disposal and treatment to material recovery. To estimate WEEE arising, Axion Consulting, commissioned by WRAP, used product lifetime distributions and known sales data of EEE to reflect the relationship between WEEE arising and EEE pom. The model provides the user also with the possibility of altering these assumptions to estimate the amount of WEEE available for collection. Further details of the methodology and the results are available in a report on the WRAP website³.
69. The assumptions used in the WRAP model for this IA are the default assumptions. Some of these assumptions are outlined below. A full list of assumptions used in the WRAP model are outlined in Appendix 1 of WRAP’s published report (WRAP 2011).
- Future sales of EEE extrapolated from historical trends going back 15 years.
 - The assumptions regarding the decisions at the point of disposal of WEEE are based on discussions with industry and WRAP’s own experience.
 - Due to a lack of information on levels of WEEE in residual waste, since local authorities report the total residual waste collected, as well as the amount sent to each processing destination it was assumed that the splits of processing routes of WEEE in residual waste followed the same values, irrespective of category.
 - Data on tonnages of WEEE treated by AATFs is based on Environment Agency data. For WEEE that was recorded to have passed from one AATF to another, it was assumed that the second AATF undertook the final treatment of the WEEE
 - It was assumed that ATFs treat WEEE (excluding that for reuse) in the same manner as AATFs
70. Although current WEEE targets only apply to obligated household WEEE, under the WEEE Recast, from 2014 unobligated (WEEE that turns up at a treatment facility but does not come from a PCS) and B2B WEEE streams will both contribute towards the new collection targets. As mentioned above, the EA currently collects some data for unobligated WEEE and B2B WEEE as well as data on both B2C and B2B EEE pom.
71. It is very likely that the data for collection of B2B and un-obligated WEEE is an under estimate of the true collection rate of these currently unobligated waste streams. This is because some proportion of business WEEE is dealt with by asset management companies who do not form part of the WEEE system. In addition, although a business may renew its stock of EEE at some point in time,

³ http://www2.wrap.org.uk/recycling_industry/publications/weee_material_flows.html

this may not become WEEE immediately and may be reused or exported. With regards to unobligated household WEEE, much of this is collected by ATFs (Authorised Treatment Facilities) or refurbishment/treatment centres that do not currently report data to the EA.

72. In addition, from 2014, PV panels will qualify as EEE (and WEEE upon disposal) therefore should be included in projections for EEE pom going forwards as they will contribute towards the calculation of the targets. The WRAP model does not include data for PV panels. To estimate the quantity of PV panels put on the market forecasts of domestic PV panel installation between 2011 and 2020 are based on DECC's 2011 review of the Feed in Tariff (FiT) system. Estimates of PV panels pom between 2005 – 2011 are calculated based on DECC's estimated installed capacity in 2005 and 2009⁴. We assume that all PV capacity in 2005 was put on the market in 2005 and that growth (equivalent to PV pom) between 2005 and 2009 was uniformly distributed between the years in between. As the DECC forecasts only run until 2020, a further assumption is that the amount of PV panels pom from 2020-2025 is constant. Although the FiT data only covers domestic PV installation, therefore may miss out very large scale installations and very small installations for example on small EEE, a report by PWC⁵ mentions that the majority of UK installations are small domestic. The costs and benefits of including PV panels in the WEEE system are considered in a later section of this IA.
73. In 2018 the scope of what is considered WEEE will change which may result in some extra products being categorised as EEE however there is no data available that suggests what volumes this might be. Initial indications suggest that the move to open scope will not have a large impact on the total tonnages of WEEE arising or collected. Discussion of the costs and benefits of changing the scope of the WEEE directive appear in a later section of this IA.
74. Table 4 below shows the new targets resulting from the WEEE Recast. This includes both the targets based on EEE pom from 2016 and the transition target. This table shows only key years: 2014 – implementation year, 2016 – 45% target, 2019 – 65% target, 2025 – last year of analysis. The projections for EEE pom are from the WRAP model and include B2B and B2C EEE.

Table 4 – WEEE Recast targets

	2014	2016	2019	2025
WRAP EEE pom (tonnes)	1,630,259	1,670,658	1,738,779	1,902,877
EEE pom including PV (tonnes)	1,631,854	1,672,913	1,742,431	1,907,179
WEEE separate collection target with 65% target from 2019 (tonnes)	509,072 (average of 3 preceding years of WEEE)	734,290 (45% of EEE pom)	1,101,975 (65% of EEE pom)	1,201,600 (65% of EEE pom)

⁴ DECC energy digest 2011 p197

⁵ <http://www.ukmediacentre.pwc.com/imagelibrary/downloadMedia.ashx?MediaDetailsID=1748>

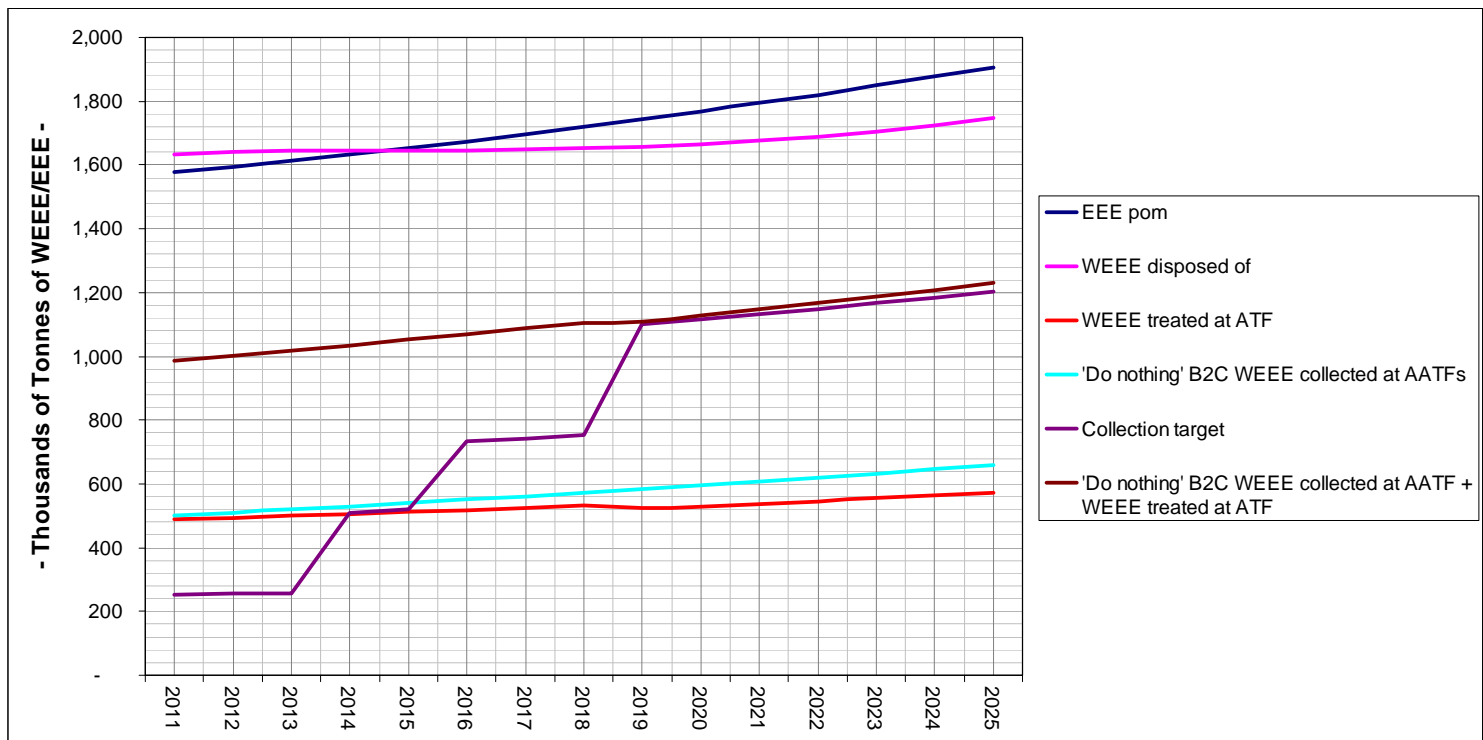
	2014	2016	2019	2025
	collected)			
Difference between target and obligated and reported B2C WEEE collection (BAU). (tonnes)	-107,187	100,702	440,761	478,813

* WEEE collection or EEE pom estimated do not include additional tonnages from open scope from 2018.

75. Table 4 above shows that by under business as usual (BAU) WEEE collection and reporting, targets become binding in 2016. As is demonstrated by the negative number for 2014, the UK will collect a WEEE surplus in this year measured against the collection targets outlined by the Directive.

76. Graph 1 below shows the projected tonnages of EEE pom, WEEE disposed of (WEEE arisings), the WEEE Recast targets (with the 65% target from 2019), 'do nothing' level of household WEEE collected at AATFs, the level of WEEE estimated to be treated by ATF according to WRAP and the amount of WEEE collected that could become obligated WEEE to meet the WEEE Recast targets.

Graph 1 – WEEE targets compared to collection projections



Sources –EEE pom (WRAP model 2011), WEEE disposed of (WRAP model 2011), WEEE treated at ATF (WRAP model 2011), Do nothing B2C WEEE collected at AATF (IA estimates based on EA data and WRAP growth estimates)

Obligating non-obligated WEEE

77. One way of achieving the UK's Recast collection targets is to collect data on WEEE that is currently being collected and treated but not data reported.
78. As mentioned above, the EA currently collects some data on unobligated WEEE and B2B WEEE collected which can be counted towards the UK target from 2014. This waste stream arrives at an AATF and is treated to the same standards as obligated WEEE but it is currently not counted towards the member state target. WRAP's model also estimates the quantities of WEEE that is treated by ATFs (unobligated WEEE). In order to avoid double counting of the same WEEE, we are using WRAP's estimates to forecast the amount of WEEE that may be collected through unobligated sources that could potentially be data captured and count towards the UK's overall WEEE collection target.
79. Under the current WEEE system, in order for WEEE data to be officially recorded by the EA, it must be treated by an AATF. Therefore, there are two main costs associated with collecting data from WEEE arriving at ATFs. The annual cost of ATFs registering with the EA as an AATF and paying the associated fees and the costs associated with collecting, reporting and auditing their WEEE collection data. Under the current WEEE Directive the target that needs to be achieved by each Member State is to collect 4kg of household WEEE per inhabitant in each year. There is currently no target for non-household WEEE but a certain amount is nevertheless collected.

Cost of ATFs becoming AATFs (i.e. non-obligated WEEE becoming obligated WEEE)

80. For an ATF to become an AATF it must apply to the relevant Environment Agency annually and pay the appropriate fee. As noted on the EA's website⁶, the cost of registering as an AATF is £500 for those issuing 400 tonnes or less of evidence for WEEE treatment received from PCSs; and £2,570 for those issuing more than 400 tonnes of evidence.
81. Given that there were 232 AATFs in 2011 and there were 499,024 tonnes of B2C obligated WEEE the average amount treated by AATFs was around 2,150 tonnes. For the Central scenario we will assume that all ATFs that become AATFs will all collect 2150 tonnes annually. All of these AATFs (that were previously ATFs) would pay the higher registration amount to the EA. For the high scenario we will assume that all ATFs that become AATFs will collect 3,000 tonnes each (meaning that there would be less AATFs having to pay registration fees) and for the low scenario we will assume that all ATFs that become AATFs collect 1,000 tonnes each (such that there are more AATFs paying a registration fee). We are also assuming that the EA's fees are fixed over time and that the size of AATFs does not change over time in each scenario. These are simplifying assumptions, in reality there would be a wide range of sizes of treatment facilities, some of which would produce less than 400 tonnes of evidence, and would pay a lower registration fee, and others that would produce more. However, based on consultation with the Environment Agency, there is no data available that allows us to estimate the average capacity of ATFs to process WEEE.

The costs of ATFs becoming AATFs are shown in table 5 below.

⁶ <http://www.environment-agency.gov.uk/business/topics/waste/99161.aspx>

Table 5 – costs of ATFs registering to become AATFs

	2014	2016	2019	2025
High Scenario – number of additional AATFs assuming all treat 3,000 tonnes of WEEE	0	61	172	181
High Scenario Costs (£m)	0	0.16	0.44	0.47
Central – number of additional AATFs assuming all treat 2,150 tonnes of WEEE	0	85	240	252
Central Costs (£m)	0	0.22	0.62	0.65
Low Scenario – number of additional AATFs assuming all treat 1,000 tonnes of WEEE	0	183	517	543
Low Scenario Costs (£m)	0	0.47	1.33	1.39

Costs of collecting, monitoring, reporting and auditing WEEE collection data

82. If an ATF becomes an AATF, this will impose additional costs of data collection, monitoring and reporting. As well as this, AATFs should produce an annual audit report to present to the EA. Based on discussions with treatment facilities an indicative amount of hours spent on administrative work related to data collection, monitoring and reporting is 1 full time person per 10,000 tonnes. The 2011 Annual Survey of Hours and Earnings (ONS, 2012), note a weekly median full time gross weekly earnings for administrative and secretarial occupations at £388.70 in April 2011. This translates to a cost per tonne of around £2. We have assumed that this average cost is equal to the marginal cost. This is a simplifying assumption as in reality the costs of data collection, monitoring and reporting are likely to vary depending on the size of the treatment facility. For example larger

AATFs may benefit from economies of scale therefore the additional cost of collecting data for one extra tonne may be minimal.

