

Title: Impact Assessment of Options for Company GHG Reporting IA No: DEFRA1334 Lead department or agency: Defra Other departments or agencies: DECC, BIS	Impact Assessment (IA)		
	Date: 31/08/2011		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Secondary legislation		
Contact for enquiries: Sue Whitehead			

Summary: Intervention and Options	RPC: AMBER
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Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, One-Out?	Measure qualifies as
Range	Range	Range	Yes	IN

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

Businesses can save money by reducing their emissions, e.g. by minimising energy and resource use. Even when measures to reduce emissions are cost effective, there may be barriers preventing action such as lack of information, transaction costs and organisational inertia (see section 4.1 to 4.7). Regulating to require GHG reporting will ensure that quoted companies have the information and tools to reduce emissions, and, by creating consistency of disclosure, will provide investors and shareholders with information on climate change risks to inform their investment decisions. Regulation is required because voluntary approaches have not led to a sufficiently high level of reporting nor consistency of reporting.

What are the policy objectives and the intended effects?

Reporting publicly provides investors and other stakeholders with the information they need to fully take account of climate change risks in their investment decisions. There is evidence that companies that measure and report their GHG emissions are able to manage and reduce these emissions. Reporting this information in a company's annual report ensures that GHG emissions are brought to the attention of the company board and senior management, which itself is a driver for emissions reduction activity.

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

Five options have been considered within this IA:

0. Business as usual – This assumes no change to the current policy position
1. Enhanced voluntary reporting: increasing awareness of reporting guidance and outreach
2. Mandate GHG reporting under Companies Act for all quoted companies
3. Mandate GHG reporting under Companies Act for all large companies
4. Mandate GHG reporting for all companies meeting an energy use criteria

Option 2 is the preferred option (see para.3.17 and 3.18 for justification).

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 10/2015						
Does implementation go beyond minimum EU requirements?			N/A			
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.		Micro No	< 20 No	Small Yes	Medium Yes	Large Yes
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			Traded:		Non-traded:	
			0.05		4.73	

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: _____

Summary: Analysis & Evidence

Policy Option 1

Description: Enhanced voluntary reporting scheme

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
Year 2009	Year 2012	Years 10	Low: 0	High: 82	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0	0	0
High	2.5	1.2	12.6
Best Estimate	1.3	0.6	6.3

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

The central estimate assumes 100 large companies additionally undertake voluntary reporting. High and Low costs assume 200 and 0 additional companies take up reporting respectively.

One-off costs for companies to start reporting: £1.3m
 Reporting On-site Emissions Administrative Costs: £0.5m;
 Reporting Transport Emissions Administrative Costs: £4.5m

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

Costs associated with reporting international emissions

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	0
High	0	11.3	94
Best Estimate	Not provided	Not provided	Not provided

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

The full range of benefits has lower bound zero, and no central estimate.

Value of CO2 emission reductions: Low £0 - High £29m.

Value of financial savings to UK organisations through reduced fuel use: electricity: Low £0m – High £5m;
 gas: Low £0m - High £1.6m; diesel: Low £0m – High £82m.

Air Quality Benefits: Low £0m – High £6.6m; less abatement Costs: Low £0m – High £31m

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

Benefits from reporting international emissions. Intangible benefits of reporting, to companies, minus any displacement effects. Includes reputation and branding benefits and reduced exposure to future climate change legislation. Benefit of increased information relating to GHG performance, for investors to base their decisions upon. Benefits from increase in quantity, quality and consistency of emissions data from UK organisations.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
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There is a maximum of a 4% reduction in on-site and freight transport CO2 emissions. Employment and turnover are a good proxy for emission. Voluntary reporters will have a high ratio of benefits to costs. Start up costs are twice ongoing costs. Rail and water freight abatement costs and potential are the same as road freight. Companies reporting under existing schemes in the baseline get no further impacts.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 0.0	Benefits: 0	Net: 0.0	No	NA

