

Title: Impact Assessment of Ecodesign Regulation and Voluntary Agreement for Imaging Equipment Lead department or agency: Defra Other departments or agencies:	Impact Assessment (IA)
	IA No: DEFRA1308
	Date: 22/09/2011
	Stage: Final
	Source of intervention: EU
	Type of measure: Voluntary Agreement Contact for enquiries: Maggie Charnley, +44 (0) 207 238 1530 Maggie.S.Charnley@defra.gsi.gov.uk

Summary: Intervention and Options

What is the problem under consideration? Why is government intervention necessary? Imaging equipment contributes to the electricity consumption of domestic and commercial buildings in Europe. There are an estimated 35 million different pieces of imaging equipment in use in the UK. Overall the UK market represents approximately 16% of the European imaging equipment market ¹ . Whilst parts of the UK market are slowly moving towards the use of more energy efficient imaging equipment, there are still significant numbers of inefficient products being sold. Behavioural barriers and information failures mean that energy efficient products are not being taken up quickly enough to secure potential energy savings benefits. As a result, Government intervention (at EU level due to the Single Market) either in the form of regulation or a Voluntary Agreement, setting minimum energy performance standards for imaging equipment, has become necessary to achieve the desired cost-effective CO ₂ emission abatement.	
What are the policy objectives and the intended effects? The objective of the restrictions for imaging equipment is to contribute to realising CO ₂ savings required to achieve the UK Climate Change Act target of 80% reduction in CO ₂ emissions by 2050 and also to achieve the EU ETS cap in the most cost-effective way, by mitigating for the effects resulting from barriers to behaviour change. Product policy is considered as a necessary complement to the EU ETS for the overall ambition to reduce CO ₂ in the most cost-effective manner possible. Lower energy usage will also contribute to energy security.	
What policy options have been considered? Please justify preferred option (further details in Evidence Base) The UK has implemented Framework Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products. A draft Ecodesign Regulation was issued by the Commission (26th October 2010) setting out requirements for imaging equipment. However, an industry Voluntary Agreement (VA) can be used under the Ecodesign Directive as an alternative to mandatory requirements under certain conditions and industry published a draft VA on the 15 th February 2011. This Impact Assessment sets out the potential costs and benefits of implementing either measure according to requirements drafted in October 2009 and February 2011 for the Regulation and VA, respectively. The costs and benefits presented here are considered against the counterfactual of “no implementation” of the measure.	
When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?	The Regulation will be reviewed 3 years after entering into force and the OVA will be reviewed 3 months after publication of new ENERGY STAR specification or by January 2013 (whichever comes first).
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

SELECTSIGNATORY Sign-off For final proposal stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY:..... Date:.....

¹ Figure based on an estimated stock of 132,415,000 imaging products in the EU by 2010 as noted in task 8 of the preparatory study. The UK had an estimated 33,220,015 imaging products in stock by 2010.

Description:

Draft Industry Voluntary Agreement

Price Base Year 2009	PV Base Year 2011	Time Period Year 19	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: £0

COSTS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	£ n/a	£0m	£0m

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

Estimated cost to manufacturers: £ negligible
 Estimated costs to consumers of products (medium cost scenario): £ 0
 (Note that the model assumes all compliance costs are passed onto the consumer.)
 Estimated costs of extra heating due to the Heat Replacement Effect: £0
TOTAL: £ 0

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

Manufacturers will be required to make changes to product documentation in order to accommodate information requirements included in the Industry Voluntary Agreement. These costs, however, are likely to be negligible, since manufacturers already provide extensive information on their products, or are otherwise passed onto consumers.

BENEFITS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	£n/a	£0m	£0m

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

Value of energy savings (net): £0
 Value of reduction in CO₂ emissions: £ 0
 Net benefit of air quality improvements: £ 0
TOTAL: £0

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

Increased security of supply as UK will require less energy as a result of lower energy use in imaging equipment; Contribution to meeting renewable energy targets; Benefits to end-users from information on the product due to new requirements; Cooling Replacement Effect: demand for cooling decreases as more efficient imaging equipment generate less waste heat; Reduction in paper usage associated with the duplexing² requirements; Global benefits from imaging equipment sales made to EU standards being sold in other markets.

Key assumptions/sensitivities/risks	Discount rate	3.5%
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The IA modelling calculates the market impact only up to 2030, thus costs post-2020 are reduced in proportion to the level of benefits that occur beyond 2030. The appraisal period is assumed to be 19 years (2012-2030). The projections become less certain further into the future, so figures post 2020 are likely to be less reliable. The measure is likely to have an asymmetric impact on firms differing by size. It is assumed that electricity prices will increase in the future and that this increase will affect consumer behaviour, pushing them to purchase the more energy efficient products. The outcomes of this IA are not as expected as the Voluntary Agreement has shown to have no savings and therefore no costs.

Direct Impact on Business (Equivalent Annual)	In scope of OIOO?	Measure qualifies as
New AB: n/a AB savings: n/a Net: n/a	No	n/a

² A duplex unit allows automatic printing of a sheet of paper on both sides of the page.

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?	EU				
From what date will the policy be implemented?	Circa 2011				
Which organisation(s) will enforce the policy?	The Steering Committee (industry, Commission, Member States and NGOs)				
What is the annual change in enforcement cost (£m)?	Unknown				
Does enforcement comply with Hampton principles?	Yes				
Does implementation go beyond minimum EU requirements?	No				
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded: 0		Non-traded: n/a		
Does the proposal have an impact on competition?	Yes				
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?	Costs: n/a		Benefits: n/a		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	Micro n/a	< 20 n/a	Small n/a	Medium n/a	Large n/a
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
Statutory equality duties³ StatutoryEqualityDutiesImpactTestguidance	No	
Economic impacts Competition CompetitionAssessmentImpactTestguidance Small firms SmallFirmsImpactTestguidance	Yes No	31
Environmental impacts Greenhouse gas assessment GreenhouseGasAssessmentImpactTestguidance Wider environmental issues WiderEnvironmentalIssuesImpactTestguidance	Yes Yes	23 23
Social impacts Health and well-being HealthandWell-beingImpactTestguidance Human rights Human RightsImpactTestguidance Justice system Justice ImpactTest guidance Rural proofing Rural ProofingImpactTestguidance	No No No No	
Sustainable development SustainableDevelopmentImpactTestguidance	No	

³ Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act of 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland

Price Base Year 2009	PV BASE YEAR 2011	TIME PERIOD Years 19	NET BENEFIT (PRESENT VALUE (PV)) (£M)		
			LOW:	HIGH:	BEST ESTIMATE: £117 - 195

COSTS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	£n/a	£0.75 -1.25m	£14 - 23m

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

Estimated cost to manufacturers: £ negligible,
Estimated costs to consumers of products (medium cost scenario): £13,865,000 - £23,109,000
(Note that the model assumes all compliance costs are passed onto the consumer.)
Estimated costs of extra heating due to the Heat Replacement Effect: £209,000 - 348,000
TOTAL: £14,074,000 – 23,456,000

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

Manufacturers will be required to make changes to product documentation in order to accommodate information requirements included in the EU Regulation. These costs are likely to be negligible, since manufacturers already provide information on their products, or are otherwise passed onto consumers.

BENEFITS (£m)	Total Transition (Constant Price)	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	£n/a	£11m	£175m

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

Value of energy savings (net): £155,505,000
Value of reduction in CO₂ emissions: £17,736,000
Net benefit of air quality improvements: £2,463,000

TOTAL: £175,704,000

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

Increased security of supply as UK will require less energy as a result of lower energy use in imaging equipment; Contribution to meeting renewable energy targets; Benefits to end-users from information on the product due to new requirements; Cooling Replacement Effect: demand for cooling decreases as more efficient imaging equipment generate less waste heat; Reduction in paper usage associated with the duplexing requirements;⁴ Global benefits from imaging equipment sales made to EU standards being sold in other markets.

Key assumptions/sensitivities/risks	Discount rate	3.5%
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The IA modelling calculates the market impact only up to 2030, thus costs post-2020 are reduced in proportion to the level of benefits that occur beyond 2030. The appraisal period is assumed to be 19 years (2012-2030). The projections become less certain further into the future, so figures post 2020 are likely to be less reliable. The measure is likely to have an asymmetric impact on firms differing by size. It is assumed that electricity prices will increase in the future and that this increase will affect consumer behaviour, pushing them to purchase the more energy efficient products. The outcomes of this IA are not as expected as the Regulation has shown much greater benefits in comparison to the Voluntary Agreement.

Direct Impact on Business (Equivalent Annual) (£m):	In scope of OI/OO?	Measure qualifies as
New AB: n/a	Yes / No	IN/OUT
AB savings: n/a		
Net: n/a		

⁴ A duplex unit allows automatic printing of a sheet of paper on both sides of the page.

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?	United Kingdom				
From what date will the policy be implemented?	Circa 2011				
Which organisation(s) will enforce the policy?	UK Market Surveillance Authority				
What is the annual change in enforcement cost (£m)?	Unknown				
Does enforcement comply with Hampton principles?	Yes				
Does implementation go beyond minimum EU requirements?	No				
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded: -0.93		Non-traded: n/a		
Does the proposal have an impact on competition?	No				
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?	Costs: n/a		Benefits: n/a		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	Micro n/a	< 20 n/a	Small n/a	Medium n/a	Large n/a
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
Statutory equality duties⁵ StatutoryEqualityDutiesImpactTestguidance	No	

Economic impacts	Impact	Page ref within IA
Competition Competition AssessmentImpactTest guidance	Yes	31
Small firms SmallFirmsImpactTestguidance	No	

Environmental impacts	Impact	Page ref within IA
Greenhouse gas assessment GreenhouseGasAssessmentImpactTestguidance	Yes	23
Wider environmental issues WiderEnvironmentalIssuesImpactTestguidance	Yes	23

Social impacts	Impact	Page ref within IA
Health and well-being HealthandWell-beingImpactTestguidance	No	
Human rights HumanRightsImpactTestguidance	No	
Justice system JusticeImpactTestguidance	No	
Rural proofing RuralProofingImpactTestguidance	No	

Sustainable development SustainableDevelopmentImpactTestguidance	No	
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⁵ Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act of 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

No.	Legislation or publication
1	INDUSTRY VOLUNTARY AGREEMENT TO IMPROVE THE ENVIRONMENTAL PERFORMANCE OF IMAGING EQUIPMENT PLACED ON THE EUROPEAN MARKET, VERSION 3.5, DRAFT 15.02.2011
2	WORKING DOCUMENT ON ECODESIGN REQUIREMENTS FOR NON-INDUSTRIAL IMAGING PRODUCTS, DRAFT, 26.10.2010
3	
4	

+ Add another row

Evidence Base

Annual profile of monetised costs and benefits* - (£m) constant prices

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Transition costs										
Annual recurring cost										
Total annual costs										
Transition benefits										
Annual recurring benefits										
Total annual benefits										

* For non-monetised benefits please see summary pages and main evidence base section



Annual profile of monetised costs and |

Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added to provide further information about non-monetary costs and benefits from Specific Impact Tests, if relevant to an overall understanding of policy options.

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

Basis of the review: [The basis of the review could be statutory (forming part of the legislation), it could be to review existing policy or there could be a political commitment to review];

EU level statutory commitment for European Commission to review Regulation after X years. Defra will feed into this EU level review, and take a proportionate approach to gathering evidence.

Review objective: [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]

The EU level review will: check whether the Regulation is operating as expected; whether it is delivering the expected reduction of carbon emissions and energy savings; whether the costs involved were higher or lower than expected; evaluate the technological development of the products available on the market; examine whether the minimum energy performance standards (MEPS) can be made more ambitious or if new MEPS should be set; and assess what the potential costs and benefits of these MEPS will be. Defra will identify areas where implementation and enforcement of the Regulation could be improved to reduce burdens on UK businesses. It will also assess the costs and benefits that the Regulation has delivered for the UK and how net benefits to the UK might be increased.

Review approach and rationale: [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]

The EU Commission's review will be carried out at EU level consisting of: evaluation of energy efficiency of products on the market at time of review; evaluation of how the policy can evolve; upcoming technological improvements expected after the review period; calculation of future estimated costs and benefits. Defra's UK review will assess: practical experience of operation of Regulation; available market data; stakeholder views; comparative analysis of predicted and actual financial savings, carbon emission reductions and energy savings. This will allow for a comprehensive assessment of the impact of the Regulation in the UK and EU and will ensure the policy is modified to reflect experience of operation of the Regulation and technological changes in the market.

Baseline: [The current (baseline) position against which the change introduced by the legislation can be measured]

The reference scenario outlined in p.17 -18 of this IA provides the baseline against which the expected impacts of the Regulation should be measured. The reference scenario contains underlying trends in markets and technologies, and accounts for the estimated impacts of historical and current policy measures. It indicates what would happen in the market if no further measures were to come into place – e.g. predictions of changing consumer preferences, and switches to different technologies.

Success criteria: [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]

The criteria to show achievement of the policy objectives will be: removal of products from the market that do not meet the MEPS; Improved energy efficiency of products available on the market; Net benefits to UK overall and UK businesses not disproportionately affected; No significant negative impact on consumers or significant negative impact on industry's competitiveness. The criteria for modifying or replacing the policy will be: Regulation no longer required to deliver financial and environmental benefits; Regulation having significant negative impact on UK businesses or consumers; Regulation could be improved to reduce burdens on UK businesses; More energy efficient models available on the market, requiring tougher MEPS to be set; New types of products available on the market, requiring expansion of the scope of the Regulation.