83. Based on discussions with treatment facilities, an annual data audit is assumed to cost £2,250 per year for each AATF. The cost of this report may vary depending on the amount tonnage of WEEE that is being collected by each AATF however we have assumed that this cost is uniform across AATFs of all sizes. Table 6 below shows the costs of collecting, monitoring, reporting and auditing data for selected years for each of the scenarios outlined above.

Table 6 – Costs of collecting, monitoring, reporting and auditing WEEE collection data

	2014	2016	2019	2025
High Scenario (£m)	0	0.50	1.43	1.50
Central (£m)	0	0.56	1.59	1.66
Low scenario (£m)	0	0.78	2.21	2.32

Increase in the recycling and recovery target (Article 11)

84. The WEEE directive currently has individual recovery and recycling targets for each WEEE category excluding category 8 – Medical Devices. These targets are outlined in Annex V of the WEEE Recast text. When the Recast is implemented in 2014, a recovery target of 70% of which 50% shall be recycled will become applicable to category 8. In addition, recycling and recovery targets will increase by 5% for all categories in 2015 with the exception of Gas Discharge Lamps. The targets will remain relevant until the directive moves to open scope in 2018 at which point targets relevant to the 6 open scope categories will come in to force. It is important to note that the wording that applies to the targets applicable from 2015 onwards is slightly different from that referring to previous recycling targets. The proportion of WEEE recovered that should be recycled can now be recycled or prepared for reuse. There is no separate target for reuse in the WEEE Recast. Table 7 below outlines the recovery and recycling targets under the Recast.

Table 7 – Recovery and recycling targets

WEEE Category	Previous target	Target applicable from 2015
Large Household Appliances	80% shall be recovered and 75% shall be recycled	85% shall be recovered and 80% shall be recycled
Small Household Appliances	70 % shall be recovered and 50% shall be recycled	75% shall be recovered and 55% shall be recycled
IT and Telecoms Equipment	75% shall be recovered and 65% shall be recycled	80% shall be recovered and 70% shall be recycled
Consumer Equipment	75% shall be recovered and 65% shall be recycled	80% shall be recovered and 70% shall be recycled
Lighting Equipment	70 % shall be recovered and 50% shall be recycled	75% shall be recovered and 55% shall be recycled
Electrical and Electronic Tools	70 % shall be recovered and 50% shall be recycled	75% shall be recovered and 55% shall be recycled
Toys Leisure and Sports Equipment	70 % shall be recovered and 50% shall be recycled	75% shall be recovered and 55% shall be recycled
Medical Devices	No targets. However, 70% shall be recovered and 50% shall be recycled from 2014	75% shall be recovered and 55% shall be recycled
Monitoring and Control Instruments	70 % shall be recovered and 50% shall be recycled	75% shall be recovered and 55% shall be recycled
Automatic Dispensers	80% shall be recovered and 75% shall be recycled	85% shall be recovered and 80% shall be recycled
Display Equipment	75% shall be recovered and 65% shall be recycled	80% shall be recovered and 70% shall be recycled
Cooling Appliances Containing Refrigerants	80% shall be recovered and 75% shall be recycled	85% shall be recovered and 80% shall be recycled
Gas Discharge Lamp	80% shall be recycled	80% shall be recycled

Costs of recovery and recycling targets

85. Within the constraints of data availability, this IA assesses the costs of changes to the recovery and recycling targets. Given uncertainty around future collection rates, WEEE included under the scope of the directive and the amount of recycling would occur independently of target increases as well as the likelihood that each individual change from the Recast will have spill over effects on other aspects of the Recast (e.g. increased collection resulting from increased collection targets may increase recycling rates), the estimates here are based on a number of simplifying assumptions.
86. Currently treatment facilities do not report on whether they have met their recycling and recovery targets in relation to the amount of WEEE that they have treated. However, each year when an AATF applies for its licence from the relevant Environment Agency it must demonstrate that it is able to meet the recycling and recovery targets by category. Furthermore, this is checked by the Agency during compliance/monitoring visits. We have therefore assumed that under the 'do nothing' scenario, current recycling targets are at least met and that future recovery and recycling targets are at least met.
87. To be able to calculate the additional WEEE that will be recovered and recycled under the target, it is again necessary to make certain assumptions about the composition of WEEE given the different targets for the various categories.
88. There is currently no official data on the costs of collecting, treating, re-using, recycling, recovering and disposing of separately collected WEEE in accordance with the UK's WEEE Regulations. There is also no uniform cost of dealing with separately collected WEEE and differences can arise between the actual cost of treating WEEE collected, which is covered by the AATFs, and the cost to the producers under the various schemes. We are mainly focussing on the costs to the producers to attempt to establish the additional costs for businesses, given that the other issue, though important, is outside the scope of this IA. It should also be noted that costs on producers are in part determined by the way that the Directive is implemented in the UK. The current UK WEEE system works in such a way that PCSs can buy (or sell) evidence for treated WEEE if they do not manage to fulfil their obligation completely. The cost of purchasing this evidence (or the revenue from selling it) will also contribute towards the cost that producers face to offset their WEEE obligations. These transactions are not quantified in this IA. Both of the above issues will be reviewed separately under BIS's commitment for the Red Tape Challenge in which a review of the UK WEEE system will be completed to coincide with the implementation of the Recast.
89. Information on the costs of collecting, treating and recovering WEEE is based on a report prepared by KPMG for BIS in 2008 on the first WEEE compliance period. These figures were obtained through interviews with 8 Producer Compliance Schemes. Although the UK regulations apply across 13 categories of EEE, WEEE is usually considered in terms of five broad categories. These are cooling appliances (Category 11 – 'Cooling'); large household appliances (Category 1 – 'LDA'); display equipment (Category 12 – 'Displays'); mixed WEEE (Categories 2, 3, 4, 5, 6, 7, 8, 9, 10 – 'Mixed') and gas discharge lamps (Category 13 – 'GDL'). It is important to note that compliance period 1, from which this data is for, was not a complete year therefore there may be some discrepancy between these adjusted costs and the true costs faced by the system in 2012.
90. It is important to note that the costs of collection, transportation and treatment of WEEE can vary dramatically across and within WEEE categories according to

various factors. For instance, location of treatment facilities relative to DCFs, volumes of WEEE arising, variations across treatment technologies used to treat WEEE, the condition of the WEEE arising. Costs and benefits will also vary over time depending on technological developments in the production of EEE; technological developments in the treatment and reprocessing of WEEE and developments in world markets for secondary and primary materials. It will also depend on the extent of hoarding that takes place amongst consumers and the separation of WEEE from other waste. Because of the uncertainty outlined above, the costs of collection, transportation and treatment included in this IA are indicative. Table 8 outlines the range and the mid-point costs for each of the 5 WEEE streams.

Table 8 – Estimates of average costs of collecting, treating and recovering separately collected WEEE from internal KPMG report.

	A: LDA	B: Cooling	C: Displays	D: GDL	E: Mixed
Cost range (£ per tonne)	- £48 £132	£43 £219	£42 £279	£1788 £2058	£88 £166
Mid point of cost range (£ per tonne)	£41	£131	£160	£1923	£127

91. The average costs in Table 8 do not represent the costs of dealing with additional tonnes of WEEE (i.e. are not marginal costs), nor do they reflect potential economies of scale from dealing with higher volumes of WEEE. Marginal costs are likely to rise as more WEEE is separately collected as extracting additional amounts of smaller WEEE items from the municipal waste stream becomes more challenging and costly. To obtain an indication of the costs we assume that the average costs are equal to the marginal costs. In the Commission's IA, no significant increase in costs over time is expected given that they assume that about 85% of WEEE is collected (but not necessarily reported) and that the composition of WEEE does not change.
92. The final IA for the UK's 2006 WEEE Regulation Consultation suggested that the average cost of collecting, treating and recycling an average tonne of WEEE in accordance with the Regulations may be in the range of £110-170 per tonne. This average figure is dependent on the type and volume of WEEE arising. The UNU report estimated the average costs for collection, treatment and transport of WEEE in 2005 at around €400 per tonne (UNU report, 2007, p.144).
93. A small survey of various Producer Compliance Schemes in the UK has also been conducted by ICER in 2011. The figures provided show the costs per tonne charged to the producers or their compliance schemes for each type of equipment (excluding GDL where these were only provided as costs per item) and are lower than the adjusted average costs since they only reflect treatment costs but not collection. The costs per category are as follows: LDA - £3-10 p/tonne; Mixed - £100 p/tonne; Displays - £200 p/tonne; Cooling - £100 p/tonne; GDL £0.21-0.24 per item.

94. The previous UK IA also provided estimates for the cost of separate collection and treatment of the 5 WEEE categories. Adjusted for inflation these are: LDA £11-21; Mixed WEEE £127-191; Displays £233-297; Cooling £159-196; GDL £1590-2120. These estimates were based on limited consultation with industry at the time.
95. The reason we have used the costs from the KPMG report is due to the uncertainty around the GDL estimates in the ICER study and the fact that the KPMG estimates are more up to date than those from the previous UK IA. It is acknowledged that the figures are already over three years old and that a further update would have been beneficial. However, comprehensive updated values are not available in the public domain. In May 2012, BIS issued a call for evidence to obtain further information on what the costs of compliance of the WEEE Directive to the various actors are. The evidence arising from this may provide some further insights in to what the true cost of WEEE is.
96. To be able to calculate the cost of collecting additional WEEE under the Recast target, it is necessary to make certain assumptions about the composition of WEEE given that costs of collection, transportation and treatment vary for different categories. The Environment Agencies have established a WEEE protocol on the composition of WEEE based on the collection of 305 tonnes of Small Mixed WEEE over the summer 2010. The results for the composition of WEEE are used here with the exception of figures for Lighting equipment, Automatic Dispensers and Gas Discharge Lamps for which no figures were provided. For these 3 categories, we have assumed that the proportion of total WEEE attributed to each of the categories is the same as the average proportions found in WEEE collected data from the EA over the years 2009 and 2010. The assumed composition of WEEE is outlined in Table 9 below and is assumed to remain the same over the whole period of this IA. This is a simplifying assumption, given that the composition of WEEE is likely to change over time as for example more IT and Telecoms equipment is purchased due to technological developments. However, these changes are difficult to establish without a detailed understanding of future market developments for each type of equipment and is therefore, not attempted here.

Table 9 – Assumed composition of a tonne of WEEE

WEEE Category	Average percentage of WEEE
Large Household Appliances - LDA	12.6%
Small Household Appliances – Mixed	22.3%
IT and Telecoms Equipment - Mixed	21.7%
Consumer Equipment - Mixed	22.3%
Lighting Equipment - Mixed	0.05%
Electrical and Electronic Tools - Mixed	12.2%
Toys Leisure and Sports Equipment - Mixed	1.4%
Medical Devices - Mixed	0.04%
Monitoring and Control Instruments - Mixed	0.02%
Automatic Dispensers - Mixed	0.1%
Display Equipment - Displays	0.95%
Cooling Appliances Containing Refrigerants - Cooling	0.19%
Gas Discharge Lamp - GDL	0.91%

* Due to compositions coming from different sources, total does not add up to 100%

97. Table 10 below develops a Low, High and Central scenario using the assumptions in table 9 on the composition of WEEE and the costs shown in Table 8 above.

Table 10 – Costs of additional WEEE collected

	2014	2016	2019	2025
Additional tonnes of WEEE to be separately collected	0	174,325	491,889	516,479
High Scenario Costs (£)	0	14.6	41.3	43.4
Central Costs (£)	0	23.3	65.7	69.0
Low Scenario Costs (£)	0	31.6	89.2	93.7

*Costs in this table do not include costs of treating additional WEEE resulting from open scope from 2018

98. Table 10 shows that the cumulative costs from the additional WEEE that needs to be collected under the new target will range from £339 – 733 million between 2013 and 2025.