Summary: Analysis & Evidence

Policy Option 2

Description: Mandate GHG reporting under Companies Act for all quoted companies

FULL ECONOMIC ASSESSMENT

Price Base Year 2009	PV Base Year 2012	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -28	High: 712	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	5.6	2.6	28

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

Covers 1101 companies
 One-off costs for companies to start reporting: £5.6m
 Reporting On-site Emissions Administrative Costs: £1.7m;
 Reporting Transport Emissions Administrative Costs: £21m

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

All international emissions reporting costs, to companies are not monetised in main figures.
 Additional costs associated with the largest companies reporting.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	0
High	0	89	741
Best Estimate	Not provided	Not provided	Not provided

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

A range is given on benefits. The Low scenario assumes zero benefits, with no central estimate.
 Value of CO2 emissions: Low £0 - High £228m;
 Financial savings to UK organisations through reduced fuel use: electricity: Low £0m – High £7.3m; gas:
 Low £0m - High £2.4m; diesel: Low £0m – High £671m; Air Quality Benefits: Low £0m – High £ 53m; less
 abatement Costs: Low £0m–High £221m

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

Benefits of reporting international emissions. Intangible benefits of reporting, to companies, minus any displacement effects. Includes reputation and branding benefits and reduced exposure to future climate change legislation. Benefit of increased information relating to GHG performance, for investors to base their decisions upon

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
A maximum of a 4% reduction in on-site and freight transport CO2 emissions. Employment and turnover are a good proxy for emission. Start up costs are twice ongoing costs. Rail and water freight abatement potential and costs are the same as for road freight. Companies reporting under Mandatory regimes, CRC, CCA or voluntarily get no further costs or benefits from mandatory reporting. Risk - costs to the largest companies of reporting may be higher on average than for very large companies.		

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:	In scope of OIOO?	Measure qualifies as
Costs: 3.4	Benefits: 0	Net: 3.4
	Yes	IN

Summary: Analysis & Evidence

Policy Option 3

Description: Mandate GHG reporting under Companies Act for all large companies

FULL ECONOMIC ASSESSMENT

Price Base Year 2009	PV Base Year 2012	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -903	High: 771	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate	180	84	903

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

Covers 24,000 companies
 One-off costs for companies to start reporting: £180m
 Reporting On-site Emissions Administrative Costs: £301m;
 Reporting Transport Emissions Administrative Costs: £423m

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

All international emissions reporting costs, to companies are not monetised in main figures

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	0	0
High	0	201	1675
Best Estimate	Not provided	Not provided	Not provided

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

A range is given on benefits. The Low scenario assumes zero benefits with no central estimate
 Value of reduced CO2 emissions: Low £0 - High £550m.
 Financial savings to UK organisations through reduced fuel use: electricity: Low £0m –High; £539m; gas:
 Low £0m-High £174m; diesel: Low £0m – High £1,130m. Air Quality Benefits: Low £0m –High £107m.
 Less abatement Costs: Low £0 –High £826m

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

Benefits of reporting international emissions.
 Intangible benefits of reporting, to companies, minus any displacement effects. Includes reputation and branding benefits and reduced exposure to future climate change legislation. Benefit of increased information relating to GHG performance, for investors to base their decisions upon .
 Air quality benefits.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5
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There is a maximum of a 4% reduction in on-site and freight transport CO2 emissions. Employment and turnover are a good proxy for emissions. Start up costs are twice ongoing costs. Rail and water freight abatement costs and potential are the same as for road freight. Companies reporting under Mandatory regimes, CRC, CCA or voluntarily get no further costs or benefits from mandatory reporting.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 108.6	Benefits: 0	Net: 108.6	Yes	IN

Summary: Analysis & Evidence

Policy Option 4

Description: Mandate GHG reporting under Companies Act for all companies meeting an energy threshold (greater than 6000MWh of electricity per annum through half hourly meters)