Monitoring information arrangements: [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review]

The UK Market Surveillance Authority (MSA) is responsible for the monitoring, verification and enforcement of the Ecodesign Regulations. It engages with industry stakeholders on a regular basis and carries out ongoing product testing to assess and ensure compliance with the Regulations. The MSA provides quarterly reports to Defra on their activities and findings on a range of products covered by the Ecodesign Regulations.

In addition to this information, at the time of the review, the UK Market Transformation Programme may collect further product data (energy performance and market availability of these products) and will engage with relevant stakeholders to collect relevant information.

Reasons for not planning a PIR: [If there is no plan to do a PIR please provide reasons here]

N/A

Annex 2 (Evidence Base for summary sheets)

1 Introduction & purpose

The Framework Directive 2009/125/EC for the Ecodesign of Energy Related Products⁶ (ErP) was adopted in October 2009 and implemented in the UK⁷ and other Member States (MS) in October 2010. This replaced Directive 2005/32/EC for the Ecodesign of Energy Using Products⁸, in order to widen the scope to include energy related products. The ErP establishes a framework by which the Commission and Member States can bring forward measures to establish minimum performance standards relating to the environmental impacts of products (e.g. their energy consumption and other environmental impacts). Industry input is an important part of the process. The legal basis is in Article 114 of the Treaty on the Functioning of the European Union (Lisbon Treaty), formerly Article 95 of the EC Treaty

The ability to establish minimum performance standards and energy labelling requirements in this way is a key foundation of the approach to reducing the carbon impacts of products in the UK. As a member of the EU, the UK is bound to implement directly any Regulations or Voluntary Agreements adopted under the Framework Directive(s). Therefore, gold plating through UK legislation is not an issue.

Ecodesign Implementing Measures can take the form of Regulation or alternatively an industry Voluntary Agreement (VA). Industry Voluntary Agreements can be used under the Ecodesign Directive rules as an alternative to mandatory requirements under certain conditions. The Voluntary Agreement should achieve the same objectives as mandatory Implementing Measures in a more rapid and cost-effective manner. VA's must also deliver added value compared to the 'business as usual' scenario, through quantified and staged objectives. Further Voluntary Agreement requirements include credible monitoring and reporting (including independent inspections) as well as participation by the majority of the industrial sector under consideration. Additional conditions are detailed in Annex VIII of the Ecodesign Directive. The Voluntary Agreement is currently Defra preferred option for addressing the efficiency of imaging equipment due to the advantages discussed above. The Regulation and Voluntary Agreement are the two measures assessed here.

There is a large number of technology types associated with imaging equipment. The technology types covered by the measures include: printers, copiers, scanners, facsimile (fax) machines and multifunction devices (MFDs)⁹, for the home or the office.

Imaging equipment is categorised based on the "marking technology" it uses and its "functionality". "Marking technologies" are the technological solutions used to place images on paper or other output material. The most common marking technologies are laser and inkjet. The levels of functionality found in imaging equipment can also vary considerably according to marking technology and even within each of the marking technology categories.

Inkjet based MFDs are by far the most popular types of imaging product in terms of sales volumes. Inkjet printers also continue to be sold in high numbers. Sales of laser based MFDs and printers have also increased in recent years with expectations that sales of the former will continue to grow into the future. On average imaging equipment is replaced between once every 4 to 6 years with laser based imaging products tending to have longer lifetimes than inkjet based products.

Annex 1 of the Regulation and the commitments section of the Voluntary Agreement sets out minimum performance standards and functionality requirements for imaging equipment.

This Impact Assessment will enable the UK to assess the costs and benefits to the UK of the two measures as proposed by the European Commission and help inform the UK's negotiating and voting position during any forthcoming meetings.

⁶ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. *OJ L 285, 31.10.2009, p. 10-35*

⁷ The Ecodesign for Energy Related Products Regulations 2010 - SI 2010 No 2617

⁸ Directive [2005/32/EC](#) of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive [92/42/EEC](#) and Directives [96/57/EC](#) and [2000/55/EC](#) of the European Parliament and of the Council. *OJ L 191, 22.7.2005, p. 29-58*

⁹ MFDs combine a number of imaging equipment types, such as a printer, copier and scanner, in one body.

The UK has fully participated in all EU discussions on these measures to date, using evidence developed by the UK Market Transformation Programme (MTP) to inform discussions and to influence the development of the proposal. Commission and help inform the UK's negotiating and voting position during any forthcoming meetings, including the Regulatory Committee meeting.

1.1 Impact Assessment Overview

The Impact Assessment sets out the potential costs/benefits of the two EC proposals below:

- Draft Voluntary Agreement (draft version of the Voluntary Agreement as circulated on 15th February 2011)
- Draft Ecodesign Regulation (draft version of the was circulated on 26th October 2010)

This document sets the scene for the effect the proposal will have on the UK industry and provides the potential financial and environmental impacts UK industry could face.

The remainder of the document is as follows:

Section 5 assesses the environmental, economic and social impacts at the three life cycle phases of a product and presents the associated costs and benefits.

Section 6 considers the other policies and measures for the product area (which have been included in the reference scenario).

Section 7 summarises the overall costs and benefits under both scenarios.

Section 8 outlines the assumptions, sensitivities and risks of the Regulation

Section 9 presents the Climate Change Policy Cost Effectiveness Indicator.

Finally, section 10 outlines the specific impact tests

2 Rationale for intervention

Imaging equipment contribute to the electricity consumption of households and non-domestic premises in Europe, with the UK market estimated to represent between 15% and 25% of the EU-25 in terms of electricity consumption, equivalent to around 1.8 TWh in the UK in 2010. Laser printers and laser MFDs represent approximately 68% of this energy consumption with the majority of the remainder being consumed by inkjet printers and inkjet MFDs.

According to the results of the EU Preparatory Study¹⁰ on imaging equipment, the primary environmental impact of thermal based devices, such as laser printers, is related to energy consumption in the use phase and paper consumption. The EU Preparatory study estimated that paper use in standard size laser MFDs and printers accounted for around 80% to 90% of use phase energy. For recent MTP evidence suggests that paper use could account for around 95% of use energy in standard size thermal MFD's and printers. These values are based on the ENERGY STAR use profiles which in some circumstances are known to overestimate imaging volumes. However, the ENERGY STAR use profiles were used in the analysis as they were the best use profile estimates available at the time of writing.

For non-thermal products, such as inkjet multifunctional devices (MFDs), the primary environmental impact is related to energy used during manufacture. The EU Preparatory study estimated that paper use in non-thermal products accounted for around 64% of use phase energy on average. MTP estimates suggest that paper account for around 70% of use energy in non-thermal products.

Under the domestic reference scenario, total energy consumption from imaging products is expected to continue to rise in the future primarily due to an increase in sales and functionality of products.

Under the non-domestic reference scenario total energy consumption from imaging products is expected to increase from 2009 until 2013, then decrease from 2014 to 2021 before finally increasing again from 2022 to 2030. The changing patterns of increasing and decreasing energy are mainly due to increased sales, usage and functionality of products causing a rise in energy use which is counter factored by improving energy efficiency.

Imaging equipment energy efficiency is mainly evaluated in terms of market penetration of ENERGY STAR. The EU ENERGY STAR label (aiming to identify best performing products) has been in operation since 2003. Whilst specifications are initially created with the intention of only qualifying the top performing 25% of the market, the market penetration of the label has been observed to increase rapidly over time, driving a need of revisions in requirements around every three years. The label has this strong influence on the market mainly due to the mandatory use of ENERGY STAR specifications in public procurement in the United States and within the European Community. Many private organisations also procure products which meet the ENERGY STAR specifications for corporate responsibility reasons and to reduce running costs.

The 2009 ENERGY STAR revision adopted two different approaches for defining the energy efficiency of imaging equipment. Under the first approach, called "Typical Electricity Consumption" (TEC), requirements are based on a maximum kWh/week allowance using a predefined duty cycle (based on product speed measured in images per minute (ipm)) and power demand measured across most power modes. The TEC approach applies to standard-size electrophotography based printers, electrophotography MFDs, high performance inkjet products, photocopiers and solid ink printers. The TEC method is used for products with relatively high power demand during use. This is mainly associated with the fact that the TEC products use heat energy in the marking process and are generally used frequently.

Under the second approach, called "Operational Mode" (OM), requirements are based on power demand in sleep and off mode and apply to a range of marking technologies and product sizes, including inkjet products as well as large format electrophotography printers, electrophotography MFDs and photocopiers. The active printing mode of OM products is not addressed as these products tend not to be used as frequently as the TEC products and so the sleep and off modes are considered the most important in terms of overall energy consumption.

Imaging equipment requirements within the draft industry Voluntary Agreement (VA) and draft Ecodesign Regulation are based on the ENERGY STAR v1.1 requirements. The Voluntary Agreement commitments

¹⁰Can be found here: <http://www.ecoimaging.org/>

state that by January 2012 90 percent of imaging equipment sold (in terms of sales volumes), by signatories to the VA, will meet the ENERGY STAR v1.1 energy efficiency specifications (see Table 1 for the breakdown in percentages of imaging products that will have to meet the ENERGY STAR requirements). In addition the draft Voluntary Agreement requirements state that all imaging products placed on the market after 1st of January 2012 must offer the capability to print several pages of a document on one piece of paper and they must be designed for recycling. It also states that any cartridge produced by or recommended by the original equipment manufacturer (OEM), for use in the product, is not designed to prevent its reuse and recycling and the machine must not be designed to prevent the use of a Non-OEM Cartridge.

The Regulation requires that 100 percent cut of products sold will need to meet the ENERGY STAR v1.1 specification six months after the Regulation comes into force (12 months for large format products). The Regulation also includes additional requirements on the sleep and off modes of some products covered under the TEC approach.

There are often considerable energy consumption differences between different imaging products of the same type and functionality levels which show that there is considerable scope for improvement in the market. Continued use and sale of inefficient imaging equipment represents a market failure in the sense that whilst negative externalities such as carbon emissions may be compensated for in market transactions, via the EU Emissions Trading Scheme, this mechanism does not correct for all market failures e.g. where barriers to behaviour change still persist (for example, those due to a lack of, or inequality in, information).

This analysis is consistent with the “third leg” of the Stern Report (the need to develop policies to remove barriers to behaviour change such as a lack of reliable information, transaction costs, and organisational and individual inertia) and provides the rationale for the Voluntary Agreement or Regulation, which complements the EU ETS.

The UK Climate Change Act came into force on November the 26th of November 2008. The Act set a legally binding target of at least 34 percent cut in greenhouse gas emissions by 2020 and an 80 percent cut in emissions by 2050, against a 1990 baseline year. The UK Low Carbon Transition Plan (issued in July 2009) lays out how the UK Government will deliver the 34 percent cut in emissions on 1990 levels by 2020, including proposals for product standards and targets to phase out the least efficient products. This plan aims to achieve more, and extend the ambition set out in the 2007 Energy White Paper, with the aim of doubling the emissions savings expected by the measures agreed so far, by 2020.

3 Content of the proposed Ecodesign Regulation and Voluntary Agreement

This Impact Assessment distinguishes between the cost and benefits broadly attributable to the Voluntary Agreement and the Ecodesign Regulation. The minimum performance standards define a minimum standard of energy performance that must be achieved. The resulting energy savings can therefore be considered ‘guaranteed’ (assuming 100% compliance¹¹), but there is little incentive for manufacturers to produce products which go beyond this level.

3.1 Ecodesign Requirements

The draft Ecodesign Regulation under the Ecodesign Directive and the draft Voluntary Agreement set out minimum performance standards for imaging equipment (‘Draft EC proposal’).

As mentioned above the Voluntary Agreement states that by January 2012 90% of all imaging products sold (in terms of sales volumes), by signatories to the Voluntary Agreement, will meet the ENERGY STAR v1.1 energy efficiency specifications and that under the Regulation 100% of all products will meet the same ENERGY STAR specification. Table 1 outlines an estimation of the percentage of each product type which will meet the ENERGY STAR specification.

There are no equivalent labelling requirements proposed for imaging equipment.

¹¹ In reality compliance rates are much lower. However, the UK has implemented a compliance policy which has involved appointing a market surveillance authority, in line with requirements of the Directive, that will address issues of non-compliance.

The scenarios are considered against the counterfactual of “no implementation” of the measure (the Reference Scenario). This baseline includes all policies formally agreed at present (Section 6.2), therefore the costs and benefits presented here relate only to the draft Voluntary Agreement and Regulation.