99. Costs of treating each WEEE category differ (see table 8) and furthermore, the revenues that will be received from selling recyclates will vary across categories. It is likely that all WEEE collected under the WEEE categories that generate a net benefit from recycling and selling the associated recyclates would be recycled under the 'do nothing' option due to the economic incentives to do so. Therefore only the impact of recycling the WEEE categories that currently incur a net cost to recycle are assumed to be additional to the status quo.
100. Based on discussions with industry, we have assumed that 'LDA' 'Cooling' and 'Small Mixed WEEE' generate net revenue and that 'Displays' and 'GDL' generate a net cost. Therefore the increase in the recovery and recycling targets should only impact on 'GDL' and 'Displays'. Although discussions with industry suggested that some treatment facilities can treat 'Cooling' at a small net cost and some with a small net revenue, due to the increased volumes associated with the increased WEEE collection targets, we have assumed that treatment costs may fall in future and therefore that Cooling WEEE will be recycled anyway – as there is a net revenue. In addition, 'Cooling' is also covered by EU regulations on substances that deplete the ozone layer and therefore, high quantities would be appropriately treated and recycled regardless of the WEEE recycling and recovery targets.
101. To calculate the amount of additional WEEE that will be recycled under the Recast we must first calculate the quantities of Displays and GDL that will be collected in the 'do nothing scenario' and under the WEEE Recast separate collection targets. This is done by applying assumptions of the composition of WEEE to the total tonnages of WEEE collected; GDL is assumed to account for 0.91% of WEEE and Displays is assumed to account for 0.95% of total WEEE collected. We have then applied the recycling and recovery targets of the 2002 WEEE directive to the 'do nothing' levels of GDL and Displays and compared this level of recycling with the level estimated by applying the WEEE Recast recycling and recovery targets to the tonnages of 'GDL' and 'Displays' collected under the increased collection targets of the Recast. The difference between these figures is the additional level of recycling that should occur under the Recast (i.e. Additional tonnes of WEEE to be recycled/ recovered = Amount of WEEE recycled and recovered under new target – Amount of WEEE recycled and recovered under old target). It is important to note that although the recycling and recovery target for GDL does not increase under the Recast, due to the additional volumes of GDL WEEE collected, there is also an additional amount of GDL WEEE recycled under the Recast.
102. For example, in 2019 we predict that 584,687 tonnes of general WEEE would be collected in the 'do nothing' scenario. Applying the assumed proportion of GDLs and outlined above gives us that 5,320 tonnes of GDL would be collected. Under 'do nothing', 80% of GDL should be recycled – 4,256 tonnes. Under the Recast collection targets, 1,101,975 tonnes of WEEE would be collected in 2019 of which 10,027 tonnes is GDL. The recycling target for GDL is 80% under the Recast, therefore 8,022 tonnes of GDL will be recycled under the Recast. The difference between these two numbers, 3,765 tonnes of GDL, is the additional amount recycled due to the WEEE recast (8,022 – 4,256 = 3,766). This is added to the additional tonnes of Displays recycled to give the number outlined in table 11 below.
103. It has not been possible to determine the specific costs of recycling GDL and Displays because data is not available that separates recycling from the costs of collection and transportation. As an estimate for the recycling costs per tonne of

GDL and Displays we have used the estimated cost of collection, transportation and treatment from a report prepared by KPMG for BIS in 2008. In this study, only a small number of the PCSs interviewed gave separated costs of collection, transportation and treatment and given that the sample size was small and that there is a high margin of error, the costs of collection, transportation and treatment are used. To estimate the costs of additional recycling due to the Recast targets, we have taken the high, low and central cost scenarios and multiplied these by the additional tonnes of WEEE to be recycled/recovered in each category. It is possible that using these cost figures could lead to over-estimation of the true costs of recovery and recycling as transportation costs can account for a large proportion of the total costs of collection, transportation and treatment costs of WEEE and can also vary greatly depending on location and regional distribution of WEEE. Furthermore, these estimates are from 2008 and therefore may have changed. Although these are the only figures available to BIS, due to the level of uncertainty associated with these cost estimates, the results below should be treated with caution. Table 11 below develops a low medium and high costs scenario for the increased recycling and recovery targets. As is explained above, these cost estimates do not represent marginal costs of recycling GDL and Displays, nor are they costs of recycling specific tonnages of WEEE but rather are indicative average costs.

Table 11 - Additional Costs of recycling and recovering additional 5 % of separately collected GDL and Displays WEEE

	2014	2015	2016	2019	2025
Additional tonnes of WEEE to be recovered/ recycled	0	372	2,689	6,921	7,297
High Scenario Costs (£m)	0	0.02	2.44	6.87	7.21
Central Costs (£m)	0	0.06	2.78	7.75	8.14
Low Scenario Costs (£m)	0	0.10	3.12	8.63	9.07

* In this table, 2015 costs are also shown as this is when the majority of the recovery and recycling target changes occur.

104. The total cumulative of costs from the recycling and recovering an additional 5 percent of separately collected WEEE are estimated to range from £57-71 million between 2013-2025.

105. Open scope may alter which recovery and recycling categories apply to which specific items of EEE therefore it is difficult to assess the impact of the targets under open scope. This is because under open scope, there will be a reduction from 10 WEEE categories to 6 and certain specific items of EEE/WEEE may fall in to an open scope category that has a different recycling and recovery target to

the category that it was in before open scope comes in to effect. Because of this, we assume that if the recycling and recovery targets were extended to apply to the current 13 WEEE categories up to 2025, the impacts would be similar to the case where the open scope recovery and recycling targets are applicable.

106. The Recast outlines in Article 11 (4) that the UK should keep records on the weight of products and materials when they leave the recovery or recycling/preparing for re-use facility in order that the EU can use this information to assess the case for re-examining recovery/recycling targets or setting category specific targets. AATFs are already required to report this data so there are no significant additional costs expected of this element of the Recast.

Change in the scope of the WEEE directive

Inclusion of PV panels from 2014

107. Article 5 of the commission text states that “Member States shall adopt appropriate measures to minimise the disposal of WEEE in the form of unsorted municipal waste, to ensure the correct treatment of all collected WEEE and to achieve a high level of separate collection of WEEE, notably, and as a matter of priority [...] photovoltaic modules”. PV panels will come under the scope of the UK WEEE regulations as soon as the Recast regulations are transposed in to UK law in 2014 and they will fall in to category 4 (Consumer equipment and photovoltaic modules).

108. According to 2010/11 K-Matrix⁷ estimates, the Solar PV industry had a turnover of approximately £5.3bn and consisted of around 2,000 companies including all associated activity in the supply chain. Some of the actors in the supply chain would be newly captured by the changes in the Recast however it is also likely that supply chain actors such as component manufacturers will already be captured because these components may also form parts of other pieces of EEE currently covered by the Directive. Because of this, it is difficult to assess the precise number of businesses that will be affected by this aspect of the regulations.

109. PV producers and distributors will have to register with the respective Environment Agency. The costs for this registration will depend on whether they are VAT registered and the level of their turnover. The costs for 2011 are summarised in Table 12 below.

Table 12 – Producer Registration fees

	VAT registered and a turnover of over £1m	VAT registered with turnover of under £1m	Not VAT registered
Costs	£445	£220	£30

110. Projected tonnage of PV WEEE arising up to 2025 is based on BIS estimates. To estimate the quantity of PV panels put on the market DECC provided forecasts of domestic PV panel installation between 2011 and 2020 for the 2012 review of the Feed in Tariff system (IA number: DECC0091). Estimates of PV panels from between 2005 – 2011 are calculated based on DECC’s estimated

⁷ <http://www.bis.gov.uk/policies/business-sectors/green-economy/market-intelligence/market-data>

installed capacity in 2005 and 2009⁸. We assume that all PV capacity in 2005 was put on the market in 2005 and that growth (equivalent to PV pom) between 2005 and 2009 was uniformly distributed between the years in between. As the DECC forecasts only run until 2020, a further assumption is that the amount of PV panels pom from 2020-2025 is constant. Although the FiT data only covers domestic PV installation, therefore may miss out very large scale installations and very small installations for example on small EEE, a report by PWC⁹ mentions that the majority of UK installations are small domestic.

111. The average lifespan of PV panels currently uncertain due to it being a relatively new technology. The EU commissioned BIO IS to write an IA in 2011 to assess potential options for the inclusion of PV panels under the WEEE directive. This study assumes a fixed lifespan of 25 years in line with the general warranty period for PV panels however it accepts that the true technical lifespan may be longer. The International Energy Agency assess that the life expectancy of roof top PV panels is 30 years and 30-60 years for ground mounted installations¹⁰. However, the decision by end user to dispose of PV panels can depend on economic, legal and technical aspects. In addition, some PV panel WEEE will arise as a result of breakages during installation and transportation and some users may well leave the panels on their roof even if they are well beyond their efficient lifetime. Because of this and to be consistent with WRAP methodology for projections, we have applied a lifetime distribution curve¹¹ to the estimates for PV panels pom calculated above to give forecasts for PV WEEE arising until 2025. The lifetime distribution assumes that 0.11% of panels become WEEE in year 1 and 2 after installation and then from year 14 to year 35 various proportions become WEEE. This lifetime distribution function is currently only an approximation as robust information on the true lifespan of PV panels is currently unknown due to them being a relatively new technology.

Table 13 – lifetime distribution function for PV panels

A	1	2	3	4 - 13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
B	0.11	0.11	0.11	0	0.5	2	3	5	7	8	9	9.5	9.8	9	8	6.5	5	3	2	1	0.5

A – Year

B- % of PV modules arising as WEEE

Table 14 – PV panel WEEE arising to 2025

	2014	2016	2019	2025
PV panel WEEE arising (tonnes)	319	605	1,017	3,485

⁸ DECC energy digest 2011 p197

⁹ <http://www.ukmediacentre.pwc.com/imagelibrary/downloadMedia.ashx?MediaDetailsID=1748>

¹⁰ IEA, Methodology Guidelines on Life Cycle Assessment of Photovoltaic Electricity, 2009: http://www.iea-pvps-task12.org/fileadmin/IEA-PVPS_Docs/Images/LCA_guidelines-8-2-10.pdf

¹¹ Estimated by PV Cycle

Cost of separate collection of PV panels

112. Currently and under the Recast, collection targets do not apply to specific WEEE categories meaning that low collection rates in some categories can be compensated for by higher collection in other categories. Nevertheless, any WEEE that is separately disposed of at a DCF, must be separately collected and treated in line with the requirements of the Directive.

113. There are currently no forecasts as to what the separate collection rate for PV panels will be from 2014 as this will depend heavily on consumer behaviour and decisions at the time of disposal. Given the relatively low numbers of PV panel waste arising up to now, it is difficult to make confident estimates of the tonnes of PV panel waste that will be separately collected. When PV panels come under the scope of the WEEE directive in 2014, they will classify as Category 4 WEEE. According to EA data for 2011, category 4 WEEE constituted an average of 45% of Category 4 EEE pom. Assuming that 45% PV EEE pom is collected as WEEE, the projected separate collection rates are shown below in table 15. It is important to consider that PV panels can have different characteristics to some other Category 4 WEEE therefore in reality, there may be more or less than 45% of PV EEE pom separately collected.

Table 15 – PV WEEE separately collected

	2014	2016	2019	2025
PV WEEE separately collected (tonnes)	144	272	458	1,568

114. In a report written for the commission on the inclusion of PV panels as WEEE, BIO IS estimate the proportion of each type of technology of PV panel that will be put on the market from 2005-2050. The report also estimates the costs of collection, transportation and treatment of each PV panel technology based on consultation with PV Cycle, one of the major PV recycling firms in the EU. It should be noted that the costs provided in the Commission's report assume that high volumes of PV panels are recycled such that the process benefits from economies of scale. Although these costs could be realistic once the regulations have been in place for a number of years, in practise we may expect the initial costs to be higher. As PV recycling is currently not widespread in the UK, data is limited therefore it is assumed that the costs estimated in the EU study are the same for the UK. The Euro values have been converted using the rate €1 = £0.8581¹². The cost of collection, transportation and treatment of PV panels in low medium and high scenarios respectively are £249, £215 and £180. Applying these costs to the above estimates for levels of PV panels recycled as a result of the Recast regulations gives the estimated cost of collection, transportation and treatment of the additional estimated PV panels separately collected under the Recast. Table 16 demonstrates the costs of collection, transportation and treatment of PV WEEE for selected years.

¹² From DECC

Table 16 – Costs of collection, transportation and treatment of separately collected PV WEEE

	2014	2015	2016	2019	2025
High Scenario Costs (£m)	0.03	0.04	0.05	0.08	0.28
Central Costs (£m)	0.03	0.04	0.06	0.10	0.34
Low Scenario Costs (£m)	0.04	0.05	0.07	0.11	0.39

115. As mentioned above, WEEE separate collection targets do not apply to specific categories of WEEE however by 3 years of entry in to force of the Recast, the Commission will assess the possibility of setting individual collection rates for PV modules.
116. Due the specialist nature of PV panel recycling and the fact that the Commission may implement PV specific targets, it is currently unclear whether PV WEEE will be included in the standard UK WEEE system alongside other Category 4 WEEE or whether a bespoke system of PV panel recycling will be preferred.

Cost of Recycling and Recovery targets on PV WEEE

117. The Recycling and Recovery targets that will apply to PV WEEE will be 75% recovery of which 65% must be recycled in 2014 when PV panels come in to scope, increasing to 80% recovery of which 70% must be recycled from 2015. The Commission will review recycling and recovery targets in 2016. In 2018 when WEEE will be classified by 6 open scope categories, the recovery target for PV panels will be 85% of which 80% shall be prepared for reuse and recycled.
118. Based on the estimates calculated above for PV WEEE separately collected and applying the recovery and recycling gives us the amount of PV WEEE that should be recycled under the Recast. Assuming that the recycling and recovery targets are met, according to our estimates, 70 tonnes of PV panels will be recycled in 2014 and 878 tonnes should be recycled in 2025.
119. To estimate the additional costs of recycling PV WEEE we have used the collection, transportation and treatment costs outlined in the BIO IS report with the transport costs deducted (£128 per tonne). The assumed cost of recycling PV WEEE in low, central and high scenarios respectively are therefore £120, £86 and £51. Applying these costs to the above estimates for levels of PV panels recycled as a result of the Recast regulations gives the cost of recycling PV panels in accordance with the EU targets outlined above. Table 17 demonstrates the costs of recycling PV panels for selected years.

Table 17 – Costs of recycling PV panels

	2014	2015	2016	2019	2025
High Scenario Costs (£m)	0.001	0.006	0.008	0.013	0.045
Central Costs (£m)	0.003	0.010	0.013	0.022	0.075
Low Scenario Costs (£m)	0.008	0.014	0.018	0.031	0.105

120. In the EU there are currently examples of voluntary PV recycling systems formed by industry. For example PV Cycle which was established in July 2007. Members of this scheme have committed themselves to collect a minimum of 65% of PV modules installed in Europe since 1990 and recycle 85% of waste¹³. According to www.pv-magazine.com, in 2010/11 PV Cycle collected and recycled 2 tonnes of PV WEEE in the UK¹⁴.