FULL ECONOMIC ASSESSMENT

Price Base Year 2009	PV Base Year 2012	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)			
			Low: -145	High: 486	Best Estimate:	
COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)	
Low	Optional		Optional		Optional	
High	Optional		Optional		Optional	
Best Estimate	28.9		13.5		145	
Description and scale of key monetised costs by 'main affected groups' Covers 2017 companies One-off costs for companies to start reporting: £29m Reporting Transport Emissions Administrative Costs: £116m						
Other key non-monetised costs by 'main affected groups' All international emissions reporting costs, to companies are not monetised in main figures						
BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)	
Low	0		0		0	
High	0		76		632	
Best Estimate	Not provided		Not provided		Not provided	
Description and scale of key monetised benefits by 'main affected groups' A range is given on benefits. The Low scenario assumes zero benefits with no central estimate Estimated reduction in CO2 emissions: Low £0 - High £202m; Financial savings to UK organisations through reduced fuel use: diesel: Low £0m – High £563m; Air Quality Benefits: Low £0m – High £47m; less abatement Costs: Low £0m – High £180m						
Other key non-monetised benefits by 'main affected groups' Benefits of reporting international emissions. Intangible benefits of reporting, to companies, minus any displacement effects. Includes reputation and branding benefits and reduced exposure to future climate change legislation. Benefit of increased information relating to GHG performance, for investors to base their decisions upon. Air quality benefits.						
Key assumptions/sensitivities/risks					Discount rate (%)	3.5
There is a maximum of a 4% reduction in on-site and freight transport CO2 emissions. Employment and turnover are a good proxy for emission. Start up costs are twice ongoing costs. Rail and water freight abatement costs and potential are the same as road freight. Companies reporting under Mandatory regimes, CRC, CCA or voluntarily get no further costs or benefits from mandatory reporting.						

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: 17.5	Benefits: 0	Net: 17.5	Yes	IN

1. Summary of IA and Summary Table of Costs and Benefits

- 1.1 This IA models four options for increasing greenhouse gas (GHG) reporting. These options are: (1), Enhanced Voluntary Reporting; (2), Mandate Reporting for UK quoted companies; (3), Mandate Reporting for all large companies; and, (4), Mandate Reporting using an Energy Consumption Criterion.
- 1.2 Although the policy is expected to realise benefits in: (i) improved information for investors to base their decisions on; (ii) reductions in these emissions as well as the associated energy savings; as well as the potential for (iii) companies improving their reputations, branding opportunities, and exposure to climate change risks, it has only been possible to quantify and monetise some of them. A large number of assumptions, and best available proxies, have been required to estimate this partial coverage of the full set of impacts, including how to take account of impacts associated with existing/planned policies that work towards delivering similar aims.
- 1.3 Many respondents to the consultation provided data and further information on costs and benefits of reporting so allowing for a more accurate estimate of the costs to companies and a narrowing of the estimated range of the benefits, but with remaining uncertainty over the scale of benefits. **This IA shows that there is likely to be a significant overall benefit from mandatory reporting by quoted companies at the high end of the range**, but with greater uncertainty about the overall benefits for options extending to larger number of companies. The IA does not quantify the benefits to investors but the overwhelming view from investors has been that a voluntary approach to corporate reporting is not delivering clarity and consistency of information about emissions, but that a mandatory approach would deliver benefits to shareholders/investors.
- 1.4 Some major institutional Investors are already actively seeking this type of information, for example through dialogue with individual companies and intervention at Annual General Meetings but have drawn attention to the fact that this carries a cost for them and is inefficient as information that is provided is often not in a consistent format that enables investors to make comparisons. It is in large part investor pressure that has resulted in the increase there has been in levels of disclosure of climate change-related information over the last decade. The Carbon Disclosure Project (CDP) which is a voluntary initiative backed by investors was set up in 2001 and has been asking global quoted companies to disclose information on their greenhouse gas emissions since 2003. But CDP in their response to the consultation supported a phased introduction of mandatory reporting, starting with quoted companies, because in their assessment they have taken reporting as far as they can on a voluntary basis. This is illustrated by the fact that although more than half of UK quoted companies are reporting some information on their GHG emissions, the Environment Agency's most recent report on Environmental Disclosures by quoted companies [include ref.] shows that in 2009/10 annual reports only 22% were reporting this information in accordance with Government guidance (see paragraph 4.5 under 'rationale' for further background and detail on consistency of disclosure). It is envisaged that regulations under option 2 would set a minimum level of reporting, requiring disclosure of a figure for global direct emissions (scope 1 and scope 2 as defined by the GHG Protocol), a base year and a relevant intensity ratio (e.g. emissions per £ turnover, per tonne production or whatever other factor is relevant to the business). This is consistent with recognised international practice and will provide for a basic level of consistency between disclosures, which will make it easier for investors and other stakeholders to interpret and use this information. **The rationale for a Government intervention to address this is that information about companies' exposure to climate change-related risks is material information for all investors and other stakeholders; that provision of such information helps markets to function optimally; and government intervention can provide for a level of transparency and consistency, as is already the case for company financial information, which is not being achieved by individual private initiatives.**