Table 1 Summary of imaging equipment scenarios

Scenario	2012	2013
<p>Draft industry Voluntary Agreement</p>	<p>Stage 1 INKJET PRINTERS</p> <ul style="list-style-type: none"> Assumes 94% products achieve current average performance of ENERGY STAR qualified products in sleep and off mode No change assumed to ready mode as no ENERGY STAR requirements <p>INKJET MFDs</p> <ul style="list-style-type: none"> Assumes 99% products achieve current average performance of ENERGY STAR qualified products in sleep and off mode No change assumed for ready mode as no ENERGY STAR requirements <p>LASER PRINTERS</p> <ul style="list-style-type: none"> Assumes 94% products achieve current average TEC levels of ENERGY STAR qualified products <p>LASER MFDs</p> <ul style="list-style-type: none"> Assumes 56% products achieve current average TEC levels of ENERGY STAR qualified products <p>← not modelled specifically →</p> <ul style="list-style-type: none"> Energy savings from duplex imaging requirements under ENERGY STAR 	
<p>Draft Ecodesign Regulation</p>		<p>Stage 1 INKJET PRINTERS, INKJET MFDs, LASER PRINTERS and LASER MFDs:</p> <ul style="list-style-type: none"> Assumes 100% products achieve current average performance of ENERGY STAR qualified products. <p>← not modelled specifically →</p> <ul style="list-style-type: none"> Energy savings from duplex imaging requirements under ENERGY STAR Off mode requirements for TEC based products

The main difference between the Voluntary Agreement and the Regulation is that most imaging products manufactured (not all speed categories would be included in the scope of the Regulation) will need to meet

ENERGY STAR specification levels under the Regulation. This will have a biggest impact on the laser based products, more specifically laser MFDs, as a much lower percentage of these products are expected to be bought up to ENERGY STAR specification under the Voluntary Agreement.

The implications of these requirements are that low efficiency imaging products will be phased out by the draft Voluntary Agreement or Regulation. The potential impacts of these requirements are described in section 5.

3.2 Product Information Requirements

Under the draft Voluntary Agreement and Regulation, manufacturers are obliged to provide specific information on the product both prior to purchase on the packaging and on free access websites. Certain information must also be included in the product's technical documentation file, drawn up for the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC. Details of these requirements are provided in the Annex 3 to this Impact Assessment.

4 Analysis and Evidence

4.1 Overview of the imaging equipment market

Seventeen manufacturers are responsible for approximately 95% of all imaging equipment placed on the EU market. These manufacturers are; Brother, Canon, Dell, Epson, HP, Kodak, Konica Minolta, Kyocera Mita, Muratec, Lexmark, Océ, Oki, Panasonic, Samsung, Sharp, Toshiba and Xerox. There are a number of other manufacturers selling imaging equipment into the EU market which accounts for the remaining 5% of sales. However, there are significantly fewer imaging equipment manufacturers than manufacturers of other technological equipment such as personal computers.

Most imaging equipment is now manufactured in South East Asia, especially in China, Japan and the Philippines. One company still appears to manufacture some products in the UK although this is likely to cover products such as fax machines and typewriters. Typewriters are not covered by the draft Voluntary Agreement or Regulations.

Whilst most imaging equipment is manufactured in South East Asia there is some cartridge manufacturing in the EU. A larger number of EU based companies are involved in cartridge remanufacturing (taking used cartridges from the market place, replacing worn parts and then reselling).

The imaging equipment market in the UK has been estimated at approximately £1.7 billion per annum (Gartner 2008)¹².

4.1.1 Market breakdown by technology

Inkjet based multi functional devices (MFDs) are by far the most popular types of imaging product in terms of sales volumes. Inkjet printers also continue to be sold in high numbers. Sales of laser based MFDs and printers have also increased in recent years with expectations that sales of the former will continue to grow into the future. These trends are illustrated in Figure 1, below.

¹² Gartner (2008) Printer Trends

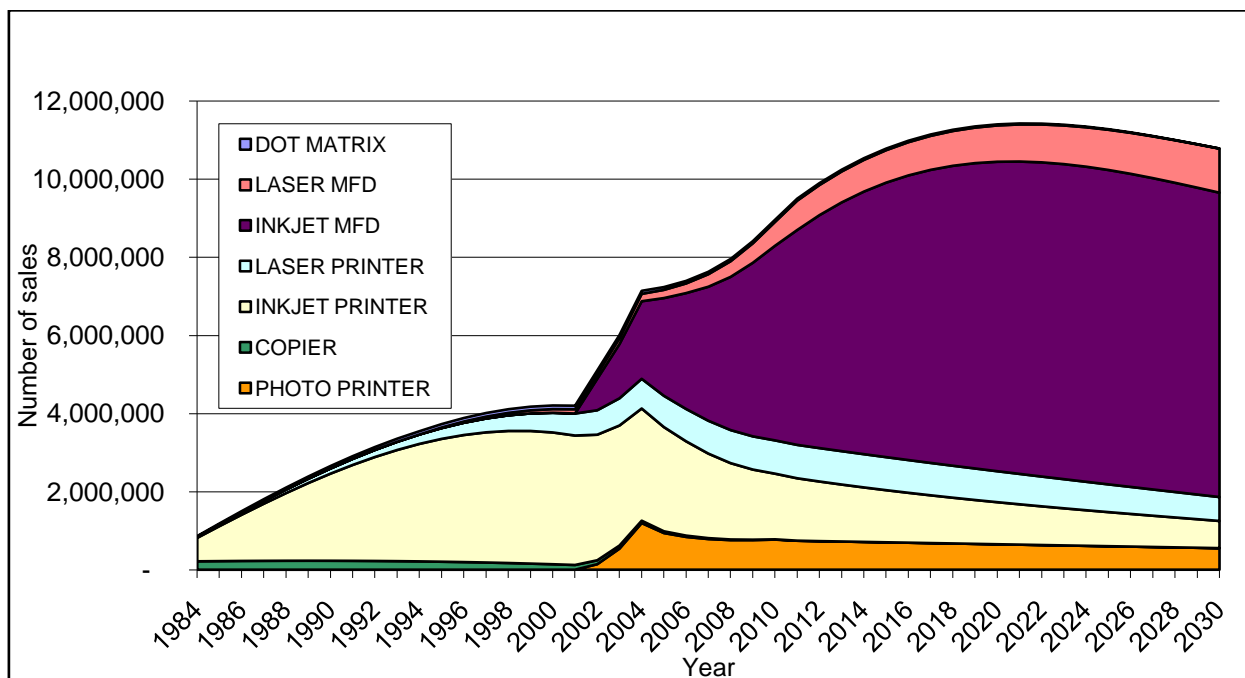


Figure 1 Number of UK sales of imaging equipment

Table 2 and Table 3 show the expected sales volumes for imaging products under the reference scenario, illustrating the continued shift toward MFDs from single function devices.

Table 2 Domestic imaging equipment sales distribution

Year	Inkjet Printer	Inkjet MFD	Laser Printer	Laser MFD	Others
2009	19%	60%	4%	2%	<16%
2015	11%	73%	3%	3%	<5%
2020	9%	77%	2%	3%	<5%

Table 3 Non-Domestic imaging equipment sales distribution

Year	Inkjet Printer	Inkjet MFD	Laser Printer	Laser MFD	Others
2009	33%	33%	22%	10%	<2.5%
2015	17%	47%	18%	17%	<1.5%
2020	12%	52%	16%	19%	<1.0%

The shift from single function devices to more efficient MFDs (due to the replacement of multiple products) is not in itself expected to result in reduced total energy consumption due to increased usage, sales and functionality of products expected in the future.

4.1.2 Market breakdown by efficiency

In terms of energy efficiency, recent estimates suggest that ENERGY STAR penetration rates for inkjet based products are very high (approximately 94% for inkjet printers and 99% for inkjet MFDs). ENERGY STAR penetration rates for laser based imaging products are lower (approximately 86% for laser printers and 46% of laser MFDs). Some of the lower ENERGY STAR penetration rates are likely due to some products not having the required duplexing¹³ functionality rather than the products being less energy efficient.

As previously mentioned the main energy use for thermal based devices, is related to energy consumption in the use phase and paper consumption, whereas for non-thermal products, such as inkjet multifunctional devices (MFDs), the main energy use is during manufacture.

4.1.3 Supply chain

Imaging products are often sold to consumers directly by the original equipment manufacturers (OEMs) but other channels to market such as general retailers are also used. In addition, some imaging products are not sold directly to the customer but are leased as part of an imaging equipment service. Most imaging equipment can easily be installed by the end users. However, some very high specification imaging products may be installed by the OEM or another specialised company.

¹³ A duplex unit allows automatic printing of a sheet of paper on both sides of the page.

4.2 Evidence and analysis of the costs of improved product efficiency

4.2.1 Making products compliant with performance requirements

There are a considerable number of imaging products on the market, from a range of manufacturers, which already meet the proposed requirements. It is expected that some additional costs may be imposed on manufacturers, but that these will be minimal as the technology required to meet the requirements is widely available (witnessed by the large numbers of products which are already capable of meeting the ENERGY STAR requirements). There are some additional costs associated with the inclusion of a duplexing unit in higher speed products. Whilst most higher speed products already include a duplexing unit there are a small number of products on the market which would need to be retrofitted.

Some models of laser based imaging equipment can remain on the market for many years. Some of these older products will likely not be able to meet the ENERGY STAR specifications without significant changes to their design. It is assumed that manufacturers would be more likely to discontinue than redesign older products that failed to meet the requirements.

There are no expected negative impacts for UK manufacturers. There is a potential benefit for UK based cartridge remanufacturers in that the Voluntary Agreement and Regulation require that OEMs do not design cartridges so that they cannot be remanufactured and do not design imaging products so that they cannot accept remanufactured cartridges. These requirements may increase the UK market size for remanufactured cartridges.

4.2.2 Costs of improving product efficiency

There does not appear to be a marked price increase for inkjet products that meet the ENERGY STAR specifications.

There are likely to be some extra costs for laser based products, most noticeable of which would be the addition of a duplexing unit to higher speed products (if one was not already included) where required to meet the ENERGY STAR specifications. It is expected that these extra costs would amount to approximately £200 for each duplexing unit. However, most higher speed products already have duplexing functionality included and so it is expected that only a small number of higher speed products would need to change. The addition of a duplex unit in higher speed products would also reduce paper costs which could be considerable in a high speed imaging product.

Other costs associated with ensuring that imaging products are able to meet the ENERGY STAR specifications include installing more efficient power supply units (PSUs) and motors as well as the inclusion of more efficient heating components (laser products only) and LED based light sources in the imaging unit (also laser products only).

The costs associated with the inclusion of more efficient PSUs are expected to be £2.00 in 2012 decreasing by 75% by 2030. This cost increased in based on known costs of improving the PSU efficiency in computer products. More efficient motors are expected to cost just £1.00 in 2012 again falling by 75% by 2030. The additional costs for motors are based on an expert assumption that better magnets, improved brushes or alternative motor types will be relatively inexpensive alterations. The improvement in heating components are expected to cost £5.00 in 2012 again falling by 75% by 2030. These additional costs are based on an expert assumption that more efficient heating components are common place in the market and should therefore add little additional cost. It is assumed that the inclusion of LED light sources in scanner or imaging units will cost £5.00 in 2012 but one more reduce quickly by 75% by 2030 due to LEDs rapidly becoming the dominant type of lighting component used in ICT products.

4.2.2.1 Uncertainly

An expert assumption has been made that there is a 25% level of uncertainty surrounding the cost figures presented within this impact assessment. As a results the costs figures are presented showing a 25% uncertainty range.

The extra costs for duplex functionality have not been included in the impact assessment due to the fact that it would also have been necessary to discount the savings from reduced paper usage. Given the wide range of imaging speeds and use patterns found in laser printers and laser MFDs the savings associated with the use of a duplex unit would be complex and prone to large amounts of uncertainty.

The large variability in imaging products on the market also means that the costs associated with making different components more efficient may vary considerably according to product type. The costs included in the IA are assumed to be average cost increases.

5 Analysis of Policy Impacts

5.1 Identification of Potential Impacts

The two draft measures, in setting the requirements identified in section 3.1, seeks to improve the environmental performance of imaging products. Environmental performance of products must be considered throughout their life cycle, at the component/product manufacturing, usage and end-of-life phases.

Table 4 sets out the potential environmental, economic and social impacts at each of the life-cycle phases. These will be examined (including their costs and benefits) in subsequent sections 5.3- 5.9.

Table 4 Areas of potential impacts

Life cycle stage	Impact category		
	Environmental	Economic	Social
Component/Product Manufacture	<ul style="list-style-type: none"> Material and energy use requirements during manufacturing process 	<ul style="list-style-type: none"> Costs of making products compliant Availability of technology and need for R&D Other compliance issues e.g. labelling, supply chain management, competitive position Market surveillance and compliance systems and processes 	<ul style="list-style-type: none"> Possibility of firms leaving the market and any effects on employment
Usage	<ul style="list-style-type: none"> Changes in CO₂ emissions across UK Changes in air quality as a result of less electricity being generated 	<ul style="list-style-type: none"> Changes in electricity consumption across UK due to less power consumed Changes in energy costs for consumers resulting from a reduction in electricity consumption Changes in the required delivery of renewable energy as a result of changes in electricity demands 	<ul style="list-style-type: none"> Changes in functionality of products as result of compliance with requirements or due to decisions of manufacturers when faced with decisions on product adaptation
End of life	<ul style="list-style-type: none"> Ease of recycling and any requirements to deal with different materials used in order to ensure compliance 	<ul style="list-style-type: none"> Changes in recycling and waste management costs 	<ul style="list-style-type: none"> None foreseen

5.2 Additional uptake of efficient products

Figure 2, below, depicts the stock-weighted average sleep mode power consumption for inkjet printers and inkjet MFDs, for the reference scenario, draft Voluntary Agreement and draft Ecodesign Regulation. As there are various types of inkjet printers and inkjet MFDs, as well as operating power modes, this graph is given for illustrative purposes only.