Cost of marking PV panels with the WEEE symbol

121. Article 10 (3) of the original WEEE directive says that producers should appropriately mark EEE (or where this is inappropriate, mark the packaging or paperwork that comes with the equipment) with a crossed-out wheeled bin symbol to discourage the co-disposal of WEEE. It also says that users should be given information on the meaning of this mark. The Directive does not specify that products need to be marked via moulds however costs for this marking are not straightforward to estimate.

122. Adhesive labels with the appropriate WEEE label printed on are available from various online retailers. Taking a mean per unit price from 3 different sources¹⁵ gives an estimated cost of 5p per label. Applying this cost to the estimates for solar PV sales gives the costs per year which are estimated at £0.013m in 2020 when PV sales are in their peak. It is possible that the costs estimated in this IA may be higher than the reality because producers may opt for private contracts with label producers and buy in greater mass than is available through online retailers which would mean a reduced per unit cost. Also, it is possible that producers may integrate the inclusion of the WEEE logo in to their generic production process which may further reduce the costs. In this case, it is harder to estimate the costs however the original UK IA for the WEEE directive refers to one industry estimate for the cost of production of a plastic mould with the crossed-out wheeled bin sign is around £5,000.

Non-monetised costs of change in scope

Inclusion of PV panels from 2014

¹³ <http://www.pvcycle.org/index.php?id=4>

¹⁴ http://www.pv-magazine.com/news/details/beitrag/pv-cycle-recycles-over-1-000-tons-of-modules_100004693/#axzz1p5Rm2RRe

¹⁵ Price correct in March 2012

123. There will also be costs of enforcement which will be undertaken by the relevant Environment Agency and VCA (Vehicle Certification Agency). It is unclear as to precisely what these costs will be due to the relative inexperience of dealing with PV WEEE in the UK. However, Environment Agency enforcement costs would be covered by the registration fees that producers pay to the agency. VCA enforces the obligations relevant to Distributors of EEE and also ensures that manufacturers are complying with requirement to place the WEE symbol on new EEE. Enforcement costs carried by VCA are provided for by an MOU between them and BIS. It is likely that any additional enforcement costs as a result of including PV panels under the scope of the Directive will be covered by this MOU. Other costs that are not quantified here include administration costs experienced by producers and distributors of PV panels.

Change to open scope in 2018 (Article 2)

124. The WEEE Recast aims to improve the efficiency of the Directive by clarifying the scope and the categories included. The new scope will come in to force in 2018 and is defined by 6 categories. Category 1 – Temperature Exchange Equipment; Category 2 - Screens, monitors, and equipment containing screens having a surface greater than 100 cm²; Category 3 – Lamps; Category 4 - equipment (with any external dimension greater than 50cm); Category 5 - Small equipment (with no external dimension more than 50cm); Category 6 – Small IT and telecommunication equipment (no external dimension more than 50cm). The text of the directive provides a non-exhaustive list of products that are included in each category.

125. Article 2 (4) specifies a list of exemptions that will still qualify under open scope. These are: equipment to be sent into space, large scale stationary industrial tools, large scale fixed installations (except any equipment which is not specifically designed and installed as part of these installations), means of transport for persons or goods, non road mobile machinery made available for professional use, equipment specifically designed solely for the purposes of research and development on a business to business basis and medical devices and in vitro diagnostic medical devices.

126. Unlike the RoHS directive, open scope is expected to have little impact on which products are classified as EEE and are therefore considered WEEE at the end of their life. This is because the definition of EEE has not changed as a result of open scope in the Recast. The primary change in 2018 will be the inclusion of equipment from large scale fixed installations that is not specifically designed and installed as part of these installations which comes from a change to the list of exclusions. As mentioned above, there were 5,957 companies registered as producers of EEE in the 2011 reporting period. There are no figures available on which producers might need to register under the WEEE Recast, given that this will need to be assessed depending on their products and its characteristics. However, it is likely that this number will be small.

127. The additional companies will have to register with the respective Environment Agency. The costs for this registration will depend on whether they are VAT registered and the level of their turnover. The costs are summarised in Table 12 in an earlier section. Given the uncertainty around the number of firms that will be affected by this element of the Recast, costs are not monetised in this IA.

128. Approved Exporters (AEs) are required to pay certain fees to be able to export WEEE. An Exporter of waste that is not currently regarded as WEEE but

will become WEEE under open scope from 2018 or PV panel WEEE from 2014 would need to cover their licence fee. Currently an application costs £500 for a small AE (less than 400 tonnes) and £2,570 for a large AE (more than 400 tonnes). A £110 fee is also charged for adding additional overseas sites to an AE approval.

Retailers' Obligations

129. Article 5 (2ba) of the Recast provides regulations that will apply to retailers with a sales area relating to EEE of at least 400m² from the entry in to force of the directive. The Recast states that these retailers should provide facilities (in store or nearby) for the collection of WEEE with no external dimension larger than 25cm if they cannot show that alternative methods of collection are at least as effective. Any assessment of the effectiveness of collection methods should be made available to the public.
130. The Commission does not intend to provide further details around what would precisely constitute 400m² of sales area relating to EEE. Based on discussions with retailers and The British Retail Consortium, there is no concrete indication currently on how many retailers are captured by this aspect of the regulation would choose to offer collection facilities and how many would seek to provide alternative collection methods. Additionally, retailers' sales areas fluctuate between years and during the year for instance, some retailers will increase their EEE sales floor space over the Christmas period. Others, may have a large sales volume of EEE but do not dedicate significant sales floor area due to their business model. For the above reasons, estimates of the complete costs and benefits of this aspect of the Recast are difficult to compile.
131. Under the current WEEE regulations, all retailers (distributors) of EEE have obligations. However, some may opt out of offering in store take back of WEEE and discharge their obligations via a DTS. An estimated 70% of retailers chose to discharge their obligation by joining the UK's DTS which is approved by BIS.
132. The number of stores that will be captured by the additional requirements of the WEEE Recast is thought to be small. A survey of 31 stores in Stratford upon Avon by Valpak showed that only one store on an out of town Retail Park would be captured by the requirement. This survey did not count isles of mixed products, counted footprint rather than shelf space and was counted at one point in time rather than an average over the year. Valpak have tested the sensitivity of including isles which include EEE and non-EEE products in one store and found that this could have a large impact on whether a store would be captured by the requirements or not.

Costs of new retailers' obligations

133. Based on analysis of sales of EEE in Q1 2011 by a retailer that is considered to sell a balanced share of EEE in terms of product type, size and weight, Valpak found that very small EEE comprised around 3% of their total sales of EEE in terms of weight and that this percentage was unlikely to exceed 5% for other retailers. As 'very small WEEE' is not an official category of WEEE, there is no data or forecasts about how much very small WEEE arises. Valpak analysis also shows that some items that fell in their classification of very small EEE are close to the boundary of the 25cm requirement. This means that there may be some brands of the same product that are not captured by this requirement.

134. Currently retail stores over a certain size must provide collection points for batteries regardless of whether they have been purchased in store. This is a similar operating model to what is proposed by the Recast however Valpak have outlined some differences in the characteristics between very small WEEE and batteries. Most notably, the public may perceive some very small WEEE to have some value and additionally, that disposal of very small WEEE is perceived to have a lesser impact on the environment than batteries. In addition to this, very small WEEE is less portable than batteries and further, there is already a mechanism in place for collecting very small WEEE (at DCFs as small mixed WEEE) which means that if very small WEEE was collected in store, there would be some proportion that would be displacing WEEE that would have been disposed at a DCF (thus reducing DCF collection rates).
135. Based on Valpak's assessment of Stratford upon Avon, if we assume that this town is representative of a typical UK town, we might assume that around 3% of all retailers in the UK are captured by these requirements of the WEEE Recast. According to the British Retail Consortium¹⁶, there were around 284,500 retail outlets in the UK in 2011. Using the percentage assumed above, this may suggest that around 8,500 retailers may be captured by the regulations of the WEEE Recast. It is important to accept that these assumptions are untested which is especially relevant considering that the majority of retailers that would be captured by the requirements would be out of town retail parks and perhaps large shops in cities. With this in mind, this might be an over estimate of the number of firms that would be captured by the new regulations in reality.
136. As mentioned above, it is unclear whether retailers will choose to discharge the obligations themselves or whether an alternative approach will be taken. If a store chose to discharge their obligations themselves, they would need to purchase an appropriate container. 1,100 litre wheelie bins are available via online retailers. A mean of four of these retailers gives a cost of £295 with a range of £215-£497. Specialist WEEE containers are also available but the costs of these are likely to be higher. If each retailer were to provide one container this could result in a one off cost of £1.8m-£4.2m with a central cost of £2.5m. These containers would have to be replaced after a certain amount of wear and tear but the cost of this replacement is not accounted for in this IA.
137. As mentioned above, there is no data specifically for very small WEEE so we will assume that the cost of transport, treatment and the potential recovered material revenues are the same as small mixed WEEE as it is a subset of this category. It is important to consider that costs associated with transporting 1 tonne of WEEE from DCFs to treatment facilities may be lower than the cost of emptying and transporting the contents of very small WEEE containers mainly due to economies of scale and the proximity of stores to treatment centres.
138. Based on Valpak's assessment, in-store collection of very small WEEE is likely to amount to around 6% of very small EEE pom (central scenario). Given that very small EEE is assumed to be 3% of total EEE pom, this amounts to a collection rate of 0.18% of total EEE pom. The range of collection rates is 0.1%-1% of total EEE pom. Applying this assumption to the WRAP forecasts of EEE pom, we have estimated the tonnages of WEEE that may be collected via this method. This is shown below in table 18. Applying the costs of collection, transportation and treatment associated with Small Mixed WEEE from the KPMG report (2008) to these tonnages gives an overview of the potential costs and benefits of this element of the Recast. Table 18 also shows the costs of collecting

¹⁶ http://www.brc.org.uk/brc_stats_and_facts.asp

and treating very small WEEE including the one off cost of buying a container and the material revenues from recovered materials from recycling the WEEE.

Table 18 – costs of retailers over 400m2 providing collection for very small WEEE

	2014	2016	2019	2025
WEEE collected (0.18% of total EEE pom) (tonnes)	2,937	3,011	3,136	3,432
High Scenario Costs (£m)	2.1	0.3	0.3	0.3
Central Costs (£m)	2.9	0.4	0.4	0.4
Low Scenario Costs (£m)	4.7	0.5	0.5	0.6

Non-monetised costs associated with new retailers' obligations

139. There may be additional costs associated with training staff on the procedures associated with the collection of very small WEEE which are not quantified in this IA as there are no current estimates as to whether this will be a significant time burden or not. In addition, there could be opportunity costs associated with the space that is used to keep the very small WEEE containers.

140. Article 14 (1) of the Recast states that producers should make purchasers of their products aware of the methods by which they can dispose of their EEE at end of life. The introduction of a new method of disposal of WEEE means that producers would have to inform consumers about this however, these costs are assumed to be negligible as for instance, an information sheet can be downloaded free of charge from the VCA website which can be posted in store.

141. It is important to remember that the text of the directive gives retailers the option to use an alternative method of collection of very small WEEE as long as this method can be proven to be as least as effective as the approach outlined above. Alternative approaches have not been assessed by this IA.

Shipments of WEEE and used EEE

Non-monetised costs

142. The minimum requirements in the Recast are intended to distinguish between used EEE that is being exported from WEEE. Exporters are required to show copies of invoices and contracts relating to the sale and/or transfer of ownership of EEE, evidence of evaluation or testing for each item to reflect its functionality, a declaration by the holder who arranges the transport of EEE that none of the material transported is waste, and they must suitably package to protect used EEE items in transit. The IA undertaken by the EU does not specify any costs but

acknowledges that potential additional costs might arise in particular where enforcement activities are rather low (EU IA, 2008, p. 59). The UK is believed to have a good compliance record with regards to export requirements therefore these enforcement costs could be expected to be low.

143. Currently in the UK, the EA requires those that claim they are exporting used EEE for reuse to follow the general EU Correspondents guidelines on waste shipments. The EA are generally satisfied with documentation that demonstrates that all items have been tested - this may be simply a label with a PAT testing sticker and bar code and a full listing of the contents of a consignment and associated paperwork inside the door of the container.
144. Due to data constraints, it is not possible to assert how many exporters of used EEE operate in the UK nor is it possible to find out the volumes of used EEE that is shipped. According to COMTRADE data, around \$34 billion of 'Electrical, electronic equipment' (HS85) was exported by the UK in 2011. However, it is not possible to determine how much of this was used rather than new.
145. As mentioned above, the majority of the additional requirements on shipments of WEEE and used EEE are already satisfied in the UK. However, the directive is specific about the records that a member state should require for shipments of used EEE, all of which would be included under the requirements already implemented in the UK. The only additional requirement outlined by the Recast refers to the fact that the item should be categorised according to the WEEE categories outlined in the directive. This requirement will already be fulfilled by exporters operating within the current UK WEEE system however it is unlikely that those that are outside of the system would currently report this information. There is no data available as to how many businesses would be affected by the additional shipping requirements however the impacts are expected to be minimal. All that is required in order to transpose these shipping requirements in the UK is to enable the competent authorities to enforce the existing requirements through the implementing regulations.
146. Annex VI of the Recast relating to the minimum requirements for shipments does not discriminate between actors already in the WEEE system and those operating outside of the official system. If the UK implementation of the Recast specifies that all exporters of used EEE must do so via the official UK WEEE system then there may be administrative costs for these exporters associated with this.