- 1.5 One investment company that responded to the consultation described the benefits to it of mandatory reporting as follows: *“The main conclusions outlined in the Stern Review were that 1% of global GDP should be invested a year to mitigate its [climate change] effects, and that failure to do so could risk global consumption being up to 20% lower than it otherwise might be. The impact on the long-term absolute value of our portfolios as a result of this has the potential to be very significant. We believe that where carbon emissions are a material commodity with financial value they should be properly defined, measured, accounted for, audited and reported. This would help to balance our long-term liabilities with long-term returns. The additional quantity and it is hoped quality of data as a result of mandatory carbon reporting will provide a better understanding of companies’ and sectors’ emissions profiles. This will allow us to more closely question those less carbon efficient companies and engage to increase efficiency and achieve emissions reductions. It will also enable us to better manage any carbon risk in our UK holdings. ... Reducing data costs would enable a greater focus on encouraging companies to reduce their emissions”.*
- 1.6 **The evidence referred to elsewhere in this IA (paragraphs 4.2, 4.4, and 4.6) demonstrates that there are also potential benefits to individual companies from providing such information** (because the process of measuring and reporting emissions generates a focus at senior levels within a company on the sources of those emissions) through improved energy and resource efficiency. The rationale for a Government intervention to help drive realisation of these efficiency benefits is that better emissions management by companies contributes to the public policy goal of meeting the challenging legally binding emissions reduction targets set in the Climate Change Act.
- 1.7 A reasonably broad coverage of potential savings from CO₂ related to on-site emissions, which includes electricity and gas use, and from freight transport, which includes road, water, and air freight, and other non-CO₂ GHGs has been modelled and monetised. Calculating the level of benefits requires estimations to be made of the level of behaviour change which companies and investors will experience when presented with this information. **Details of evidence of behaviour change and benefits of reporting are mentioned in more detail principally in section 4 (rationale), especially paragraph 4.6, and section 9 (analysis of benefits).** A wide range has been placed around the anticipated benefits, given the uncertainties around the level of expected behaviour change – this range is from no change through to reductions of up to 4% for most CO₂ and other GHGs emissions, and up to 4% for freight transport.
- 1.8 **The assumptions on benefits were tested during the public consultation and an assumption of a range of benefits from 0 to 4% is based on feedback received.** Whilst assuming that the range of benefits starts at zero might underestimate the benefits, despite much input during the consultation from businesses and trade associations, **it has not been possible to establish quantitatively the minimum level of benefits.** The lack of firm quantitative data on benefits contributed to the decision by Ministers to opt for a more cautious regulatory approach than that favoured by most companies in the consultation (see para 3.14 for details of the results of the consultation).
- 1.9 While the estimates of the range of benefits have been narrowed as far as possible on the basis of the quantified data that is available, the qualitative research evidence referred to elsewhere in this IA provides evidence that some companies will derive benefits from measuring and reporting their emissions. A judgement can therefore be made that, although this policy is unlikely to deliver benefits precisely at the high end of the range, it is also unlikely that the benefits will be precisely at the low end of the range, and so there are likely to be benefits from this policy. This is seen in, for example, the results of the survey of 150 plus companies undertaken by PwC for Defra in 2010 and summarised in Defra’s evidence review to Parliament referred to in section 3.2. This is confirmed by evidence from the Carbon Disclosure Project which has been requesting data on emissions management from quoted companies globally over the last 10 years. Bloomberg analysis of CDP’s 2011 report