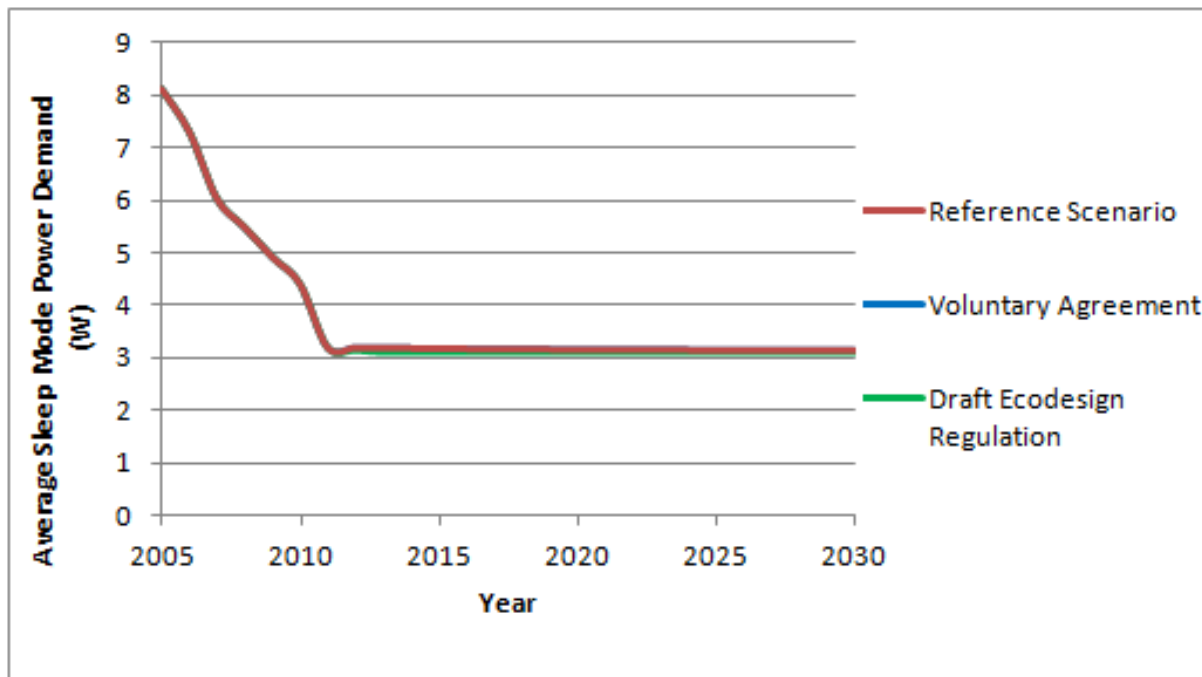


Figure 2 Average sleep mode power consumption of inkjet printers and inkjet MFDs

It is assumed that the current ENERGY STAR specifications will be the dominant driver in bringing the sleep mode power demand down in all policy scenarios (the only difference being the compliance rates). It is assumed that prior to 2010 the sleep mode power demand dropped quickly as easily made changes to the products were made. From 2011 onwards as the ENERGY STAR compliance rate becomes so high that the power demand in all scenarios stabilises at around the current ENERGY STAR levels.¹⁴ (ENERGY STAR compliance rates for inkjet imaging equipment are already very high and there is likely to be little difference between the reference scenario, Voluntary Agreement and Regulation.) The average sleep mode power demand under the Voluntary Agreement is the same as that in the reference scenario as no further improvement would be expected from the already very high ENERGY STAR compliance rates. The average sleep mode power demand under the Regulation policy line is fractionally lower than the reference scenario because the Regulation will require the remaining few inkjet products to become compliant with the ENERGY STAR specifications.

¹⁴ It is possible that sleep mode power demand could decrease even further in future but this would likely require the use of another policy measure to come in – something that we do not model at this time.

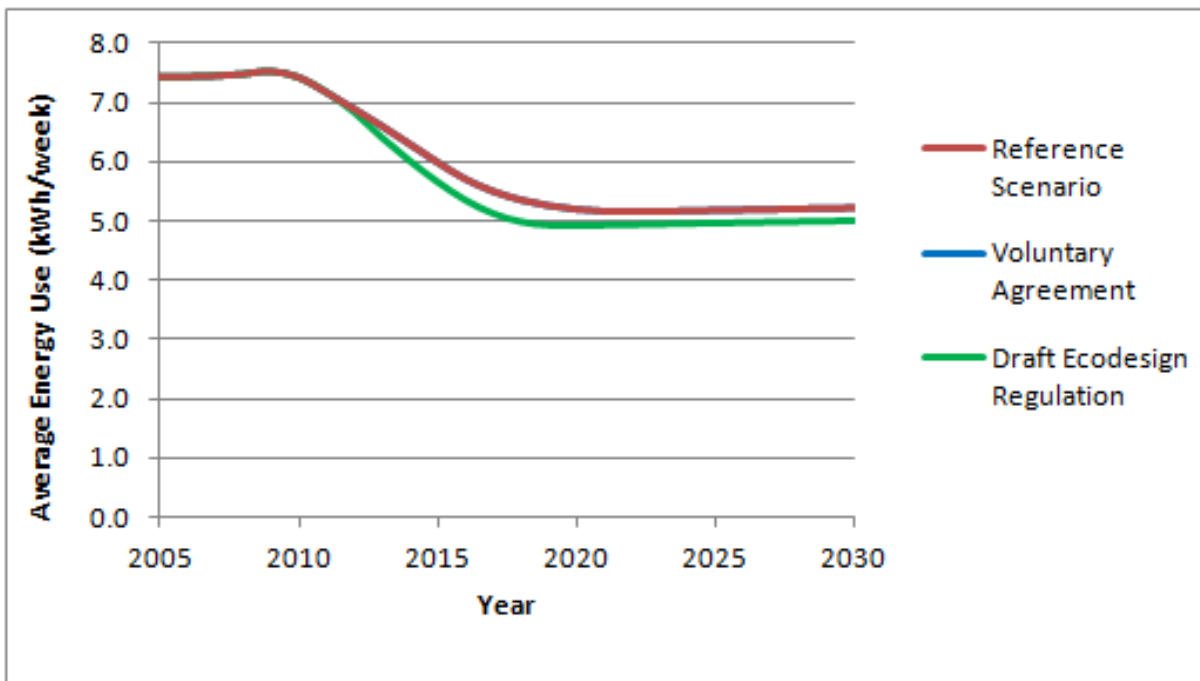


Figure 3 below, illustrates the stock-weighted average energy consumption for laser printers and laser MFDs across the scenarios (see Table 1). Again, as there are various types of laser printers and laser MFDs this graph is given for illustrative purposes only.

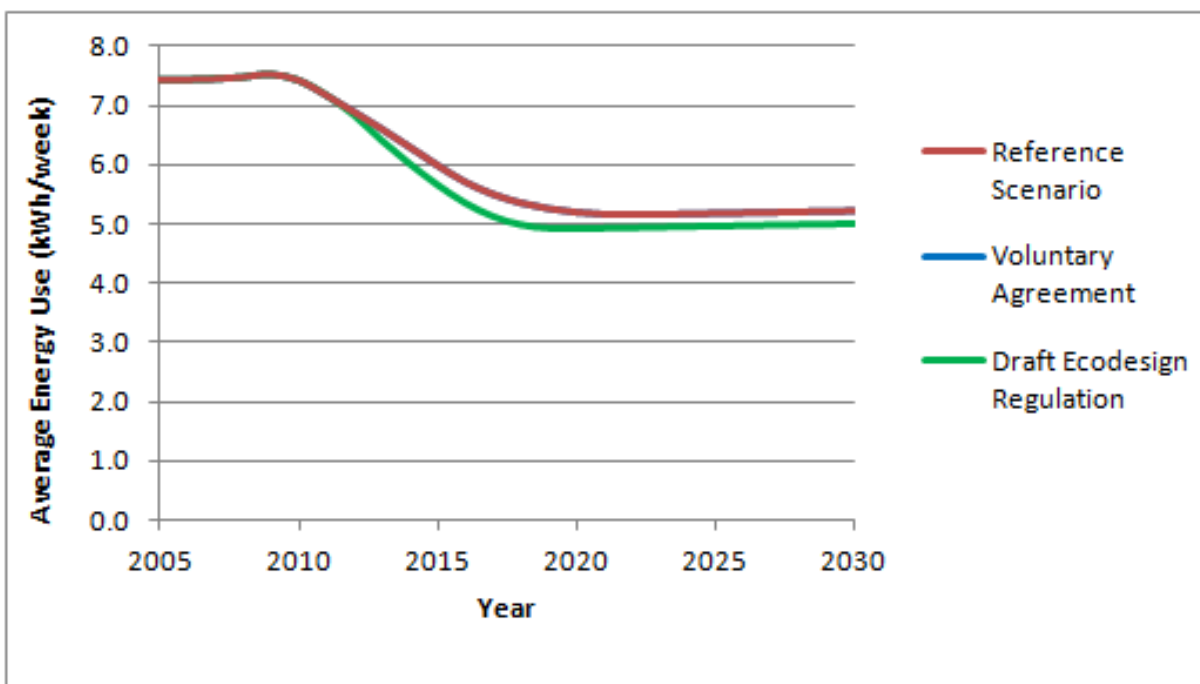


Figure 3 Average energy consumption of laser printers and laser MFDs

It is assumed that with time the average energy use of laser based equipment will decrease under all scenarios. Those manufacturers which produce both inkjet and laser based equipment will be able to meet the Voluntary Agreement requirements largely through their inkjet based products because as seen in Figure 2 most products already meet the requirements.

The smaller manufacturers that only manufacture laser based products are already showing very high ENERGY STAR compliance rates (in the reference scenario)¹⁵ Therefore the energy use under the reference scenario will be the same under the Voluntary Agreement and it will not result in any significant improvements to the energy efficiency of laser based products, hence why the voluntary agreement trend line in Figure

¹⁵ Two companies reported to the Commission that around 90% of their laser products were already meeting ENERGY STAR specification (October 2010)).

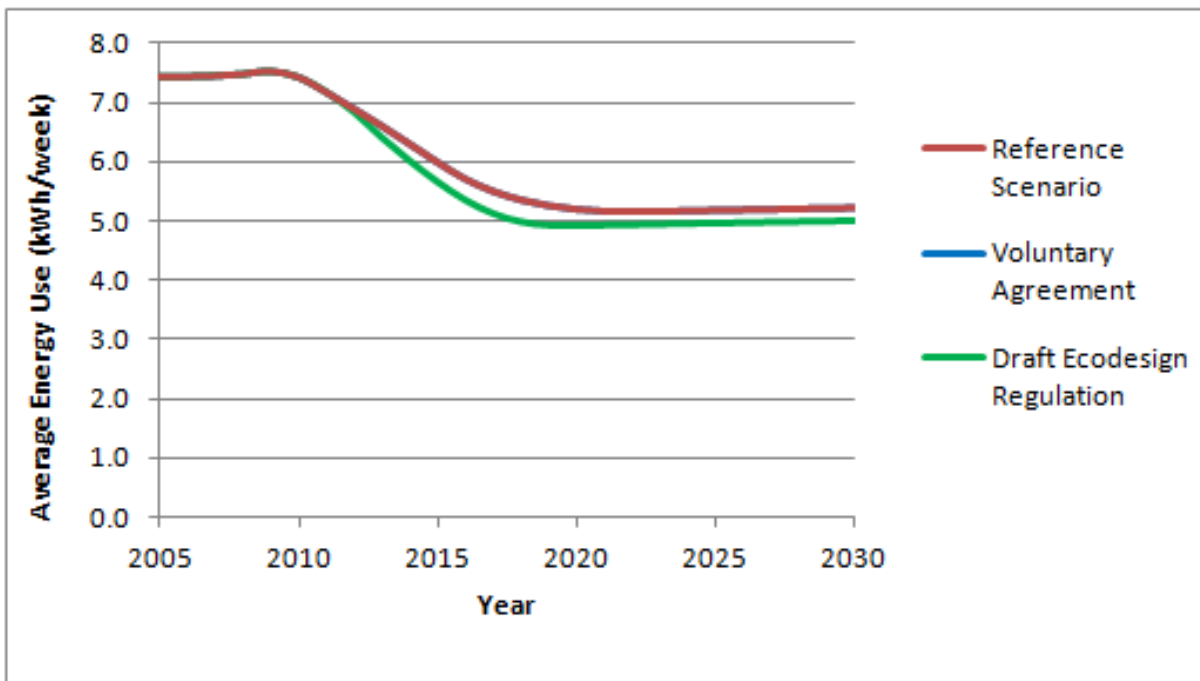


Figure 3 cannot be seen.

Under the Regulation there will be a much larger energy savings as all manufactures will be required to bring all laser based products up to ENERGY STAR specification levels.