Other non-monetised costs

147. This IA does not quantify any additional costs of enforcement associated with the WEEE recast. It may be that increased sources of data in terms of WEEE collected via newly obligated routes or the introduction of new WEEE items in the waste stream (e.g. PV panels) may introduce additional burdens on the enforcement agencies. Environment Agency were unable to quantify this due to the current uncertainty around what the future impacts of the Recast may have on enforcement costs. Although increased enforcement costs would initially be borne by the Environment Agencies, it is expected that this would be covered by registration fees.

Non-monetised costs of increasing collection of WEEE .

148. As mentioned in paragraph 70, from 2014, it will be necessary for the UK to include B2B WEEE as well as B2C WEEE towards its Member State collection

targets. As such, our projections for collection of WEEE above the 'do nothing' scenario include B2B WEEE therefore the costs of collecting and treating additional WEEE as a result of the Recast assessed here include B2C and B2B WEEE. Under the current WEEE Directive, producers of B2C WEEE must finance the collection and treatment of all WEEE disposed of via the official WEEE system. Individual B2B producers are only required to finance the collection and recycling of equipment they place on the market when asked to do so by the final end-user. However, the Recast states that any equipment sold to businesses that could equally be sold into households will in future be classified as B2C equipment at end of life. The current method of calculating producers' financial obligations under the existing UK WEEE system combined with the higher collection targets could lead to potential market distortions in which final holders of WEEE are able to capitalise on the requirement for PCSs to gain access to that waste in order to meet their obligations. Our calculations attempt to capture the total costs as best as possible however we have not been able to quantify how the distribution of these costs may fall in terms of which producers may bear a higher proportion of these costs. This is due to lack of evidence in this area. The commitment under the Red Tape Challenge to amend the UK Regulations in a way that ensures producers pay a fair price in meeting their financial obligations will need to consider this issue.

Benefits

Increased recovery and recycling targets

Revenues from recycled materials sold

149. WEEE that is being recovered and recycled provides benefits in form of the materials that can be recovered from these items and then be sold on. The value of the recovered material though depends on the composition of WEEE, since for example large household appliances will not necessarily contain the same materials as IT and Telecoms equipment. The value of these materials is also dependent on the market price, which can vary over time.
150. Evidence from discussions with industry suggest that in general, 2 WEEE streams generate a net revenue after considering the cost of transporting and treating the WEEE and the revenues gained from selling the recycle outputs from treatment. These are LDA and Mixed WEEE. Recycling cooling equipment is done at a small net cost by some treatment facilities and a small net benefit by others. GDL and Displays are generally recycled at a net cost. Based on this, we have assumed that LDA, Mixed WEEE and Cooling are recycled under business as usual and therefore, increasing the recycling and recovery targets will only impact on GDL and Displays. This assumption includes an assumption that due to increased volumes of WEEE collected due to the increased separate collection targets, Cooling appliances will generate a small positive net revenue (or at least zero net revenue) when averaged across treatment of all Cooling WEEE.
151. The EU IA estimates that under the WEEE Recast, material could be recovered, which is worth €2.2bn. They do highlight though that this value is very dependent on price developments (EU IA, 2008, p.9 +p.45).
152. In order to estimate the potential material revenues recoverable from recycling additional WEEE, we must examine the material composition of WEEE.

To determine the material composition of Displays WEEE we have referenced a 2007 Defra study which involved hand sorting 125 tonnes of Small Mixed WEEE and a 2011 report by the Environment Agencies which hand sorted a sample of 305 tonnes of small mixed WEEE both of which assess the overall composition of WEEE by category and the material composition of each. Taking an average of the material compositions outlined in both reports gives: 14.5% metals, 18.1% plastics and the remaining percentage is composed from other materials.

153. Neither the Defra study mentioned above nor the subsequent work by the Environment Agencies and WRAP estimate the material composition of GDL therefore to estimate the material composition of GDL we have used estimates from a 2008 report prepared by Stewardship Solutions for the Lighting Council of New Zealand and the New Zealand Electricity Commission with support from the New Zealand Ministry for the Environment. The report has based its estimates on estimates made in other similar international studies and information supplied by the New Zealand Lighting Industry. The overall estimated waste composition for GDL in 2007 in New Zealand was 79% glass, 5.7% metal, 7% plastic and 8.3% other materials. We have not found data specific to the UK therefore we will assume that the composition of GDL WEEE in the UK is the same in New Zealand given that it is likely that similar products are sold in both countries
154. Other studies also make estimates of the material composition of WEEE. According to the EU Impact Assessment the three main materials in WEEE arising in the EU are metals (approximately 50% ferrous metals, 5% of ferrous metals), glass and plastics (20-25%) (EU IA, 2008, p.28). Ferrous metals are mainly steel and the IA also outlines that the collection and recycling of this material typically leads to savings in energy of 74%, in water pollution of 76% and air pollution of 86% compared to primary steel production (EU IA, 2008, p.46). Precious metals in WEEE can include for example gold, copper, platinum or silver amongst others. Plastics can also be used as recycling feedstock, leading to savings in energy and pollution of up to 80% according to the EU IA (2008, Annex 6, p. 96).
155. WRAP undertook a study (2009) of small WEEE collected from the kerbside in 2009. During the trial 2,101 items were collected confirming that metals (48%) and plastic (32%) were the largest components of small WEEE in 2009. Glass only made up 1% of the sample. It should be borne in mind again that the composition of WEEE is highly dependent on the type of WEEE collected.
156. Recycled metal is usually separated into ferrous and non-ferrous metals. The amount of the latter is expected to be much smaller. Using the WEEE protocol study conducted by Defra, estimates for the share of ferrous and non-ferrous metal was established as roughly 10% for non-ferrous meta (90% for ferrous metal). This figure was then applied to the amount of metals recovered to obtain the amount of non-ferrous/ferrous metal recovered.
157. According to 'Let's recycle'¹⁷ ferrous scrap metal prices reached a range between £160-210 per tonne in April 2012. Non-ferrous metals can include for example copper or aluminium and their prices vary considerably with copper achieving a price of up to £4,000 per tonne and aluminium reaching £950 per tonne for in April 2012. According to a study undertaken by WRAP in 2010, the price of plastics in WEEE follows rather closely the price of plastic bottles, indicating a price range of £60- 360 per tonne in April 2012. For estimates of glass prices we have used the 'clear glass' prices also from 'Let's recycle' which range from £27 to £32 per tonne.

¹⁷ www.letsrecycle.com

158. Table 19 below shows the low scenario, central and high scenario prices used for the analysis. With regards to non-ferrous metals we have modified the high and low scenarios given that it is unlikely that the non-ferrous metals contained within a tonne of WEEE will be only aluminium (lowest possible price) or only copper (highest possible price). For this reason, the high scenario is the mid point between the aluminium high price and the copper high price. The low scenario is the mid point between the aluminium low price and the copper low price. The central scenarios are the mid points between the high and low scenarios for all materials.

Table 19 – material prices used for material revenue calculations

	Non-ferrous metals	Ferrous metals	Plastics	Glass
Low scenario price (£)	900	160	60	27
Central price (£)	1,687	185	210	29.50
High scenario price (£)	2,475	210	360	32

159. In each case, we have made a simplifying assumption that the prices will remain constant over the whole period, in reality metal prices tend to fluctuate significantly over time. The prices outlined above were used to calculate the value of the recovered non-ferrous metal, ferrous metal, plastics and glass by multiplying these with the amount of non-ferrous metal, ferrous metal, plastics and glass respectively (for example: Value of the material = Amount of material recovered from Displays and GDL x Price of the respective material). The results are outlined in Table 20 below.

Table 20 – Estimate of the value of additional recovered plastics, metals and glass

	2014	2015	2016	2019	2025
Additional tonnes to be recovered/ recycled (tonnes)	0	372	2,689	6,921	7,297
Low scenario - Value of additional recovered materials in (£m)	0	0.02	0.11	0.29	0.30
Central - Value of additional recovered materials (£m)	0	0.03	0.19	0.49	0.51
High Scenario- Value of additional recovered materials (£m)	0	0.05	0.27	0.69	0.73

160. The cumulative benefits from the additional recycling target range from £2.4m to £5.8m between 2013 and 2025. This will depend heavily on material prices.

Benefits from Co2 Avoided

161. A previous UK IA (June 2009) highlighted that the Commission considered the main benefits from the Recast would be to avoid damage caused by Ozone Depleting Substances (ODS) in cooling equipment. The IA also outlined that in the European ODS Regulation the removal of ODS from cooling equipment prior to further treatment and dismantling, recycling and disposal is already required. It also notes that it was estimated that at the time all cooling equipment was collected separately and recycled. The WEEE Directive mainly transferred the obligation to finance this treatment to producers. The previous UK IA also outlined that there was evidence from discussions with the waste management industry, that all cooling appliances arising as waste were separately collected and sent for treatment and recycling in accordance with the ODS Regulations and the WEEE Directive.

162. A report by the UNU (2007) estimates the total environmental benefits from increased separate collection of WEEE across Europe between 2005 and 2011 (Page vi, the UNU Report). However, the UNU notes that “*one important assumption [...] is that the 2011 values are based on the current 2005 impacts without taking into account the changes in product and waste stream compositions over time.*” (The UNU Report, Page vi). The methodology used in the UNU report to estimate environmental benefits is the QWERTY/EE approach which “calculates the environmental impacts based on a streamlined Life Cycle Assessment of products, components or waste streams” (The UNU Report, p 28).
163. Given this assumption, the UNU estimates that of “*..the estimated 36 million tonnes of avoided CO2 emissions, 34 million tonnes results from removing CFC based cooling agents.*” (Page vii, the UNU Report). The UNU Report estimates that 2.3 million tonnes of CO2 savings result from an additional estimated 3.1 million tonnes of WEEE being separately collected. Of this total WEEE it is estimated that 45 per cent is cooling equipment and large household appliances. Subtracting this from the 3.1 million tonnes gives 1.7 million tonnes of WEEE accounting for 2.3 million tonnes of CO2 savings. This implies that the separate collection of one tonne of WEEE (excluding cooling appliances and large household appliances), and its subsequent treatment, re-use, recycling and recovery produces CO2 benefits in the region of 1.3 tonnes of CO2. This estimate is broadly consistent with those given in *The Waste Strategy for England 2007*, which provides estimates of CO2 benefits from recycling plastics, ferrous metals, and glass (the major materials of EEE) of 1 tonne of CO2, 1.4 tonnes of CO2, and 0.7 tonnes of CO2 respectively for each tonne of material. (Waste Strategy 2007, Page 54).
164. Given that methodology used by the UNU for deriving environmental impacts includes a full lifecycle assessment, the CO2 savings will be a combination of traded and non-traded carbon. According to a WRAP study (2009) of 2,101 items of WEEE collected from the kerbside, the composition of small WEEE was approximately 48% metals, 32% plastics and 20% other materials. Assuming that the CO2 benefits associated with metals is traded carbon and the CO2 benefits associated with the other materials is non-traded, we will assume that the CO2 benefits calculated above based on the UNU report are 50% traded and 50% non-traded. DECC publish a price for traded and non-traded for use in appraisal. The latest estimates were published in October 2011¹⁸. The values are reported in 2011 prices. Table 21 shows the range of carbon price estimates for the key years – High, Low and Medium.

Table 21 - Carbon price in £

	2014	2016	2019	2025
Low Scenario - Traded	10	14	17	28
Central – Traded	17	21	26	51

¹⁸ <http://www.decc.gov.uk/assets/decc/11/cutting-emissions/carbon-valuation/3136-guide-carbon-valuation-methodology.pdf>

	2014	2016	2019	2025
High scenario – Traded	21	27	33	73
Low scenario – Non traded	29	30	31	34
Central – Non traded	58	60	63	69
High scenario– Non traded	87	90	94	103

165. Using the carbon prices from the above table, the monetary value is calculated as mentioned. The results for each scenario are outlined in Table 22 below.

Table 22 – Estimate of CO2 benefits under the increased recycling target

	2014	2015	2016	2019	2025
CO2 tonnes avoided	0	484	3,496	8,997	9,486
Low scenario- Monetary value of CO2 avoided (£m)	0	0.01	0.10	0.27	0.32
Central - Monetary value of CO2 avoided (£m)	0	0.02	0.19	0.53	0.64
High scenario - Monetary value of CO2 avoided (£m)	0	0.04	0.29	0.79	0.95

166. The table above shows that between £2.36m-6.98m could be saved of CO2 emissions in monetary terms cumulatively between 2013 and 2025 depending on the amount of CO2 emissions saved per tonne of WEEE.

167. Further benefits will be accrued to the environment due to CO2 emissions avoided from the additional amount of GDL and Displays WEEE recycled. The same assumptions are made about the CO2 emissions avoided per tonne (1.3 tonnes of CO2 per tonne of WEEE collected) and the same calculation is used to establish the CO2 emissions avoided as before (i.e. CO2 emissions avoided per tonne x additional amount of WEEE recycled/ recovered in tonnes = CO2 tonnes avoided). Given that we know the material composition of Displays and GDL, we can use this to make an assumption about how much of the CO2 savings is traded and much is non-traded. For displays, 15% is assumed to be traded carbon and for GDL, 6% is assumed to be traded carbon.