shows that the member firms of the CDP Global Leadership Indexes outperformed their peers by delivering near double the total returns between 2005 and 2011 of the 500 firms in the FTSE Global Index. Indeed, as noted in sections 9.5-9.7 of this IA, individual companies who estimated their own benefits in response to the consultation options or in response to trade and professional association surveys often estimated higher benefits than the upper estimate in this IA – potentially due to higher emissions reductions, or alternatively due to difficulties in considering adequately how other GHG mitigation policies drive their decisions.

1.10 However, by definition in the absence of a legal requirement to report emissions in company reports, current evidence is based on the experience of companies which have chosen to measure and report their emissions for their own reasons. It is logical to assume that these are the companies who have seen emissions management and reporting as an opportunity and will therefore tend to have derived relatively high benefits from it. Thus while the upper estimate of 4% benefits over the appraisal period is a realistic estimate of the potential benefits, the extent to which those benefits will be realised is dependent on the behavioural response of those companies included in any new regulatory requirement. On the basis of evidence in the PwC research and elsewhere, one might expect the majority of these potential benefits to be realised, bearing in mind that one unknown factor is how companies who have not so far chosen to report their emissions may choose to respond to a new mandatory requirement.

1.11 **What can be deduced from the analysis is that for option 2, a one-off step change of around 0.15% of the 0-4% behaviour change range would be required for the benefits to at least justify the costs** (for option 3, a 2.2% behaviour change has been estimated for the benefits to justify the costs). Hence **a key part of Ministers' preferred option, as explained in the Post Implementation Review plans in section 12, is to carry out further analysis of the actual costs and benefits experienced by those quoted companies reporting for the first time in 2013 and 2014 to provide more certainty on the translation of potential benefits into actual benefits before considering extending the policy to all large companies.**

1.12 **On costs, this revised final impact assessment provides further details on the reduction in the costs compared to the consultation impact assessment, more detail is given in annex F.** The main reason for the difference is due to the earlier, higher figure being based on a model of what it was expected GHG reporting would cost companies to implement, based on earlier work done by DECC prior to the introduction of the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme and this proxy was extended to calculate a cost for transport emissions in the consultation IA. This was a significant overestimate for costs, at the high end of the range.—Indeed for onsite emissions, costs of reporting have now been reduced significantly in line with evidence from the consultation (to reflect that the CRC typically covers more sites/emissions, and lots of activities needed stripping out as irrelevant for GHG reporting – see Annex D for more details). Transport costs of reporting have also come down very significantly, post consultation, as previously a crude approximation had been used in the absence of any firm pre-consultation evidence, i.e. the CRC proxy used in the consultation IA was too crude; the proportion of larger firms was overestimated, as was the number of firms that the policy would affect.

1.13 Whilst the costs in the consultation impact assessment were widely criticised as inflated, there was a good reaction from the business community to our call in the public consultation for more and better information on the costs of this policy. The revision to the costs are based on the input we received from companies and trade associations such as the CBI, the Freight Transport Association and many others. The significant reduction in costs is compared to the high end of the range of consultation costs – the central cost estimate in the Final IA is actually higher than the low end of the cost range at consultation stage. The reason for this wide range of costs at consultation stage was due to very significant uncertainties (see Annex F for more details).