5.3 Monetised Costs

5.3.1 Costs to consumers

The main costs to consumers will arise due to the upfront purchase costs associated with duplexing units in higher speed products. However, as previously mentioned consumers are likely to save money overall through reductions in paper use. The additional costs associated with other components are also likely to be passed onto the consumer, but as there are already a large number of products on the market which meet the requirements, these costs are not expected to be significant. Any extra costs, with the exception of the duplexing unit, are likely to fall over time due to economies of scale for the more efficient components.

The prices used to estimate the increased purchase cost to consumers as a result of the Voluntary Agreement and Regulation are given in Table 5.

Table 5 Imaging equipment costs used in the Impact Assessment calculations

Imaging Product type	Requirement	Description	% products incurring cost in 2013 ¹⁶	Current price excl VAT, 2012 (£)	Cost excl VAT, 2014 (£)	Cost reduction over time
Laser MFD	Regulation	Efficient power supply unit	34%	£2.00	£1.92	75% by 2030
		Efficient motor	34%	£1.00	£.96	75% by 2030
		Improved heating components	34%	£5.00	£4.79	75% by 2030
		LED scanner/imaging unit	34%	£5.00	£5.00	75% by 2030
	Voluntary	Efficient power	0%	n/a	n/a	n/a

¹⁶ Percentage products incurring cost in 2013 is equivalent to those that would not qualify as ENERGY STAR in the reference scenario for the year in question (therefore diminishes naturally over time as market penetration would have increased anyway). Percentages shown here are for the year a requirement would come into force. It is assumed that in the year prior to requirements being implemented, one third of products requiring design change would already implement the change and therefore reflect this back to the consumer.

	Agreement	supply unit				
		Efficient motor	0%	n/a	n/a	n/a
		Improved heating components	0%	n/a	n/a	n/a
		LED scanner/imaging unit	0%	n/a	n/a	n/a
Laser Printer	Regulation	Efficient power supply unit	6%	£2.00	£1.92	75% by 2030
		Efficient motor	6%	£1.00	£.96	75% by 2030
		Improved heating components	6%	£5.00	£4.79	75% by 2030
		LED imaging unit	6%	£5.00	£5.00	75% by 2030
	Voluntary Agreement	Efficient power supply unit	0%	n/a	n/a	n/a
		Efficient motor	0%	n/a	n/a	n/a
		Improved heating components	0%	n/a	n/a	n/a
		LED imaging unit	0%	n/a	n/a	n/a
Inkjet MFD	Regulation	Efficient power supply unit	1%	£2.00	£1.92	75% by 2030
		Efficient motor	1%	£1.00	£.96	75% by 2030
	Voluntary Agreement	Efficient power supply unit	0%	n/a	n/a	n/a
		Efficient motor	0%	n/a	n/a	n/a
Inkjet Printer	Regulation	Efficient power supply unit	6%	£2.00	£1.92	75% by 2030
		Efficient motor	6%	£1.00	£.96	75% by 2030
	Voluntary Agreement	Efficient power supply unit	0%	n/a	n/a	n/a
		Efficient motor	0%	n/a	n/a	n/a

Table 6 sets out projections for increase in purchase costs to consumers (as generated by the impact modelling underpinning this IA) resulting from the proposed Voluntary Agreement or Regulation under the different scenarios. This represents the difference between the total cost of sales between imaging equipment sold in the absence of the proposed Voluntary Agreement or Regulation. Manufacturers are anticipated to start introducing new products onto the market in the months preceding the regulation coming into force; this is reflected as a purchase cost from 2012 onwards.

Table 6 Purchase costs to consumers (excl. VAT) from imaging products purchases resulting from the Draft Voluntary Agreement and the Regulation (£2011)

Year	Draft Voluntary Agreement (£) Discounted @ 3.5%	Draft Ecodesign Regulation (£) Discounted @ 3.5%
2011	0	0
2012	0	957,000 – 1,595,000
2013	0	3,011,250 – 5,018,750
2014	0	2,158,500 – 3,597,500
2015	0	1,383,750 – 2,306,250
2016	0	886,500 – 1,477,500

2017	0	817,500 – 13,62,500
2018	0	751,500 – 1,252,500
2019	0	687,750 – 1,146,250
2020	0	509,250 – 848,750
2021 -2030	0	2,701,500 – 4,502,500
TOTAL	0	13,865,250 – 23,108,750

In general fluctuations in exchange rates can either increase or decrease the assessment of costs. Since the exchange rate will apply to the whole price of the product (not just the additional cost to meet the specific ecodesign requirement) then the impact of exchange rates is likely to be relatively insignificant for the purpose of comparing options in this IA.

5.3.2 Costs to manufacturers

As previously explained there are some additional costs associated with meeting the requirements. However, there are already a significant number of products on the market that can meet the requirements and so costs are not expected to be significant at the component level. The one exception is the need to include a duplexing unit on some higher speed products. These costs are likely to be passed onto the consumer who would in turn likely reduce overall running costs due to the reduction in paper consumption.

There are no expected negative impacts on UK manufacturers.

5.3.3 Cost from the heat replacement effect (HRE)

Imaging equipment produces heat as part of its operation and will contribute useful heat during the heating season (thereby lowering the amount of energy required by the heating system). Older inefficient products, which will be phased out as a result of the Regulation, generate a greater amount of heat than the more efficient products being driven by the Regulation. Consequently, the amount of heat generated in peoples' homes from such appliances will be reduced under the Regulation, requiring people to use their heating systems more in order to maintain the same level of heat. This is referred to as the 'heat replacement effect' (HRE).

An increase in the use of heating systems to cater for HRE will result in an increase in CO₂ emissions; this is a real increase in emissions not covered by the EU ETS and is therefore presented as a cost of the Regulation and Voluntary Agreement (Table 7.1).

Table 7.1 Increased CO₂ costs due to the Heat Replacement Effect (£2012) in -domestic properties

	Draft Voluntary Agreement		Draft Regulation	
	Carbon increase (ktCO ₂)	Value CO ₂ increase (Discntd £)	Carbon increase (ktCO ₂)	Value CO ₂ increase (Discntd £)
2011-2020	0.00	0.00	3.28	116.250 – 193.750
2021-2030	0.00	0.00	3.1	92.250 – 153.750
TOTAL (2011-2030)	0.00	0.00	6.38	208.500 – 347.500

5.3.3.1 Cooling Replacement Effect (non-domestic properties only)

Older inefficient products, which will be phased out as a result of the Regulation, generate a greater amount of heat than the more efficient products being driven by the Regulation. Consequently, the amount of heat generated in non-domestic properties from such appliances will be reduced under the Regulation requiring a reduction in the cooling demand in hotter months. Therefore, cooling systems will be used less in order to maintain the same level of cooling. This is referred to as the 'cooling replacement effect' (CRE).

A decrease in the use of cooling systems to cater for CRE will result in a decrease in emissions; this is a real decrease in emissions which is covered by the EU ETS and is therefore presented as a benefit of the Regulation.

The HRE and CRE will both occur in non-domestic properties. The assumption has been made that the increase in energy (non traded) due to HRE is counterbalanced by the saved energy due to reduced cooling demand (traded). Therefore there will be a zero net effect in non-domestic buildings. The magnitude of this increase in non traded energy and decrease in traded energy is shown in Table 7.2.

Table 7.2 Magnitude of Heat Replacement Effect and Cooling Replacement Effect, on the energy demand, carbon emissions and cost (for non-domestic properties)

	Draft Voluntary Agreement		Draft Regulation	
	Carbon increase (kt CO ₂)	Value CO ₂ increase (Discntd £)	Carbon increase (kt CO ₂)	Value CO ₂ increase (Discntd £)
2011-2020	0	0	86	373,162- 621,936
2021-2030	0	0	81	248,660 – 414,433
TOTAL (2011-2030)	0	0	167	621,821 – 10,36,369

As there is a net zero effect from the heat or cooling replacement effect in non-domestic properties only the HRE in domestic properties is included in this impact assessment.

5.4 Non-Monetised Costs

5.4.1 Environmental implications of these changes

As previously mentioned it is unlikely that significant changes will be required to inkjet products to allow them to meet the Voluntary Agreement or Regulation. Some component changes will more likely be required in laser based products including changes to the power supply unit (PSU), motor, drum heater and potentially inclusion of an LED based scanner in MFD devices.

There are no expected negative environmental impacts associated with the change to components.

Table 8 lists and compares the breakdown of the main materials used in domestic and non-domestic imaging products

Table 8 Materials used in MFD and printers

Imaging equipment Component	MFD	Printer
Paper use	Paper	Paper
Outer casing	Plastic or metal	Plastic or metal
Cooling imaging equipment	Plastic, copper coils in motor	Plastic, copper coils in motor
Laser scanning assembly	Glass, metals and plastics (laser products only)	Glass, metals and plastics (laser products only)
Scanner Unit	Glass, metals, plastics and other materials found in circuit boards.	n/a
Paper transport components	Metals and plastics	Metals and plastics
Microchips, RAM and integrated circuits	Silicon, copper, aluminium, mercury, cadmium, beryllium, lead and other metals including precious and rare earth metals	Silicon, copper, aluminium, mercury, cadmium, beryllium, lead and other metals including precious and rare earth metals
Motherboard and associated wiring	Silicon, copper, aluminium, mercury, cadmium, beryllium, lead, other metals including precious and rare earth metals and plastics including PVC	Silicon, copper, aluminium, mercury, cadmium, beryllium, lead, other metals including precious and rare earth metals and plastics including PVC
Display	Glass, plastics, possibly mercury with CFL backlighting, lead	Glass, plastics, possibly mercury with CFL backlighting, lead

Power supply and power cables	Copper, steel, other metals, plastics including (PVC)	Copper, steel, other metals, plastics including (PVC)
Consumables	Plastics, metals and inks or toner	Plastics, metals and inks or toner
Fuser unit and assembly	Metals, plastics, rubber and ceramics (Laser products only)	Metals, plastics, rubber and ceramics (Laser products only)
Motor	Metal, plastics	Metal, plastics
Battery	CMOS batteries: Nickel Metal Hydride (NiMH), Nickel Cadmium (NiCd), lithium	Nickel Cadmium (NiCd), Nickel Metal Hydride (NiMH), Lithium-ion (Li-ion), or Lithium-ion Polymer (LiP) batteries.

The components are largely ferromagnetic and non-ferromagnetic metals, and plastics such as polyvinyl chloride (PVC), acrylonitrile butadiene styrene (ABS) and low-density polyethylene (LDPE). MFDs with scanning units have additional material requirements due to the addition of the scanning functionality.

The amount of materials used in imaging products can be closely related to their intended use. For example, large high speed laser MFDs will use considerably more materials than small inkjet printers as additional materials are required in the scanning units, paper holding trays, laser scanning assembly, fuser units and duplexing unit. Whilst some material reductions may occur in the future, such as reductions in the size of heating rollers to improve heating efficiency, it is likely that a move towards more MFDs over single functional printers will result in increased material usage per product. This increase in material use may be offset by increased reuse of components from end of life equipment into new products. This reuse of components frequently occurs in the high end imaging products. Material use increases associated with MFDs may also be offset by a reduction in numbers of single function that would otherwise have been purchased.

In order to meet requirements of the proposed Voluntary Agreement or Regulation only minor evolutionary changes in component design are required. Products can be designed to meet the requirements through more efficient power supplies and motors, improved heating performance, use of LEDs in place of CFLs and lasers, and improved power management capability. These changes are unlikely to require large amounts of additional material (or changes in materials) or vastly increase production impacts, whilst improving the overall operation of the product.

5.4.2 Information Requirements

The Voluntary Agreement and Regulation sets out specific requirements regarding information on efficiency performance, amongst others, that manufacturers will be obliged to supply. These are set out in detail in the Annex 3 of this Impact Assessment. Information requirements are similar for both scenarios. Some information is to be provided on the product itself, with other information to be made available from manufacturer's information (brochures) and on free access websites.

Manufacturers of imaging equipment already provide extensive information on their products through catalogues and on their websites. The costs associated with the information requirements under the Regulation are not deemed to be significant in comparison with the volume of sales and costs of the imaging equipment.

5.4.3 Supply Chain Management and Competitive Position

There is widespread availability of the components required to ensure compliance with the Voluntary Agreement (proven by the fact that this is already happening in the reference scenario) or Regulation and a range of suppliers within a competitive market, suggesting that there is unlikely to be a shortage of required parts and that individual suppliers will not be able to impose significantly higher prices due to higher demand. There are therefore unlikely to be any significant supply chain issues associated with adoption of the Voluntary Agreement or Regulation.

5.4.4 Market Surveillance and Compliance Systems & Processes

Under the Ecodesign Regulation, manufacturers are obliged to carry out a conformity assessment of any product which they place on the market in accordance with Article 8 of Directive/2009/125/EC. They can choose between the internal design and control system or the management system set out in Annexes IV and V of Directive 2009/125/EC in order to comply with this requirement.

It is not expected that the Regulation will incur any significant costs in terms of verification procedures for the two UK manufacturers, although the burden may be greater on smaller firms which are unable to spread the compliance costs over a larger number of units of production.

The UK Government will need to ensure compliance of products being placed in the market, and it has been estimated that approximately £1 million will need to be set aside for compliance monitoring of all products which are coming under Ecodesign Regulations.