Change in the scope of the WEEE directive

Revenues from recycled materials sold as a result of recycling targets applying to PV panels

168. The main benefits from recycling PV panels are the revenues that arise from selling recycled raw materials. The Commission's PV study estimates this by combining assumptions for the material composition of PV panels with raw material prices. The study accepts that these estimates may be high as they rely on the assumption of high yield recycling. Furthermore, there were concerns in the response to the Commission's public consultation that these estimates are high in part due to over estimation of the quantities of valuable materials in PV panels. Because of this we have estimated our own potential value of recycled material from PV panels. We assume that the material composition of PV panels is 76% Glass, 10% Aluminium (both in line with the Commission's estimates for a c-Si PV panel) and 0.075% Silver. The assumption related to silver is based on a report published by Oakdene Hollins in 2011 which assesses the material composition of various strategic energy technologies. The assumption is a mean across estimates for 2003 and 2007. Material prices for recycled glass and aluminium are from www.letsrecycle.com and the high and low prices of silver between April 2011 and April 2012 are from the CNN website¹⁹. Table 23 demonstrates the low high and central scenario prices for raw materials and table 24 shows the monetised benefit from recycling PV panels as a result of the WEEE Recast.

Table 23 – Raw material prices

	Glass	Aluminium	Silver
Low scenario (£/tonne)	27	600	616,039
Central (£/tonne)	29.5	775	707,304
High scenario (£/tonne)	32	950	798,569

Table 24 – Material revenues from PV recycling targets

	2014	2015	2016	2019	2025
Tonnes of PV WEEE recycled	70	116	152	256	878
Low Scenario - Material Revenues (£m)	0.037	0.061	0.080	0.135	0.462

¹⁹ <http://money.cnn.com/data/commodities/> accessed on 3/5/12

	2014	2015	2016	2019	2025
Central – Material Revenues (£m)	0.043	0.071	0.093	0.157	0.538
High Scenario– Material Revenues (£m)	0.049	0.081	0.106	0.179	0.613

169. Calculations undertaken as part of this IA suggest that after taking in to account the costs and revenues from PV recycling, there may be a net benefit. This result is also confirmed in the BIO IS report. This outcome would suggest that the private sector would recycle a high amount of PV panels independently of regulation however in reality, this will depend on various factors including the volumes of PV WEEE arising, the quality of the recyclates and the prices of raw materials. Further, it is important to consider that the assumptions used in this IA are simplifying assumptions and do not take in to account the fact that initially recycling costs may be higher and levels of material recovery may be low initially due to PV recycling being a relatively new technique and volumes of PV WEEE being currently low. As mentioned above, there are some PV recycling organisations operating in various EU countries including the UK however it is difficult to determine whether these would recycle a high level of PV WEEE independently of regulations obligating them to do so. Because of this, we have assumed that recycling of PV WEEE due to the inclusion of PV EEE under the WEEE directive is additional to the status quo.

Benefits from avoided Co2 from separate collection and treatment of PV WEEE

170. Another important benefit of increased recycling of solar PV panel WEEE are the carbon savings from diverting PV panels from landfill and recycling and recovering raw materials which is a less carbon intensive process than mining the materials in the first place.

171. There is no evidence that shows the amount of CO₂/tonne that is saved from recycling PV panels rather than extracting the raw materials from primary sources therefore the same calculation outlined above is used for the amount of CO₂ avoided: 1.3 CO₂/tonne of WEEE. This assumption is applied to our estimates for PV WEEE separately collected under the Recast. Given the previous assumption that PV Panels are composed of 10% metals (aluminium) and 76% glass, we have assumed that 86% of the carbon savings are traded carbon. Applying this assumption to DECC's carbon prices used previously allows us to roughly estimate the carbon savings as a result of the inclusion of PV panels in the WEEE directive. Table 25 shows the estimated carbon savings for selected years from separately collecting and treating PV panel WEEE.

Table 25 – CO₂ benefits from separately collecting and treating PV panels

	2014	2016	2019	2025
Tonnes of Co2 avoided	187	354	595	2,039

	2014	2016	2019	2025
Low Scenario- Monetary value of CO2 avoided (£m)	0.002	0.006	0.011	0.059
Central - Monetary value of CO2 avoided (£m)	0.004	0.009	0.019	0.109
High Scenario- Monetary value of CO2 avoided (£m)	0.006	0.013	0.025	0.157

Benefits from avoided PV WEEE in landfill

172. Assuming that PV WEEE would have otherwise been disposed of via landfill, there will be additional benefits of the WEEE Recast in terms of savings from avoided landfill gate fee payments when PV WEEE is diverted from landfill and correctly treated instead. To estimate the savings from avoided landfill gate fee payments we have used a range of £9-£63 per tonne with a median of £21 per tonne. This is from the WRAP gate fees report for 2012. For further details on this report see paragraph 183. Applying this saving to the total tonnes of PV WEEE estimated to be collected under the Recast assuming, as in paragraph 101, that 45% of PV WEEE pom is separately collected. The benefits are outlined for key years in table 26 below.

Table 26 – savings from reduced landfill gate fees for PV panels

	2014	2016	2019	2025
Amount of PV WEEE collected (tonnes)	144	272	458	878
Low Scenario benefits (£m)	0.001	0.002	0.004	0.014
Central benefits (£m)	0.003	0.006	0.010	0.033
High scenario benefits (£m)	0.009	0.017	0.029	0.099

Non-monetised benefits of recycling PV WEEE

173. BIO IS's PV report also looks at the environmental effects that lead and cadmium leaching have as a result of landfilling PV panels. Lead leaching is estimated to be up to 75-518 grams/tonne from c-Si PV modules; Cadmium leaching is estimated to be up to 27-153 grams/tonne from CdTe PV modules. Diverting PV panels from landfill could also result in environmental benefits. These impacts are not monetised in this IA.

Retailers' Obligations

CO2 Benefits from increased collection of very small WEEE

174. As mentioned in the preceding section on the costs of the retailers' obligations from the Recast, we have estimated that an additional 0.18% of total EEE pom of very small WEEE will be collected as a result of the Recast. Using these estimates and applying the assumption that 1 additional tonne of WEEE separately collected and treated results in 1.3 tonnes of avoided CO2 emissions (see paragraphs 164-165 for further details on how this assumption is derived) gives the total amount of CO2 emissions avoided as a result of the retailers' obligations. Table 27 below shows the tonnages of CO2 emissions avoided and the monetary value based on DECC's carbon values (see table 21). We have assumed that 50% of the CO2 emissions are traded carbon and 50% are non-traded (see paragraph 166).

Table 27 – CO2 emissions savings

	2014	2016	2019	2025
Tonnes of CO2 emissions avoided	3,818	3,914	4,077	4,462
Low scenario monetary value (£m)	0.07	0.09	0.10	0.14
Central monetary value (£m)	0.14	0.16	0.18	0.27
High scenario monetary value (£m)	0.21	0.23	0.26	0.39

Other non-Monetised Benefits

Registration, information and reporting and Authorised Representative

175. In an attempt to reduce the administrative burden faced by EEE producers that sell products in multiple member states, the Recast obligates producers and distance sellers to register an authorised representative in the UK. This means

that a company that is already established in another member state but wishes to sell its products in the UK can assign an authorised representative to undertake its responsibilities rather than having to establish itself in the UK. For example A French producer placing EEE onto the market in the UK by means of distance selling will be required to appoint a representative who is established in the UK, who will be responsible for fulfilling the French producers obligations under the directive in respect of the EEE which the French producer has placed on the market in the UK.

176. This may not represent significant change for producers and distance sellers that are already established and registered in the UK. However, it may reduce the administrative costs of new actors entering the UK EEE market. Furthermore, foreign producers currently established in the UK EEE market may be able cut costs by reducing their presence in the UK due to the fact that they will only be required to have one legal representative present from 2014 onwards. Quantifying these impacts is rather difficult but it is likely that there should be a reduction of costs to business through lower administrative burdens.
177. According to Articles 16 (2ca) and 18 of the Recast, the EU will be relying more on the exchange of information amongst Member States compared with a requirement in the previous version for Member States to ensure that the producers on their territory can enter in their national register all relevant information to reflect their activities across all other Member States. In principle this involves the cooperation of member states in access to documentation and national producer registers. This should facilitate the registration and reporting process for producers that operate across a number of member states. However, there could be some costs borne by the EA and HMG involved in the making the relevant information easily available for other member states. These costs and benefits are not quantified in this IA.
178. With the extension of the scope, though some companies that previously did not need to comply with the registration and reporting process will now need to do so. This could lead to some costs in these companies when setting up a reporting mechanism. These are not quantified here given that the number of firms affected is uncertain and as explained in the previous section on opening the scope this was not attempted here for proportionality reasons. The costs are likely to be small though given that, the majority of the information required should be readily available to these firms. However, this is also likely to increase enforcement costs given that more companies will need to be monitored and supervised. Given that the number of companies is not known, it is difficult to establish by how much these costs would increase.

Non-monetised benefits of shipping requirements

179. There should also be reduced enforcement costs for the EA (and indirectly the shipping industry) as this should reduce the amount of illegal WEEE shipments. Furthermore, if the Recast reduces the amount of illegal shipments coming from other countries to the UK or provides an easier way to repatriate illegal shipments, this would also save on enforcement costs. The EU IA assumes that the 'number of illegal shipments of WEEE outside the EU' would be reduced as a result of the changes to shipping requirements in the Recast, having potentially a positive impact on environmental and health aspects in these countries. It is difficult to establish the value of potential benefits that might accrue to the UK in relation to the inspection and monitoring of WEEE shipments, given that these benefits will accrue mainly to countries outside of the UK. Establishing

these benefits therefore, has not been attempted given that they would require a disproportionate effort.

Table 28 (a): summary table of costs and benefits for option 2 (NPV and constant prices in 2011 prices, £m)

Option 2: Central Scenario (£/m)	Lines of cost/benefit	costs - constant prices	benefits - constant prices	costs - PV prices	benefits PV prices
Changes to the WEEE collection target. This includes a change from a 4kg per head target to a 45% of EEE pom in the preceding 3 years from 2016					
	Costs of additional ATFs registering as	5.2	-	4	
	Costs of additional data collection and reporting by ATFs	8.8	-	6	
	Cost of annual data audit	4.6	-	3	
Recycling targets: This includes introduction of recovery and recycling targets to an additional category of WEEE and increasing recovery and recycling					
	Costs of recycling additional WEEE	65.5	-	48	
	Value of recovered material from increased recycling of GDL and Displays	-	4.2		£3
	Monetary value of CO2 avoided from increased recycling	-	4.8		£4
Inclusion of solar PV panels as EEE.					
	Costs of separate collection of PV panels	1.5	-	1	
	Cost of recycling PV panels	0.3	-	0.25	
	Cost of labelling PV panels with WEEE logo	0.01	-	0.01	
	Monetary value of CO2 avoided from PV panel collection and treatment	-	0.4		0.3
	Value of recovered material from PV WEEE recycling	-	2.5		2
	Savings from avoided landfill gate fees from PV panels diverted from landfill	-	0.2		0.1
Additional requirements that distributors (retailers) of EEE with a sales area relating to EEE of over 400m2 collect very small WEEE in store free of					
	Cost of additional retailers' obligations	8	-	6	
	Monetary value of CO2 avoided from increased collection due to additional retailer	-	2		2
Additional requirements for international shipments of used EEE and WEEE.	non monetised costs and benefits				
The appointment of a legal authorised representative in a country in which a producer sells EEE.					
Moving to an 'open scope' categorisation of EEE in 2018					
	Total	93	14	69	11
	Net benefits and NPV	-79		-58	

* may not sum exactly due to rounding.

Table 28 (b): summary table of costs and benefits over time for option 2 (PV prices £m)

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total PV
Cost (pv prices, £m)	2.8	0.5	3.6	3.5	3.3	8.4	8.2	8.0	7.8	7.6	7.5	7.4	69
Benefits (pv prices, £m)	0.2	0.3	0.6	0.6	0.6	1.1	1.1	1.1	1.2	1.2	1.2	1.4	11
												NPV	- 58

*no impacts in 2013 (i.e. no transitional impacts)

Option 3: Achieve higher WEEE targets through establishing a protocol to generate substantiated estimates of unobligated WEEE in addition to obligated WEEE

180. Currently, the WEEE reporting data that we provide to the European Commission comes from waste treatment facilities which are authorised to treat WEEE and approved to issue evidence notes for the re-use and treatment of WEEE. These sites are known as Approved Authorised Treatment Facilities (AATFs) and the WEEE is known as “obligated WEEE” as it has to be treated or reused in accordance with the Directive.
181. A significant amount of WEEE is treated by facilities which are authorised to treat WEEE, but do not have approval to issue evidence notes and have no need or requirement placed upon them to do so. These are known as Authorised Treatment Facilities (ATFs as opposed to AATFs) and the WEEE is known as “unobligated WEEE”, as it is out of scope of the Directive.
182. We only measure the amount of obligated WEEE that is treated at AATFs to count towards the UK targets. However, the recast directive will allow for “substantiated estimates” of unobligated WEEE (WEEE that falls outside the remit of the directive and is treated at ATFs) to be counted towards the UK target. This unobligated WEEE is not measured at the moment, but as the targets are significantly higher in the recast Directive, we will need this evidence to help the UK meet its overall collection and recycling targets.
183. This option considers the case in which the UK meets the WEEE recast collection targets by quantifying the volume of collection of unobligated WEEE through the use of a mechanism such as a protocol. These estimates would be added to the tonnages of known collected obligated WEEE to produce a final substantiated estimate as required by the recast. Unobligated WEEE may be recycled through AATFs, ATFs or other routes. Examples of *non-obligated or unobligated WEEE include*:
- WEEE received at an AATF which is not counted at the first AATF in the recycling chain and so cannot issue evidence;
 - Business WEEE that has been returned by the end-user, rather than an obligated producer or its PCS.
 - Household WEEE collected or delivered directly to an AATF, with no involvement of a PCS.
 - WEEE that has been collected from a private DCF (not operated by a local authority) and is not subject to an agreement with a PCS.
184. It is not feasible to routinely measure the amount of (unobligated) WEEE treated this way, so a tool to allow for extrapolation of measurement from a representative sample of facilities is required. BIS has set up a project with

WRAP to develop a mechanism to quantify the level of unobligated WEEE treated in the UK in line with WEEE Recast Article 16 (4) all estimates of costings are based on Wrap estimates. This additional knowledge will be important also in terms of testing the values estimated in the WRAP Market Flows Model. The ability to refine these estimates will also support improved targeting of intervention activity.