- 1.14 The additional freight transport costs and benefits, in this impact assessment compared to the consultation impact assessment, relate to water, rail and air freight. There is no evidence available on the potential for cost effective abatement in these areas. These have been estimated assuming that potential savings are similar to the potential for road freight, i.e. that 4% emission reductions are possible. Furthermore, the analysis assumes that the cost of reporting emissions per tonne of carbon produced is the same, on average, for road transport as for other modes of transport.
- 1.15 In the analysis two benefits scenarios are analysed. These are: (1), High; and (2), Low. The High benefit assumes emission reductions of 4% for electricity and gas related emissions and 4% for transport fuel related emissions over the lifetime of the appraisal period. The behaviour change potential at the high end of the range builds-up to 4% fairly rapidly and then stays at that level for the remainder of the 10 year appraisal period – so for the majority of the 10 year appraisal period, a 4% behaviour change is modelled each year, relative to the counterfactual. Note that this is not an additional 4% each year (i.e. not 4% in year 1, 4% + 4% = 8% in year 2, etc). Low benefits assume that no additional emission reductions are motivated by the policy. No central estimate is provided. **However, as a pure illustration, without indicating how likely such an outcome would be, the mathematical mid-point net benefit for option 2 would be around £343m.**
- 1.16 A key point to note is that although the impacts described above have been modelled and monetised as completely as possible for direct emissions (scope 1) and indirect energy (scope 2) emissions¹, in terms of geographical coverage the international impacts have not been modelled and monetised under the main benefits. This IA provides a partial illustration of international impacts based upon the FTSE 350, again with a wide range of anticipated costs and benefits due to uncertainties². In addition, it was not possible to quantify/monetise the impacts associated with improved investor information, reputation, branding, and reduced exposure to climate change risk.
- 1.17 Table 1 provides an overview of the analysis described above and supports the summary sheets by disaggregating costs and benefits for each option and placing the information in one place. It displays benefits for each option using the two different scenarios on benefits. It also displays the costs of reporting electricity and gas related emissions and of reporting transport related emissions, and the costs of reducing emissions. Net Benefits are displayed for the main monetised costs and benefits.
- 1.18 For estimates of net benefits, these have been reported using high benefits and central costs, for High, and low benefits and central costs, for Low. This shows that assuming low benefits, it is only possible for Option 1 to be beneficial. As explained in paragraph 1.8 above, there is good qualitative evidence supporting the judgement that it is unlikely benefits will be precisely at the low end of the range. Using high benefits it is possible that all options have benefits that are greater than costs.
- 1.19 **In the light of consultation responses, and the evidence on costs and benefits, Ministers have decided to propose only to mandate reporting for the limited group of quoted companies (option 2).** Mandatory reporting of GHG emissions by all quoted companies will provide transparency about a company's exposure to climate change related risks which is essential information for investors who wish to assess medium to long-term risks.
- 1.20 Whilst there was most support in the consultation for a regulatory approach, and in particular regulation of all large companies (option 3), there is less risk in achieving benefits

• ¹ WRI/WBCSD Greenhouse Gas Protocol: A corporate accounting and reporting standard categorises emissions into three scopes, and this is widely accepted approach to identifying and reporting emissions. Scope 1 refers to emissions direct to the atmosphere from activities owned or controlled by an organisation, such as transport or process emissions; Scope 2 refers to emissions released to the atmosphere associated with purchased energy such as electricity, heat, steam or cooling.