5.5 Component/Product Manufacture – Social

There are unlikely to be any large negative impacts on UK employment due to the fact that most imaging products are made in Asia. There may be some positive impacts through the growth of the cartridge remanufacturing industry in the UK.

5.6 Monetised Benefits

5.6.1 Product Usage – Environmental

There are two areas of environmental impact associated with reduced power consumption from the implementation of the proposed Voluntary Agreement and Regulation. These are:

- Reductions in CO₂ emissions across UK due to less power being consumed;
- Changes in air quality as a result of less electricity being generated, but more household heating used.

5.6.2 Value of changes in CO₂ emissions

In accordance with Government guidance, the valuation of the decrease in emissions that will result from products using less power is calculated using the projected EU Allowance price under the EU Emissions Trading Scheme (i.e. the revenue gained from selling permits for emissions).

Table 9 Value of reduction in CO₂ emissions (£2011)

Year	Draft Voluntary Agreement (£)		Draft Ecodesign Regulation (£)	
	Carbon reduction (kt CO ₂)	Value CO ₂ reduction (Discntd £)	Carbon reduction (kt CO ₂)	Value CO ₂ reduction (Discntd £)
2011	0	0		-
2012	0	0	9	125,000
2013	0	0	32	437,000
2014	0	0	49	661,000
2015	0	0	60	798,000
2016	0	0	67	872,000
2017	0	0	73	923,000
2018	0	0	73	912,000
2019	0	0	67	818,000
2020	0	0	58	691,000
2021 – 2030	0	0	438	11,498,000
TOTAL	0	0	926	17,735,000

5.6.3 Value of air quality impacts

The reduction in energy usage resulting from the restrictions imposed by the Regulation will have additional benefits in terms of air quality since less pollution will be generated from power stations. The value of air quality impacts can be assessed by measuring the marginal external costs caused by each tonne of pollutant emitted. In this case, in the absence of detailed data on air pollution from power stations, damage costs (which estimate the value of air quality changes) are calculated by applying average values for the benefit of reducing a pollutant emitted by one tonne (as provided by Defra) to the gross energy savings.

The increase in energy required to run heating systems in domestic properties as a result of the heat replacement effect described above will lead to an increase in overall emissions from power stations, thereby increasing the costs involved in avoiding air quality damages.

The net impact on air quality is the difference between the value of air quality improvements and the cost of additional air quality damage due to HRE. In the case of imaging equipment, this is a net benefit (Table 10).

Table 10 Summary of total air quality impacts, 2012-2030 (£2011)

		Draft Agreement (£) Discounted @ 3.5%	Voluntary @	Draft Regulation (£) Discounted @ 3.5%
Value of improvements in air quality	2011-2029	0		2,439,000
	2030-2030	0		111,000
Cost of additional air quality damage due to HRE	2011-2029	0		-61,500 - -102,500
	2030-2030	0		-3,000 - -5,000
Net benefit of air quality improvements	2011-2029	0		2,356,000
	2030-2030	0		107,000
TOTAL (2011-2030)	2011-2030	0		2,463,000

5.7 Product Usage – Economic

5.7.1 Value of energy savings

A major economic impact as a result of placing restrictions on power consumption is a benefit to consumers in terms of savings from lower electricity bills.

Benefits to consumers from reduced electricity consumption have been calculated by taking the savings in electricity use (in GWh) and multiplying these by the variable element electricity prices (pence per kWh) as published in the guidance booklet produced by the Interdepartmental Analysts Group (IAG) to assist in evaluations and appraisals of greenhouse gas policies. This gives values for the gross energy savings (

Table 11).

As a result of the ‘heat replacement effect’, domestic consumers will be required to spend extra on heating and this will reduce the running cost benefits of the Voluntary Agreement or Regulation. An estimate of the total amount that consumers will have to pay to generate this lost heat is included in

Table 11 alongside the total net energy savings benefit (gross energy savings less the additional heating running costs).

Table 11 Total savings energy consumption 2011 – 2030 (£2011)

Year	Draft Voluntary Agreement		Draft Regulation	
	Energy Savings (GWh)	Value (Discntd £)	Energy Savings (GWh)	Value (Discntd £)
2011	0	0	0	
2012	0	0	22.62915	1,582,000
2013	0	0	80.8256	5,531,000
2014	0	0	124.7661	8,357,000
2015	0	0	153.5058	10,059,000
2016	0	0	171.0419	10,945,000

2017	0	0	184.6437	11,542,000
2018	0	0	186.0502	11,328,000
2019	0	0	170.1806	10,162,000
2020	0	0	146.5733	8,542,000
2021- 2030	0	0	1221.447	78,106,000
Total gross savings	0	0	2461.664	156,154,000
Total costs of HRE	0	0		647,000
Total net savings	0	0		155,505,000

5.7.2 Value of renewables benefit

With a reduction in electricity requirements resulting from the usage of more efficient imaging equipment, the UK will be able to meet its targets for the contribution of renewable energy sources to overall energy at a reduced cost. Currently, renewable energy sources are more costly in financial terms than other sources of energy and reducing overall energy requirements will generate an additional benefit by reducing the need to make energy reductions through renewables. This benefit has been estimated at £18 per MWh¹⁷. The net energy savings predicted from the measure (i.e. includes the renewable benefit for electricity less the reduction for additional heating), are presented in Table 12. However, due to the inherent uncertainty in the estimate of the renewables benefit value, these savings have not been included in the overall figures presented in Section 7 and the Summary Tables, as per current DECC guidance.

Table 12 Summary of renewables benefit, 2011-2030 (£2011)

	Draft Voluntary Agreement (£)	Draft Regulation (£)
Value of renewable benefit at 2020	0	3,000.
Value of renewable benefit at (2011-2030) discounted @3.5%	0	32,000

5.8 Non- Monetised Benefits

5.8.1 Product Usage – Social

No social impacts are foreseen.

5.8.2 End of Life Phase

The potential impacts of this phase have not been quantified or monetised as there are no anticipated large scale impacts associated with the products themselves. There may be some impacts associated with an increase in cartridge remanufacturing, but these impacts have not been modelled due to uncertainties over the proposed language in the measure.

In general, imaging products have a positive scrap value as they contain precious metals, steel and copper. Thus impact may be reduced by virtue of the advantage to the installer to recycle old imaging products rather than to incur disposal costs. Impacts in the disposal phase should be minimal due to the disposal of most products under the WEEE Directive during which important materials will be recovered. Prior to the implementation of WEEE it was estimated that the amount of electronic waste going to landfill within the EU was growing at a rate of 3 to 5 percent a year, far exceeding the growth rate of other municipal waste which was growing by 1 to 2 percent a year. Whilst the WEEE Directive has facilitated an increase in the recycling of end of life imaging products, a number of challenges remain including; increasing waste diversion from landfill, limiting illegal exporting of waste and facilitating product design to increase potential for material reuse.

¹⁷ http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx

Challenges also remain in the recycling processes themselves including limiting the release potentially hazardous substances such as dioxins and furans whilst attempting to reclaim metals and plastics. There are some potential negative impacts from the proposed measures in that a significant amount of component reuse occurs in higher specification laser based devices. This reuse of components may be compromised if older components were to limit the ability for products to meet the energy efficiency requirements.

There may be some positive benefits in terms of increased remanufacturing of cartridges. However, the relative benefits of recycling versus remanufacturing cartridges are unclear and so it is not possible to quantify the effect of the requirements on restricting remanufacturing.

Whilst these impacts exist, it is unlikely that the proposed regulation will result in a quantifiable change in end of life impacts. Where consumers elect to replace their imaging products with more efficient ones in advance of the product becoming obsolete, there will be impacts from disposal of existing stocks. However, the extent to which this might happen is unknown and as a result it has not been possible to estimate any associated costs in this impact assessment.

Consequently no major environmental or economic effects are expected in the end-of life phase as a result of implementing the requirements.

5.9 Non-quantified costs & benefits

5.9.1 Other non-quantified costs

If manufacturers opt to sell their existing (non-compliant) products onto non-EU markets (i.e. markets not covered by the regulation) rather than incur increased component costs to comply with the regulation, then additional marketing costs may be incurred if there was no existing business in such markets prior to the Regulation. This is unlikely, however as most markets have already been accessed to some extent.

Manufacturers are likely to have to employ extra people to ensure that new products will meet the Regulations. Most large companies already employ individuals to ensure that new non-domestic products will be able to meet the requirements of ENERGY STAR to guarantee good access to Government procurement contracts.

5.9.2 Other non-quantified benefits

The expected reduction in paper usage associated with the duplexing requirements in the Regulation have not been quantified due to uncertainties over usage. Given that paper use in imaging products can account for up to 90% of overall energy impacts, the use of duplex imaging can have significant benefits.

MTP estimate that by requiring thermal based products to meet the ENERGY STAR duplex requirements savings for products sold in 2013 alone could be as high as 1,660 GWh and financial savings from reductions in paper use of £111 million. These savings are based on the assumption that duplex units will result in one third less paper being used than in non-duplex based products.

In addition the following non-quantified benefits could occur:

- Increased security of supply: adopting the Regulation will also assist in enabling a longer-run shift towards tighter carbon emission caps in the future and the UK will require less energy as a result of lower energy use in imaging equipment;
- Contribution to meeting Government targets for renewable energy – with a reduction in electricity requirements resulting from the use of more energy efficient products, the UK will be able to meet its targets for the contribution of renewable energy sources to overall energy supply at a reduced cost;
- Benefits to end-users from openly available information on the product due to information requirements for manufacturers, enabling end-users to make a choice to buy (or not) products, over and above the minimum standard;
- Cooling Replacement Effect, whereby demand for cooling decreases as a result of more efficient imaging equipment generating less waste heat;

The Regulation may also produce potentially significant wider benefits on a global scale, in particular in areas where there are no “caps” on carbon emissions; lower energy use and carbon emissions are likely to result from (1) imaging products produced in the EU (to EU standards) and sold on other markets, (2) imaging products which are produced in other countries to EU standards (for the EU market), which are then also sold locally, and (3) the EU standards will help drive non-EU markets to meet similar standards.

6 Evidence and Analysis of Baseline and Counterfactual

6.1 Estimates of Product Efficiency in the Reference Scenario

As previously discussed the draft industry Voluntary Agreement and draft Ecodesign Regulation is based on the ENERGY STAR v1.1 requirements.

Within the reference scenario there is already quite a high ENERGY STAR compliance rate for Inkjet MFD and printer products.

The Voluntary Agreement commitments state that by January 2012 90 percent of imaging equipment sold (in terms of sales volumes), by signatories to the VA, will meet the ENERGY STAR v1.1 energy efficiency specifications.

The Voluntary Agreement does not specify which imaging products need to meet the requirements and therefore it is assumed that the Voluntary Agreement specifications can be met in the reference scenario given the very large sales volumes of the inkjet MFDs which are nearly all meeting the ENERGY STAR specifications. It is also assumed that there will be growth in the percentage of other products meeting ENERGY STAR specification by 2012 (in the reference scenario). This means there are no differences in savings between the Voluntary Agreement and the Reference scenario.

The cost and benefits outlined in this impact assessment for the Voluntary Agreement (the cost and benefits above the reference scenario), are for bringing some of the products which are not already covered by the ENERGY STAR up to specification, so that 90% of imaging products meet the ENERGY STAR compliance levels. However, as previously discussed this target is already being met within the reference scenario.

As demonstrated in this impact assessment the draft Regulation will bring about quite significant benefits over the reference scenario and draft industry Voluntary Agreement. This is because the Regulation requires that 100 percent of products sold (those products within the scope of the Regulation) will need to meet the ENERGY STAR v1.1 specification. The majority of the savings under the Regulation will come from laser based products. This is because the Voluntary Agreement does not require that manufacturers make these types of products comply with ENERGY STAR specifications and those manufacturers which manufacture both inkjet and laser will be able to meet the Voluntary Agreement requirements largely through their inkjet based products.

Under both the domestic and non-domestic reference scenarios, total energy consumption from imaging products is expected fall until around 2020 and then to continue to rise from 2021 in the future primarily due

to an increase in sales, usage and functionality of products.