185. The key objective of this project is to develop and test a methodology for accurately estimating the amount of unobligated WEEE recovered through AATFs, ATFs and any other identified routes which is not recorded in the obligated WEEE system. The resultant methodology will allow for a robust evaluation of the quantity of unobligated WEEE being recycled in the UK and support BIS's reporting towards meeting the WEEE recycling targets in the Recast WEEE Directive. The substantiated estimates will count towards the UK MS target. As noted by the Commission²⁰ it is estimated that less than half of the WEEE is counted in the official system, at a European level – therefore it's expected that the protocol will allow the UK to meet more ambitious EU targets in the future. The protocol will need to be structured such that the WEEE counted is treated to required standards.

Costs

One off costs

186. There will be two main phases to this work. Phase 1 will involve the development of a robust methodology through consultation with a steering group including industry stakeholders. This will include:

- reviewing current methodologies for the calculation of unobligated WEEE
- the application of the methodology to a variety of treatment operations

This needs to ensure

- double counting is avoided
- separate identification by category and B2B/B2C
- whether more than one methodology is required, dependant on size or nature of facility, or other variables.
- identifying strengths, weaknesses and costs, and future costs of implementation or review and update.
- testing of the methodology (including the number and type of sites for testing).

187. Phase 2 will involve the initial testing of methodology in parallel with the public consultation process on the future of the WEEE system in the UK.

²⁰ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0810:FIN:EN:PDF>

188. This will involve selecting the treatment operators to be involved and the sampling and collation of data. Consideration will be given to the timing and length of sampling.
189. Relevant responses to the public consultation will be fed into the process for review and incorporation into the methodology where appropriate.
190. It's assumed that the development, testing and the implementation of the methodology will involve a one off cost in the first year for Government.

Table 29– one of cost of methodology development and testing in 2013

	High scenario	Central	Low scenario
Methodology development	£25,000	£25,000	£25,000
Testing of methodology	£24,000	£30,000	£36,000
Implementation	£50,000	£100,000	£200,000

Recurring costs

191. The methodology for how the unobligated WEEE will be calculated is currently being developed. However it is envisaged the methodology will calculate a figure for unobligated WEEE. To ensure that the estimate of unobligated WEEE reflects the existing landscape, the methodology will be updated every 3 years. To update the estimate a number of treatment operators will be selected to be involved and either be audited or provide data.
192. There is no additional annual cost imposed on treatment operators by the protocol as the methodology requires 3 year updates. The cost of updating the protocol will be met by the producers.

Table 30– Recurring cost of updating the protocol

	2017	2018	2019	2020	2021
High scenario	£50,000	£0	£0	£0	£50,000
Central	£100,000	£0	£0	£0	£100,000
Low Scenario	£200,000	£0	£0	£0	£200,000

Benefits

Benefits from AATF's reporting non-obligated WEEE every three years

193. Under the protocol AATF's would be required to report the amount of non-obligated WEEE they receive every three years. However, AATF's currently report this data to the EA on an annual basis. In 2011 AATF's and Authorised Exporters received 74,668 tonne of non-obligated WEEE. Under the Protocol it is likely that the AATF's would continue to collect this data as before on an annual basis but only report it once every three years. Hence this would result in an admin saving for AATF's. However, the saving would be marginal as these AATF's already report obligated WEEE tonnes to the EA and would do so for non-obligated WEEE at very little additional cost. It is therefore not monetised.

Other impacts of WEEE recast

194. All other impacts of the WEEE recast such as the inclusion of PV panels are the same as option 2. This is explained in detail under the evidence pages for option 2 (paragraphs 108-149 and 169-180) and are for brevity not repeated in this option. A full list of quantified costs and benefits for both options are outlined in the summary tables (tables 28 and 31).

Table 31 (a): Summary of costs and Benefits (PV and constant prices, at 2011 prices)

Option 3: Central Scenario (£/m)	Lines of cost/benefit	costs - constant prices	benefits - constant prices	costs - PV prices	benefits - PV prices
This includes cost of establishing the protocol to generate substantiated estimates of unobligated WEEE in order to meet more ambitious targets.					
	Methodology development work	0.03	-	0.02	
	Testing of methodology	0.03	-	0.03	
	Implementation of methodology	0.1		0.1	
	Cost of updating protocol	0.3		0.2	
Inclusion of solar PV panels as EEE.					
	Costs of separate collection of PV panels	1.5	-	1	
	Cost of recycling PV panels	0.3	-	0.25	
	Cost of labelling PV panels with WEEE logo	0.01	-	0.01	
	Monetary value of CO2 avoided from PV panel collection and treatment	-	0.4		0.3
	Value of recovered material from PV WEEE recycling	-	2.5		2
	Savings from avoided landfill gate fees from PV panels diverted from landfill	-	0.2		0.1
Additional requirements that distributors (retailers) of EEE with a sales area relating to EEE of over 400m2 collect very small WEEE in store free of					
	Cost of additional retailers' obligations	8	-	6	
	Monetary value of CO2 avoided from increased collection due to additional retailer obligations	-	2		2
Additional requirements for international shipments of used EEE and WEEE.	non monetised costs and benefits				
The appointment of a legal authorised representative in a country in which a producer sells EEE.					
Moving to an 'open scope' categorisation of EEE in 2018					
	Total	10	5	8	4
	Net benefits and NPV	-4.5		-4	

*May

not sum exactly due to rounding

Table 31 (b): Summary of central costs and benefits over time (PV prices, £/m)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total PV
Cost (pv prices, £m)	0.2	2.8	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.6	8
Benefits (pv prices, £m)	-	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	4
													NPV	- 4

Conclusion

195. The WEEE Recast has been agreed at EU level and is a directly applicable EU measure. It must be transposed in the UK by 14th February 2014.
196. Two options have been considered in detail with regards to increasing the amount of WEEE that is separately collected and treated such that the UK meets the collection targets outlined by the Recast. This Impact Assessment assumes that the current UK WEEE system remains in place up to 2025 and assesses the costs and benefits as such.
197. Option 3 is the preferred option given that according to our estimates of the associated costs and benefits, it has a higher NPV than option 2 in the central (and low) scenario.
198. It has not been possible to quantify all costs and benefits due to lack of evidence. However, a summary of all quantified costs and benefits associated with all options are outlined in summary tables 28 and 31.
199. BIS has committed to reviewing the UK WEEE system and introducing regulatory change by 2014 under the 'Red Tape Challenge'. The changes to the WEEE system resulting from this are the subject of a separate Impact Assessment published alongside this one (in no. 0393).

Specific Impact Tests

Small Firms Impact Test

200. The Commission's Small and Medium Sized (SME) Panel informed the Commission's proposals for the Recast of the WEEE Directive and the views of this panel were taken into account. There were no SME exemptions in the original Directive. However, upon transposing the 2006 regulations in the UK, HMG took steps to minimise the impacts on SMEs by, for example providing for alternative methods of take-back, so that small retailers did not need to take-back WEEE in store. The 2006 regulations also allowed SME's to become members of PCS's so that they would only have to bear the cost of recycling the EEE which they had placed onto the market in line with their market share. Furthermore, BIS also established a list of criteria, which all PCSs must meet to ensure that SMEs are able to obtain full access to the PCS's, for example, they are not prevented from joining a scheme by disproportionate costs. During the recast negotiations, the UK sought to ensure that the impacts on SMEs were not disproportionately high by seeking to introduce a "de minimis exemption for distance seller SMEs placing very small amounts of EEE on the market".
201. Microbusiness Exemption Rule: Under the microbusiness exemption rule whereby regulation exempts organisations of 10 or fewer employees and start-ups, this measure is out of scope because it relates to the EU.
202. The additional retailers' obligations from the Recast are not expected to cause any disproportionate impact on small firms due to the fact that the requirements do not apply to retailers with a floor space relating to EEE of less than 400m². Furthermore, an opt out from this requirement was secured, whereby alternative methods of collection may be used if they can be shown to be at least as effective as what is suggested by the Recast.
203. One of the main costs on small producers of EEE under the current UK system is the Environment Agency registration fees. As demonstrated in table 12, there are thresholds by which producers of EEE pay different fees depending on their annual turnover and whether they are VAT registered or not. The thresholds are such that a firm with an annual turnover of just greater than £1m will pay the same registration fee as a firm that has an annual turnover widely greater than £1m. What is more is that the turnover of the firm is not necessarily related to sales on EEE. This situation can mean that large firms that put small amounts of EEE on the market and small firms with a turnover of slightly greater than £1m will have to pay the highest EA registration fees. As mentioned in paragraphs 125-129, moving to open scope as part of the Recast may mean that producers that were currently not covered by the WEEE Directive will be included from 2014 for PV panels and 2018 for other items. There is a possibility that small businesses will be disproportionately impacted as a result of the change in scope from the Recast due to the reason outlined above. BIS and the Environment Agency have committed to reviewing registration fees to explore if a standard approach on fees can be adopted across all the producer responsibility regimes (including WEEE). This will seek to continue to reflect the cost recovery basis on which the fees are based, but to streamline and simplify the process and to provide a proportionate cost recovery rate for smaller producers. Furthermore, the WEEE system IA (no 0393) proposes the introduction of a de-minimis threshold for low volume producers of EEE whereby those producers who place less than a certain amount of tonnage on the market have reduced obligations and are not required to join a producer compliance scheme.

204. Data on the number of different sized firms for the solar PV industry (also affected from widening of scope) is not available given that this is a relatively new industry that is not defined by Standard Industrial Classification (SIC) codes. As mentioned above in paragraph 109, it is generally expected that the impacts of changing the scope due to the Recast will be small.
205. The data reporting requirements for producers of EEE has also been flagged by industry as being particularly burdensome on businesses that place only a small amount of EEE on the market. This is because there is a baseline level of administration associated with placing EEE on the market that does not vary depending on volume. The introduction of the de-minimis threshold as noted in para 204 would limit such regulatory burdens on small volume producers of EEE.
206. The appointment of a legal representative to represent a producer of EEE in the countries in which it sells EEE rather than the producer having to be established there is expected to reduce costs to business more generally. This may benefit small businesses more given that this may generate a greater decrease in the per tonne cost of selling EEE in to foreign markets if the seller only sells small amounts of EEE.
207. The changes from the WEEE Recast will be implemented alongside changes resulting from BIS's commitment under the Red Tape Challenge by February 2014 (see IA 0393). Throughout implementation BIS will continue to work to with small businesses to ensure that the WEEE Directive and the UK WEEE system will not impose disproportionate costs on small businesses operating in the UK.

Competition assessment

208. There is little evidence that the WEEE Directive and its transposition into UK law by the UK's WEEE Regulations have had a detrimental effect on competition in the UK. The market for EEE is overall a dynamic and innovative one.
209. Some stakeholders view the UK WEEE system as uncompetitive given the inelastic and guaranteed producer demand for WEEE as a result of obligations being aligned to market share for 100% of DCF WEEE. However, this is beyond the scope of the IA. The system failures are addressed in the WEEE systems IA (no. 0393).
210. Furthermore, some smaller companies are likely to perceive the registration requirements under the WEEE Directive as a barrier to entry into a particular market, given that it requires them to register in each Member State if for example they are selling EEE via a website. However, as noted above the UK government is interested in the views of SMEs and will consider these for the negotiations and the implementation of the recast WEEE Directive. See para 204.
211. The Commission's proposal to recast the WEEE Directive is therefore, not expected to have a negative impact on competition in the UK.

Greenhouse Gas Assessment

212. With respect to the Greenhouse Gas assessment, the impact on CO₂ emissions is included in the main analysis as a benefit. There are CO₂ savings from additional recycling of WEEE from the widening of scope and changes to the distributor take back scheme.
213. Further savings can be made from reduced energy usage by using recycled material. The table below was taken from the EU IA reflecting the savings in energy that could be made from using recycled material compared to the

production of virgin material (EU IA, 2008, p.19). This table shows that for example recycled copper needs 85% less energy than the extraction and refining of virgin materials. Given the difficulty of establishing how much of each of these materials are recovered from recycled WEEE, these benefits have not been quantified.

Table 32: Energy savings from various materials relative to the extraction of virgin materials

Material	Aluminium	Copper	Iron & Steel	Lead	Zinc	Paper	Plastics
Energy Savings (%)	95	85	74	65	60	64	>80

Source: EU IA 2008

214. On the other hand more energy will be required to recycle and treat the additional WEEE properly, reducing these benefits slightly. However, it is likely that this effect on CO2 emissions is rather small.