• ² See paragraph 9.22.

for option 2 compared to option 3 and so it is proposed a more cautious approach is adopted until there is better evidence of the benefits of extending the approach more widely. Introduction of this more limited regulatory option, covering some 1000 companies, will allow better quantitative evidence to be gathered and so allow a more informed judgement to be made of introducing regulations covering all large companies. **The Post-Implementation Review (at section 12 of this IA) provides more details of the work that will be undertaken to both assess the effectiveness of the preferred option and to inform a decision on whether regulation should be extended to all large companies.**

1.21 Defra’s Better Regulation Programme has confirmed that an “out” has been identified but not yet validated.

Table 1: Present Value Summary of Costs and Benefits for Options

			Option 1	Option 2	Option 3	Option 4
Benefits (£m)	Electricity and Gas Related	High	8	11.5	851	0
		Low	0	0	0	0
	Wider GHGs	High	0.2	0.28	20.4	0
		Low	0	0	0	0
	Freight Transport	High	117	950	1630	812
		Low	0	0	0	0
	Less Abatement Costs	High	31	221	826	180
		Low	0	0	0	0
	Total	High	94	741	1675	632
		Lower	0	0	0	0
Costs (£m)	Electricity and Gas	Central	0.7	2.2	376	0
	Freight Transport	Central	5.6	26	528	145
	Total	Central	6.3	28	903	145
Net Benefits (£m)	All Robust Monetised Costs and Benefits	High	82	712	771	486
		Low	0	-28	-903	-145

Numbers highlighted in red are negative values.

1.22 **Switching point analysis** This switching point analysis is shown to help explain the amount of additional behaviour change (in excess of emissions reduction activities that companies are already undertaking) driven by this policy that would be required for the benefits of reporting to exceed the costs.

1.23 It displays the *additional* percentage reduction in emissions required to be generated to make the policy deliver overall net benefits.

1.24 For Option 1, as firms voluntarily report it is assumed they only do so when there are private benefits. Therefore, this option will always be beneficial even in a low benefit scenario. For Option 2, emission reductions will have to be approximately 0.15% of total emissions for the option to be cost beneficial. For Option 3 companies will on average have to reduce emissions by 2.2% for the policy to be cost beneficial. For Option 4 companies will have to reduce emissions by 0.9% for this option to be cost- beneficial. However, it should be noted that this table does not reflect the likelihood or ease with which these different levels of behaviour change could be achieved. For example, it is more likely that Option 2 and Option 4 companies are among those already undertaking more emissions reduction activities and so it may be more difficult to achieve the levels of *additional* percentage reductions than for the Option 3 companies which are likely to include companies that are not currently undertaking extensive emissions reduction activities. It should be noted, however, that for these companies that the additional costs of reporting should also be lower.

1.25 An example of how the switching point is calculated is provided as follows for Option 2 (the same method applies for the other options). The switching point where the £28m of costs are just balanced by a proportion of the maximum £741m of benefits is $\frac{£28m}{£741m} = 3.78\%$ (and if this is expressed as a percentage of the maximum 4% behaviour change, then this is $3.78\% \times 0.04 = 0.15\%$). This means that a one-off step change of around 0.15% of the 0-4% behaviour change range is required before the benefits at least equal the costs over the appraisal period).

1.26 It should be understood that the fact that companies are reporting voluntarily suggests that there are overall net benefits to these organisations. The decision to roll out mandatory reporting further needs to take into account whether making more firms report will continue to deliver overall net benefits to those organisations and overall society. The largest proportion of benefits in relation to this policy are direct to companies. This is through financial savings from improved efficiency (less abatements costs), which make up approximately two thirds of the benefits. Therefore, the decision to mandate reporting has to take into account how likely it is that companies are not already fully operating efficiently. There is a substantial body of evidence from work by the Carbon Trust and others, and in research commissioned by Defra (ref. Oakdene Hollins March 2011 'Further Benefits of Business Resource Efficiency' research³), that there is a significant untapped energy efficiency opportunity in UK businesses. Evidence on the scope for public disclosure of emissions to contribute to realising that potential is set out in the PWC research published in the November 2010 report to Parliament (footnote 5 – see introduction). This found evidence from surveys of businesses that public disclosure of emissions data is a key enabler for more effective emissions management and reduction by companies.