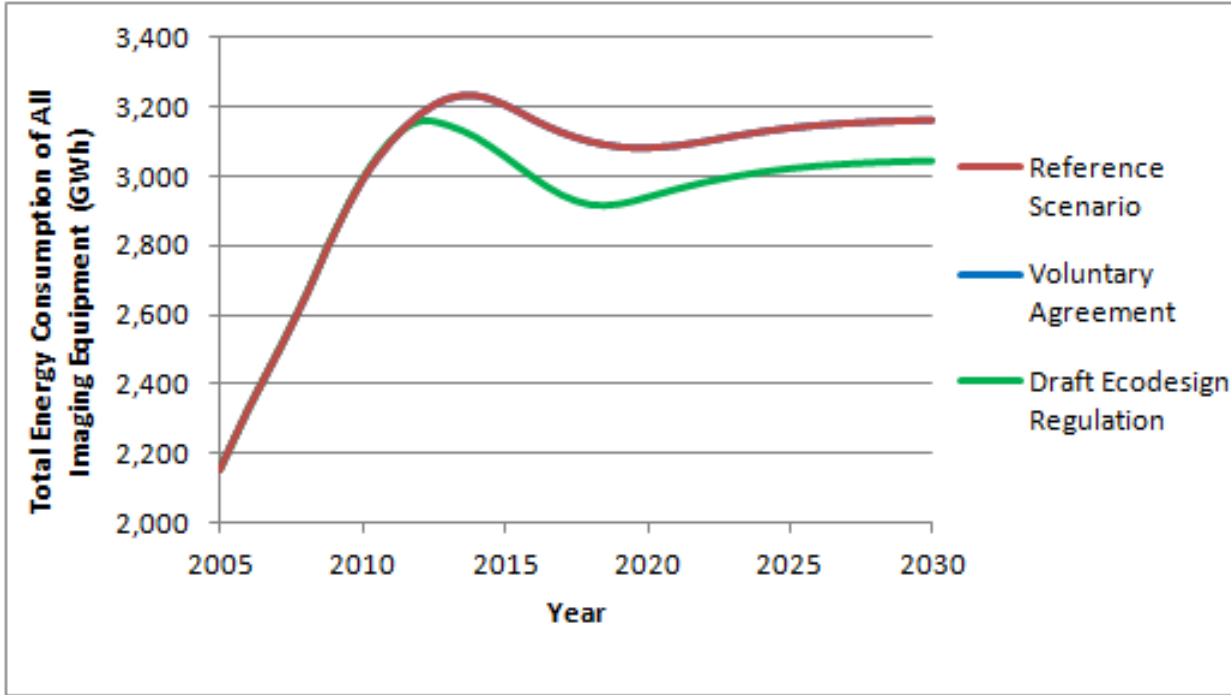


Figure 4 below shows the trend of increase of energy consumption over time for all imaging products. It also shows the change in energy consumption under the Voluntary Agreement and the Regulation. As discussed above the Voluntary Agreement is not expected to offer any savings above the already high ENERGY STAR penetration rates in the reference scenario and therefore energy consumption is expected to increase. However, under the Regulation energy consumption is expected to decrease at first with time due to increased ENERGY STAR compliance levels but then continue to rise from around 2019 due to increased sales and increasing functionality found in the products being purchased.

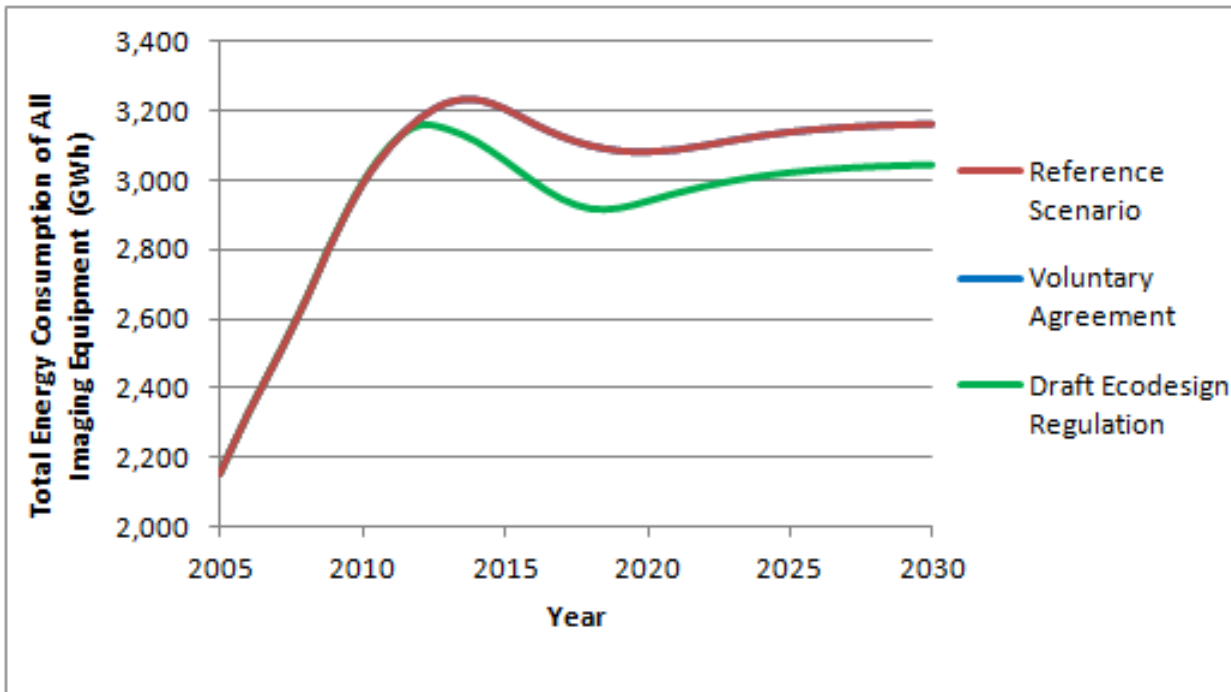


Figure 4 The change in energy consumption of imaging products with time.

6.2 Adjustments to other policies

Imaging equipment is currently covered by the EU ENERGY STAR label and the ErP Standby Regulation (EC No 1275/2008). Domestic imaging equipment is also covered by the Energy Saving Trust’s “Energy Saving Trust Recommended” label, whilst non-domestic imaging equipment is covered by UK Government

Procurement rules (which dictate that imaging equipment must meet the ENERGY STAR specifications). The projected impacts of these policies have been included in the reference scenario. There has been some very limited activity relating to imaging equipment under the Carbon Emissions Reduction Target, but the impacts are assumed to be negligible.

6.2.1 EU ENERGY STAR Label

As discussed above this is the dominant existing energy efficiency policy covering imaging equipment. The ENERGY STAR label is led by the US Environmental Protection Agency (EPA), but the European Commission has an agreement with the US Government to coordinate the energy labelling of office equipment through a voluntary EU ENERGY STAR programme. ENERGY STAR aims to qualify around the top performing 25 per cent of products at the time of specification (usually around nine months to one year prior to a specification coming into effect). Due to the complexity of the programme, it is not possible to revise the criteria as frequently as ICT product development moves. This means that compliance rates to ENERGY STAR can be high at the end of a specification cycle.

Version 1.0 of the ENERGY STAR imaging equipment specification was implemented in April 2007. The US released revisions to their ENERGY STAR imaging equipment specifications in July 2009 to include more stringent requirements for most imaging product types (known as ENERGY STAR v1.1). Furthermore, in December 2010 minor reversions were made to include requirements on verification. The US ENERGY STAR for imaging equipment is therefore known as version 1.2. However, the current version in use in the EU is version 1.1.

Within the reference line, savings due to the agreed ENERGY STAR specification are included, with market penetration of the label assumed to increase as has been observed historically for previous specification versions. Market penetration levels for non-ENERGY STAR qualifying imaging equipment have been assumed to represent the less efficient products on the market, and therefore those that would require alteration and incur potential costs as a result of the proposed measures.

6.2.2 Carbon Emissions Reduction Target

The purpose of the Carbon Emissions Reduction Target (CERT) in promoting reductions in carbon emissions is to help energy consumers in the household sector to reduce the carbon footprint of their homes by using energy more efficiently.

There has been some activity relating to energy efficient imaging equipment as innovative measures. However, levels of influence are very small and no definitive data is available, so no account has been taken of this in the reference scenario.

CERT will be succeeded by The Green Deal and Energy Company Obligation (ECO). However, it is not yet clear how these will be structured and so no estimate of the potential impact on imaging equipment has been included here.

6.2.1 Carbon Reduction Commitment Energy Efficiency Scheme (CRC)(Non-domestic, Imaging Equipment only)

The Government's Carbon Reduction Commitment Energy Efficiency Scheme (CRC) policy will apply mandatory emissions trading to energy use emissions from large business and public sector organisations with at least one meter settled on the half-hourly market. It is expected that the scheme will affect around 3,000 organisations, made up of both public and private sector.

It is estimated that the scheme will lead to around 0.5 MtC savings per year and around 1.1 MtC by 2020. The CRC policy will not have a direct effect on imaging equipment however, as organisations work to reducing their carbon emissions they are likely to buy more efficient products and they may take this into account when buying imaging equipment.

6.2.2 ErP Standby Regulation [EC No 1275/2008]

The European Commission published a set of mandatory Ecodesign Regulations covering the standby and off-modes of electrical and electronic household and office equipment (although office equipment needs to be "intended for use in the domestic environment") in 2008. The ErP Standby Regulations came into force in January 2010 with a second tier of requirements due to be enforced January 2013. The Standby Regulations apply to the off-mode of imaging equipment.

The imaging specific Regulation discussed in this assessment would remove imaging equipment from this measure and apply its own requirements and allowances to off and standby modes. However, if the Voluntary Agreement is put in place then the ErP Standby Directive requirements remaining in force for imaging products. This may not be cause for concern. However, if the Commission choose to go ahead with horizontal requirements on Network Standby Directive (due to come into force before the end of 2011) then there are likely to be a wide variety of issues as the network standby levels may be lower/higher than those found in the Voluntary Agreement (for example, for sleep mode).

Costs related to meeting off mode requirements of the proposed measure have not been included, as it is assumed that those have already been met by manufacturers adhering to the standby Regulation.

6.2.3 Energy Saving Trust Recommended (ESTR) label (Domestic imaging equipment)

The Energy Saving Trust endorses energy efficient imaging products under their Energy Saving Trust Recommended (ESTR) label. ESTR is designed to cover the top 20% of energy efficient products. The number of manufacturer registrations to the label for imaging equipment is low, and therefore it is assumed that this initiative has a minimal impact on imaging equipment energy efficiency. There are no conflicts between this label and the proposed ecodesign requirements for imaging equipment, and no assumed costs to meeting requirements as this is a voluntary label.

6.2.4 Public procurement (Non-domestic imaging equipment)

Government procurement includes a mandate that all imaging equipment procured by central Government should meet the current ENERGY STAR specifications. This follows the 2007 revised ENERGY STAR agreement which required central government procurement to ENERGY STAR efficiency levels or equivalent (without prejudice to Community and national law and economic criteria). Government procurement specifications are assumed to be implemented through the Government Buying Standards (GBS) programme, although are expected to have a relatively small impact due to their referencing to ENERGY STAR specifications for requirements. There are no conflicts between public procurement and the proposed Voluntary Agreement and Regulation requirements for imaging equipment, and no costs related to meeting public procurement requirements are included in this analysis.

7 Summary of monetised benefits and costs

7.1 Summary of Monetised Benefits

Table 13 summarises the monetised benefits from the Voluntary Agreement and Regulation in terms of energy savings, the value of reduced damages from climate change due to lower emissions and the value of air quality damages avoided.

Table 13 Total economic benefits, 2011 to 2030 (£2012)

	Draft Voluntary Agreement (£) Discounted @ 3.5%	Draft Regulation (£) Discounted @ 3.5%
Value energy savings (net)	0	155,505,150
Value of reduction in emissions	0	17,735,552
Net benefits of air quality improvements	0	78,000
Total	0	173,518,702

Note that there is an additional benefit of £173,518,702 due to the reduced requirement for renewables generation for the Regulation respectively, which has not been included in overall figures due to uncertainty in the estimates (Section 5.7.2).

Savings from requirements relating to duplexing could be as high as £111 million in 2013 for products sold in that year. For products in the domestic environment it is expected that requiring duplex units would actually increase costs by around £9.2 million for products sold in 2013. This increase in cost is largely due to the cost of the extra duplex unit outweighing the savings from the reduction in paper consumption. In the non-domestic environment, where paper usage is assumed to be significantly higher, then savings from the duplex unit requirement amount to £120.4 million for products sold in 2013.

These assumptions are based on an assumed average duplex unit cost of around £320 and a paper price of approximately £0.01 per sheet. The use profiles are based on those included in the ENERGY STAR TEC test procedure with a small reduction applied to the non-domestic and a large reduction applied to the domestic products. These reductions have been added as it is widely assumed that the use profiles in the ENERGY STAR TEC test procedure are overestimated.

7.2 Summary of monetised costs

Table 14 summarises the monetised costs from the Voluntary Agreement and Regulation in terms of the increased purchase costs and costs to manufacturers, the value of air quality damages and the increase in emissions due to HRE.

Table 14 Total monetised costs, 2011 to 2030 (£2011)

	Draft Voluntary Agreement (£) Discounted @ 3.5%	Draft Regulation (£) Discounted @ 3.5%
Estimated costs to manufacturers	0	0
Estimated total costs to consumers of product	0	13,865,250 - 23,108,750
Total costs of increase in non-traded emissions (extra heating)	0	208,500 – 347,500
Total	0	14,073,750 – 23,456,250

8 Assumptions/sensitivities/risks

A key feature of product policy is that costs are incurred in the year of purchase whereas the benefits are realised in later years over the lifetime of the product (net of the running costs). The impact assessment modelling calculates the impact on the market up to 2030, but in order to present a balanced picture of both the costs and benefits of the measures, the costs post-2020 are reduced in proportion to the level of benefits that occur beyond 2030 (resulting from products sold pre-2030, as some of these products will continue to be used post-2030).