Wider Environmental Issues

215. According to the EU IA, WEEE that is not properly treated can lead to environmental harm arising in particular from release of heavy metals such as mercury from for example compact fluorescent lamps or lead from TVs. Furthermore, toxic emissions from WEEE can also damage the environment and human health due to uncontrolled dumping and sub-standard treatment.

216. In addition improper treatment and dumping of waste in developing countries can cause health issues and environmental problems. The IA also highlights that one of the main environmental problems is the improper treatment of equipment which release CFCs and HCFCs from fridges. They estimate the monetized climate damage at around €1bn per year in 2011, although it is declining to lower levels by 2020 due to the decrease in the number of fridges that use these substances.

217. The reuse of whole appliances and the new target included could also provide environmental benefits in particular due to the fact that less WEEE is deposited into landfill or incinerated. The benefits include for example improved air quality and reduced CO2 emissions. The latter benefits have been monetized in the main analysis.

218. With respect to other benefits, the UNU study highlights amongst others benefits such as the reduction in marine aquatic eco-toxicity, terrestrial eco-toxicity, acidification and eutrophication. None of these benefits were monetised in the study.

Equality Impact Assessment

219. The proposed system will not have an adverse or disproportionate effect on any person as a consequence of race, ethnic origin, religion, gender, sexual orientation, age, transgender / transsexual or disability.

Health and Well-Being Assessment

220. An initial assessment using the screening questions for health and well-being provided by the Department of Health, no health impact assessment is considered to be required in this case. Wider environmental benefits including the reduction in CO₂ emission have already been captured in the evidence base as well as in the section on wider environmental issues.

Sustainable Development

221. The Directive could potentially contribute to sustainable development, given that it encourages the recycling of materials and the reuse of whole items, which would otherwise be waste. This is likely to have a positive effect on the environment. The benefits from material and the costs and benefits from the recycling of more WEEE have been captured in the main analysis. Environmental effects have been quantified with respect to the CO₂ emissions avoided and wider environmental issues have been addressed in the respective section above.

Direct costs and benefits to business calculations (OITO)

222. Under the One In, Two Out rule, any new burden placed on business through domestic regulation needs to be compensated by deregulation of twice the value. The proposed legislation addressed in this IA is out of scope of OITO. This is because the WEEE Directive is a directly applicable EU measure and the transposition does not gold plate the regulation i.e. it does not go over the minimum EU requirements.
223. The Recast of the WEEE Directive is a directly applicable EU measure. It must be transposed within 18 months and 20 days of publication.

Costs to Public Sector – Monitoring and Enforcement

224. The WEEE Directive is currently enforced by the respective Environment Agencies in England and Wales, Scotland and Northern Ireland and the VCA. The Environment Agency for England and Wales currently obtains revenue from the producer registration fees as well as the licensing of AATFs and AEs. The producer registration fees vary depending on whether the company is VAT registered and what level their turnover is. The Environment Agency is currently examining the possibility of updating its fees relating to the WEEE regulations. There is also an MOU in place between BIS and the Environment Agency to cover the costs associated with 'free rider' producers. The enforcement costs borne by the VCA are also currently covered by an MOU between them and BIS.
225. The enforcement and monitoring costs are currently a transfer from businesses to the regulator given that they are recovered mainly through the fees charged by the Environment Agency. These could potentially increase due to factors such as the inclusion of PV panels in 2014 and opening the scope in 2018. Companies that previously were not captured under the Directive will need to comply with it and also be monitored as well as those already in scope. As outlined in the section that explained the opening of the scope, the number of companies affected is not known.

Post Implementation Review (PIR) Plan

226. This proposal puts forward options for amendments to the UK WEEE regulations. The regulations are to be reviewed by January 2019 on the basis of a non-statutory commitment to review (PIR). The objective of the review will be to ensure that the legislation is achieving its aims without undue burden to those obligated by it. If this is not being achieved, careful consideration would be given to modifying the regulation or providing improved guidance. The approach taken will include canvassing stakeholder views through their representative organisations. This should include a mix of qualitative and quantitative evidence. BIS already have good communications with the representative organisations and will continue to work with them to ensure that the objectives are being met and we are informed of any problems.

Assumptions and Risks

General assumptions

227. The current UK WEEE system remains in place in its current state up to at least 2025.
228. A UK Infracton of EU regulation is not an option – the UK will continue to meet all targets outlined by the Recast.

Assumptions for 'do nothing' option

229. B2C WEEE collected will increase by 2% annually from 2011 up to 2012.
230. UK population increases inline with ONS UK population projections.
231. UK recycling and recovery targets are currently met and would be up to 2025.

Option 2:

Assumptions for the calculation of the new collection target

232. WRAP standard assumptions are used for calculation of EEE pom and total WEEE arising. Full assumptions can be found in Appendix 1 of WRAP's WEEE flows report. Main assumptions below:
- It was generally assumed that future sales of EEE would follow the same trends as the previous 15 years.
 - The assumptions regarding the decisions at the point of disposal of WEEE are based on discussions with industry and WRAP's own experience.
 - Due to a lack of information on levels of WEEE in residual waste, since local authorities report the total residual waste collected, as well as the amount sent to each processing destination it was assumed that the splits of WEEE followed the same values, irrespective of category.
 - Data on tonnages of WEEE treated by AATFs is based on Environment Agency data. For WEEE that was recorded to have passed from one AATF to another, it was assumed that the second AATF undertook the final treatment of the WEEE
 - It was assumed that ATFs treat WEEE (excluding that for reuse) in the same manner as AATFs

Assumptions for obligating non-obligated WEEE

233. The estimates for the tonnages of WEEE treated by ATFs are based on WRAP's WEEE flows model – assumptions outlined above.
234. The cost of an ATF becoming an AATF (paid to the EA) remains constant over time.
235. The amount of WEEE that ATFs (that become AATFs) have capacity to treat is equal to the average amount of WEEE treated by AATFs in 2011 in the central scenario. This capacity is assumed to remain constant over time.

236. It takes 1 full time administrative staff to do the appropriate data collection, monitoring and reporting for 10,000 tonnes of WEEE. It is assumed that the salary for a full time administrative staff does not change dramatically over time.
237. Data audit reports for AATFs are a fixed cost and are not dependent on the amount of WEEE collected.

Assumptions for increased recycling and recovery targets

238. All the costs reflect the impact of the new recycling target only.
239. The estimated cost of recycling and recovery includes transportation, collection and treatment.
240. We have assumed that Cooling, LDA and Small Mixed WEEE would be collected under business as usual due to there being a net revenue associated with their collection, transportation and treatment.
241. It was assumed that the composition of WEEE remains the same as the composition outlined by the Environment Agency study and the Defra 2007 study. The composition of WEEE is also assumed to remain the same over the whole period.
242. The prices of recycled materials are assumed to remain constant. High and low scenarios have been constructed based on the price ranges over the previous year. The central scenario is the mid-point.
243. The ranges of the costs and a mid-point value were used to establish a high, low and central scenario. Costs are assumed to be constant over the whole period in each case.
244. It is assumed that open scope will not have a large impact on which EEE products will fall under each recycling and recovery target.
245. No changes are assumed for the reporting system.

Assumptions for the inclusion of PV panels

246. PV panels will be installed in the UK according to DECC's estimates from the 2012 review of the PV FiT (IA number: DECC091).
247. The majority of PV installations in the UK up to 2025 will be domestic.
248. 1 MW of installed PV is equal to 100 tonnes in weight.
249. PV panel lifespan is based on disposal percentages from PV Cycle (table 12)
250. 45% of PV EEE pom is separately collected as WEEE.
251. All the costs reflect the impact of including PV panels under the WEEE directive only. The costs of collection, transportation and treatment are assumed to remain constant.
252. The material composition of PV panels is assumed to remain constant and will remain in line with the estimates made by BIO IS and Oakdene Hollins.
253. It is assumed that it will be feasible to extract silver from PV panels when recycled, in line with the BIO IS report.

Assumptions for CO2 emissions avoided

- 254. 1 tonne of WEEE separately collected and properly treated avoids an equivalent of 1.3 tonnes of CO2 emissions. This is assumed to remain constant and is assumed to be the same for all categories of WEEE.
- 255. We have assumed that metals and glass result in traded CO2 avoided and that other materials result in non-traded CO2 avoided. The material compositions of WEEE are assumed to remain constant.
- 256. It is assumed that DECC's forecasted carbon values do not change.

Assumptions for avoided landfill gate fees

- 257. Landfill gate fees estimates are based on WRAP's annual gate fees report and it is assumed that landfill gate fees remain constant over time.
- 258. It is assumed that landfill gate fees are the same for all categories of WEEE.

Assumptions for retailers' obligations

- 259. In this IA it is assumed that retailers follow the Recast text rather than pursue an alternative option that is at least as effective as what is outlined in the text (as allowed by the Recast).
- 260. It is assumed that the cost of collection, transportation and treatment of very small WEEE is equal to the cost of collection, transportation and treatment of small mixed WEEE disposed of at DCFs. Costs are assumed to remain constant.
- 261. It is assumed that WEEE containers will last up to 2025 and will not require replacing.
- 262. It is assumed that other towns in the UK will have a similar dynamic to their local retailers as is found in Valpak's research on Stratford upon Avon.
- 263. 3% of UK retailers will be captured by the retailers' obligations of the recast.
- 264. 'Very small EEE' is assumed to be 3% of total EEE pom. This is assumed to remain constant over time.
- 265. In store collection of 'very small WEEE' is assumed to amount to around 6% of all very small EEE pom. This ratio is assumed to remain constant.

Assumptions on move to an open scope

- 266. The number of businesses needing to comply with the WEEE Directive, which were previously excluded, is assumed to be relatively small. If this is not the case then this will impact on the number of companies affected, the costs and operation of the recycling and treatment of WEEE as well as WEEE composition. This could change the costs and benefits significantly.

Option 3:

Assumptions on the protocol- substantiated estimate of un-obligated WEEE

- 267. All estimates of costings are based on Wrap estimates. The high and low scenario are +/- 20% of these costs. Costs are assumed to be constant over the whole period in each case.
- 268. The unobligated WEEE tonnage recovered through AATFs, ATFs and any other identified routes which is not recorded in the obligated WEEE system is

enough combined with obligated tonnage to meet the WEEE recast collection, recovery and recycling, targets.

269. Assumptions for material composition of WEEE are as above.

270. Assumptions for CO2 and landfill benefits are as above.

Annex 1

Main References

Final regulatory Impact Assessment for the WEEE Regulations, DTI (2006), URN 06/2206
Impact Assessment of Commission's Proposal to Recast Waste Electrical and Electronic Equipment (WEEE) Directive, BERR (2009)
Commission staff working paper accompanying the Proposal for a Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE) (recast) Impact Assessment, Com (2008) 810 final (2008)
2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) Final Report, United Nations University (2008)
WEEE recast: from 4kg to 65%: the compliance consequences, UNU Expert Opinion on the EU European Parliament Draft Report on the WEEE Directive with updates of the 2007 WEEE Review study and estimated kilograms per head for 2013/2016 for all EU 27+ 2 countries, United Nations University (2010)
Market flows of WEEE Materials, WRAP (2011)
Realising the value of recovered plastics – an update, WRAP (2010)
Trial to determine WEEE Protocol for category one large domestic appliances, Defra (2007)
Trial to establish waste electrical and electronic equipment (WEEE) protocols, Defra (2007)
Explanatory Memorandum – Proposal for a Directive of the European Parliament and of the council on waste electrical and electronic equipment (WEEE), Com (2008) 810 final; 2008/0241(COD)
Environment Agency, Northern Ireland environment agency, Scottish Environment Protection Agency, 2011, National WEEE protocols, http://www.environment-agency.gov.uk/static/documents/Business/WEEE_Protocols.pdf
The WEEE Regulation (SI 2006 No. 3289), 'The WEEE (Amendment) Regulations 2007' (SI 2007 No. 3454), 'The WEEE (Amendment) Regulations 2009, No1 & 2' (SI 2009 No. 2957 and 3216) and 'The WEEE (Amendment) Regulations 2010, (SI No. 1155). Government Guidance Notes (URN 07/1631 and URN 09/ 1446)
Directive 2012/19/EU of the European Parliament and of the Council of 4 th July 2012 on Waste Electrical and Electronic Equipment (WEEE) Recast, Official Journal of the European Union (2012)
Digest of United Kingdom Energy Statistics 2011, DECC (2011)
On the Brink of a Bright Future – Insights on the UK Solar PV Market, PWC (2010)
Project WEEE – Independent Assessment of the Cost of Complying with WEEE Regulations, KPMG (2008)
Study on the Developments of a Take Back and Recovery System for Photovoltaic Products, Okopol (2007)
Separation of Mixed WEEE Plastics, WRAP 2009
Low Carbon and Environmental Goods and Services – Report for 2010/11, K-Matrix (2012)
Study on Photovoltaic Panels Supplementing the Impact Assessment for a Recast of the WEEE Directive, BIO IS (2011)

Final regulatory Impact Assessment for the WEEE Regulations, DTI (2006), URN 06/2206
A Brief Guide to the Carbon Valuation Methodology for UK Policy Appraisal, DECC (2011)
Critical Materials in Strategic Energy Technologies, Oakdene Hollins (2011)
Gate Fees Report, WRAP (2011)
Methodology Guidelines on Life Cycle Assessment of Photovoltaic Electricity, IEA (2009)
New Zealand Lighting Industry Product Stewardship Scheme – Phase 1 Assessment and Review, Stewardship Solutions (2008)
Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on waste electrical and electronic equipment (WEEE) (Recast) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0810:FIN:EN:PDF