The key assumptions used in the Impact Assessment are as follows:

- **Industry level modelling:** The modelling has been carried out on an industry wide level as opposed to on an individual company level. More accurate figures could be provided from each manufacturer identifying differences in how each would ensure compliance to the Voluntary Agreement. For example, some manufacturers could choose to ensure that more of their laser based products meet the ENERGY STAR specifications rather than relying on their inkjet products to enable them to meet targets. This would result in more savings from the Voluntary Agreement. Due to the complexity of conducting per manufacturer based modelling it was necessary to consider both budget and time restrictions and conduct the modelling at an industry wide level.
- **Increase in future electricity price.** It is assumed that electricity prices will increase in the future and that this increase will affect consumer behaviour, pushing them to purchase the more energy efficient products on the market to negate the rising fuel costs.

- **Value of air quality impacts.** In this case, in the absence of detailed data on air pollution from power stations, damage costs (which estimate the value of air quality changes) are calculated by applying average values for the benefit of reducing a pollutant emitted by one tonne (as provided by Defra) to the gross energy savings.
- **Costs in the Voluntary Agreement.** Whilst it is expected that a small number of laser based products will need to be altered under the Voluntary Agreement no costs have been included as it is assumed no additional products above those in the reference line would have to be adapted.
- **Assumption of reduced performance improvement in reference scenario.** The current reference scenario assumes that ENERGY STAR will drive efficiency improvements for a large percentage of imaging products on the market but not all. It is further assumed that as ENERGY STAR is the main driver in the market place no further improvements will take place until a new ENERGY STAR specification is implemented.
- **Reduced Costs Over Time.** It is assumed that all costs associated with increasing the efficiency of imaging products to enable them to meet the ENERGY STAR v1.1 specifications will be reduced by 75% by 2030. This assumption is made on the basis that economies of scale for the more efficient components will gradually reduce costs but that some minor costs will remain that discourages manufacturers to ensure that all products meet the ENERGY STAR v1.1 specifications.
- **Trend in sales.** MTP have forecasted a trend of generally increasing volume of sales for imaging equipment over time due to increased demand from both domestic and non-domestic purchasers. Sales of single function products, such as inkjet printers, are expected to continue to fall as sales of multi-functional products, such as inkjet MFD's, increase. Laser based products are also expected to be sold in increasing numbers to domestic customers either replacing or complementing inkjet based imaging products.
- **Confidence range for the cost figures** A 25% confidence /uncertainty range has been applied to the cost figures generated from the models. This percentage has been estimated using expert assumption and was not generated as a result of modelling exercise.

9 Climate Change Policy Cost-Effectiveness Indicator

All Impact Assessments that estimate changes in emissions in excess of either (i) 0.1Mte average per year for an appraisal of less than 20 years, or (ii) 2.0Mte over the lifetime of an appraisal of more than 20 years are required by PSA Delivery Agreement 27, Indicator 6 to undergo a Climate Change Policy Cost-Effectiveness analysis. This involves measuring the proportion of tonnes of abated, for which the cost falls below the Shadow Price of Carbon (or EU ETS Allowance Price) once weighted and discounted. This Impact Assessment falls into that category with average per year emissions reduced in excess of 0.1Mt.

The cost effectiveness analysis provides an estimate of the net social cost per tonne of greenhouse gas (GHG) reduction in the ETS sectors and/or an estimate of the net social cost per tonne of GHG reduction in the non-ETS sectors.

The current Voluntary Agreement is not expected to reduce electricity consumption by imaging equipment, which will provide a benefit for meeting the ETS cap (the traded sector). As a result of the heat replacement effect, the Regulation is also expected to slightly raise emissions in the non-traded sector.

Thus the following applies for in the traded sector:

Cost effectiveness = Overall NPV minus PV of traded sector /traded sector

Cost effectiveness Regulation = - £150

This shows that traded sector emissions decreases are cost-effective since the indicator falls below the current EU ETS Allowance price.

In the non-traded sector,

Cost effectiveness = Overall NPV minus PV of non-traded sector /non-traded sector

Cost effectiveness = £24,634

Although there is an increase in carbon emissions in this sector, the indicator shows that it is 'cost-effective' to do so: each extra tonne of carbon released provides a benefit, which is higher than the current social price of carbon.

Consequently, the emissions saved in the traded sector (as well as the relatively smaller quantity of emissions increased in the non-traded sector) are deemed to have been decreased cost-effectively.

10 Specific Impact Tests

10.1 Economic Impacts

10.1.1 Competition Assessment

The proposal as it stands does not directly limit the number or range of suppliers that would be able to exist on the market for imaging equipment in question. Companies would be free to enter and exit the market as previously, with the only restriction being that those placing products on the market ensure that they are compliant with the Regulation or Voluntary Agreement. As the Regulation will apply to all companies, it will affect them equally thus without any significant implications for their competitive position. The Voluntary Agreement, however, will only affect companies that have signed it and therefore has the potential to add costs to products from only those companies signing up to the agreement. This has the potential to make products from signatory companies more expensive than from those companies that do not sign the voluntary agreement. However, given the high percentage of products on the market which already meet the ENERGY STAR specifications it is not expected that products from signatory companies will become significantly more expensive.

It is expected that costs from adapting the products will be passed on to the final consumer. However, smaller companies may find it difficult to continue to be competitive. This is due to the likelihood that there may be an asymmetric impact on firms differing by size, with larger firms being able to spread the compliance costs over a larger number of units of production relative to SMEs; this could raise the threshold for entry to the market through higher fixed costs. There also may be some competitive advantage for those imaging equipment manufacturers that adapt more rapidly; but this is not certain.

It is likely that some manufacturers could incur extra costs under the Voluntary Agreement if their products are predominately laser based. These extra costs will occur as there is currently a lower ENERGY STAR coverage rate for laser based products and amending these products costs more than amending inkjet based products. The Regulation could also result in manufacturers of laser based products having higher costs than manufacturers of inkjet based products. However, Regulations would ensure that all laser based products met the ENERGY STAR specifications and so manufacturers would not be able to only change inkjet based products.

There is a potential that the Voluntary Agreement or Regulation might indirectly limit the number of suppliers due to an increase in the costs of production, thereby discouraging companies from entering or expanding into the market. The initial fixed costs of setting up a business (and marginal costs of producing higher efficiency imaging equipment resulting in higher product prices) are likely to be higher after the Voluntary Agreement or Regulation into force. This is, however, unlikely to have a significant impact on competition.

There is a small UK market in terms of imaging equipment manufacturing. It is not expected that this small market will be negatively impacted by either the Voluntary Agreement or future Regulation. There is a larger UK market for printer cartridge remanufacturing. It is expected that this business would benefit from the cartridge design requirements in the voluntary agreement. The remanufacturing business is likely to benefit even further from more stringent cartridge design requirements included in potential future Regulations.

10.1.2 Small Firms Impact Test

These Ecodesign Regulations are unlikely to affect small businesses. The ecodesign requirements are introduced gradually in order to provide a sufficient timeframe for manufacturers, including small businesses, to redesign their products in accordance with the Regulation.

No small business impact test has been carried out for this Impact Assessment, as the timing in the Regulation takes into account the cost impacts for manufacturers, in particular small and medium-sized enterprises (SMEs), ensuring that they have sufficient time to adapt their products before the ecodesign requirements come into effect.

In addition, the UK Market Surveillance Authority is required to raise awareness of the ecodesign requirements, so industry and small businesses will be made aware of the consequences of placing non-compliant products on the market. Only businesses, (whether large or SME) that continue to place non-

compliant products on the market will be affected by the market surveillance requirements of the Regulation (enforcement action). However, any impact will be proportionate to the non-compliant action.

Annex 3 Product Information Requirements on Imaging Equipment

10.2 Voluntary Agreement product information requirements

10.2.1 Environmental information for end-users in relation to use and end-of-life

For new models introduced after 1 January 2012 signatories commit to providing end-users with information regarding resource efficiency when using imaging equipment. The intent is to ensure the end-user is made aware of good efficiency practices when they first begin to use a new product. Signatories shall achieve this through one of the following methods:

A pop-up screen on the end-users' imaging equipment during the initial installation of software (preferred)¹⁸

- An insertion sheet provided in/on the box of the product
- An information sheet to be provided at the time of sale of the product

The following information shall be provided as a minimum¹⁹ where applicable:

- Information that recycled as well as virgin paper certified under environmental stewardship initiatives, or carrying recognised ecolabels, may be suitable providing that it meets appropriate quality standards as defined, for example, in EN 12281 on "Printing and business paper for dry toner imaging processes" for papers in the range 75-250 g/m². For specific applications, the lower boundary may be chosen at 64 g/m².
- For Electro Photography printers: indication that these can print on 64 gr/m² paper and that this paper contains less raw material per print, thus saving significant resources.
- Energy can be saved by purchasing ENERGY STAR compliant products
- Description of the benefits of printing in duplex mode (for TEC products having a duplex function)
- The environmental benefits of power management

The information as described in sections above will be provided in the form of compact statements.

This above applies to all new product models introduced after January 1, 2012. Paper weight mentioned in the pop-up window (or alternatives as described above) will be consistent with the paper weight specifications of the product.

10.2.2 Cartridge disposal and treatment

For products placed on the market after 1 January 2012, Signatories will provide end-users with information on suitable end-of-life management options for used cartridges. This information may be communicated via a company website.

10.2.3 Information on product environmental characteristics to be provided by Signatories

The following applies to products placed on the market after 1 January 2012:

Signatories will make information on the environmental performance of their products available to customers. This information may take the form of for example ECMA 370. The Eco Declaration²⁰, EPEAT verification documentation²¹, or similar company formats.

¹⁸ This can only be implemented when imaging equipments are managed through computers under mainstream Operating Systems (Microsoft Windows or Mac/OS)

¹⁹ Not all 5 statements mentioned in section 5.1.1 may be applicable to the product that is equipped with this information. Manufacturers are free to choose if they add a statement to this effect to the information, or leave out statements that are not applicable, such as the statement regarding electrophotography and duplex printing.

²⁰ The eco declaration (ECMA 370) is a communication tool for customers. ECMA 370 declaration was developed to answer questions from customers to choose the best supplier. The standard addresses individual company programs and product related attributes.

²¹ EPEAT, the Electronic Product Environmental Assessment Tool, is a set of environmental criteria to support green public procurement and environmentally conscious purchasing decisions. For Imaging Equipment, an EPEAT standard is being developed (IEEE1680.2) that will include a

Signatories will make information on inkjet and toner cartridge yield available to customers based on the measurement standards specified, for example, in ISO/IEC 24711:2006 (for ink), ISO/IEC 19752:2004 (for monochrome toner) , or ISO/IEC 19798:2006 (for colour toner) or through other company methods.

An exception from the criteria in above will be acceptable for models that are sold in small numbers (less than 5000 per year), on the ground that the cost of implementing the criteria is disproportionate to the sales of the product. Exceptions should be reported to the Independent Inspector (see Annex C, section 4 of the Draft Voluntary Agreement for reporting template).

10.3 Draft Ecodesign Regulation product information requirements

The product information requirements of the Regulation are found in the table below:

<p>All imaging products</p>	<p>a) 6 months after this Regulation has come into force, manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • Off mode demand (Watts) • External power supply efficiency (where applicable). 	<p>b) 12 months after this Regulation has come into force, manufacturers shall report the following <u>additional information</u>, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • Declarations relating to additional environmental attribute criteria. Manufacturers may use their own declaration or follow a standard
<p><i>Standard size MFDs, Printers & copiers:</i></p> <p>Colour EP</p> <p>Mono EP</p> <p>Solid ink</p> <p><i>Large format printers, copiers & MFDs:</i></p> <p>Colour EP</p> <p>Mono EP</p> <p>Solid ink</p>	<p>c) 12 months after this Regulation has come into force, manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • Auto-off mode demand (Watts) (where present) 	<p>d) By January 2013, manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • Auto-off mode demand (Watts)
<p>All Imaging Products (excluding DFE)</p>	<p>e) 12 months after this Regulation has come into force manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • Cartridge yield information provided on imaging product packaging and/or via an online declaration. • Declaration that recycled paper meeting the requirements of 	

specification of the verification documentation that the manufacturer has to make available in order to have a product registered with EPEAT. This documentation will provide disclosure of environmental performance.

	<p>EN 12281 can be used in products</p> <ul style="list-style-type: none"> • Statement detailing that reuse of print toner and ink cartridges is not prevented by constructive measures in original cartridges. • Instructions on the use of duplex and N-up printing. 	
<p><i>Standard size copiers, printers and MFDs :</i></p> <p>Mono EP</p> <p>Colour EP</p> <p>Solid ink</p>	<p>f) 6 months after this Regulation has come into force, manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> • TEC value (kWh) • 64 gr/m2 paper meeting EN12281 definition can be used in product 	
<p><i>Standard size MFDs and Printers:</i></p> <p>Colour IJ</p> <p>Mono IJ</p> <p><i>Small format printers:</i></p> <p>Colour IJ / EP</p> <p>Mono EP / IJ</p> <p>Solid ink</p> <p><i>Large format printers, copiers & MFDs:</i></p> <p>Colour EP</p> <p>Mono EP</p> <p>Solid ink</p>	<p>g) 6 months after this Regulation has come into force:</p> <ul style="list-style-type: none"> • Sleep mode consumption (Watts) • Additional allowances included in sleep mode figure (Watts per allowance). 	