Table 2: Average % Change in Emissions Driven by Policy Required for Benefits to Exceed Costs

	Option 1	Option 2	Option 3	Option 4
% Change in Emissions	0%	0.15%	2.2%	0.9%

1.27 To conclude:

- this IA shows that there is likely to be a significant overall benefit from mandatory reporting by quoted companies at the high end of the range;
- the assumptions on benefits were tested during the public consultation and an assumption of a range of benefits from 0 to 4% is based on feedback received;
- but it has not been possible to establish quantitatively the minimum level of benefits under the preferred option;
- for the benefits to at least justify the costs, a one-off step change of only around 0.15% of the 0-4% behaviour change range would be required.
- there is evidence from investors that there would be significant benefits to them and hence to the operation of markets from provision of more transparent and consistent information about companies' greenhouse gas emissions, but it has not been possible to monetise these benefits in the IA.
- Ministers have decided their preferred option is to regulate for mandatory reporting by quoted companies (option 2) with a post-implementation review assessing whether regulation should be extended to all large companies in October 2015.

1.28 The reasons for selecting option 2 as the preferred option are:

³

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=16943&FromSearch=Y&Publisher=1&SearchText=EV0441&SortString=ProjectCode&SortOrder=Asc&Paging=10>

- Mandatory reporting of greenhouse gas emissions by quoted companies will provide transparency about a company's exposure to climate change-related risks which is essential information for investors and other stakeholders;
- There is likely to be a significant overall benefit from this option at the high end of the range;
- The benefits more clearly exceed the costs for this option than for other mandatory options; and
- Introduction of this more limited regulatory option covering some 1,000 companies will allow better quantitative evidence on benefits and costs to be gathered and so allow a more informed judgement on whether to extend this policy to cover all large companies at a later stage.

2. Structure of the IA

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3. Introduction

- 3.1 The Climate Change Act (section 85) requires that, by 6 April 2012, the Secretary of State must make regulations on the reporting of greenhouse gas (GHG) emissions under the Companies Act 2006, requiring the Directors' Report of a company to contain information about GHG emissions from activities for which the company is responsible; or lay a report to Parliament explaining why this has not happened.
- 3.2 Since the Climate Change Act, there has been considerable consultation and discussion with UK business on measuring and reporting of greenhouse gases⁴, starting in 2009 when there was a three month consultation on the draft guidance on how to measure and report emissions. A number of workshops with business took place throughout the UK as part of that consultation. Engagement with UK business has continued since then, and some 150 plus companies participated in a survey in 2010 as part of the work that PricewaterhouseCoopers (PwC) and the Carbon Disclosure Project (CDP) carried out on Defra's behalf to look at the benefits of reporting. (PwC's work was a key part of the Government's report to Parliament on the benefits of reporting⁵).
- 3.3 Whilst companies are the main users and beneficiaries of measuring and reporting on their emissions, there is an interest amongst investors for incorporating climate change risks into their investment analysis, and as the basis of engagement with companies. Annually reported accounts and statements are one source of information which can be factored into investment analysis. The appetite for information amongst investors appears to be growing. Investors, whilst not the only interested group, are one of the main users of corporate disclosures. Investors with long-term horizons, such as pension funds, have an interest in companies, in which they invest, taking action to reduce their emissions now, so as to minimise future costs from the rising price of carbon.
- 3.4 A consultation was held from 11 May until 5 July 2011 to help inform the Secretary of State's decision on whether to introduce regulations requiring some companies to report on their greenhouse gas emissions within their Annual Reports. The consultation impact assessment assessed four different options for increasing GHG reporting:
- i. **Option 1: Enhanced voluntary reporting.** Provides a non mandatory option thereby imposing no additional regulatory burden. An increase in the number of companies measuring and reporting their emissions is not necessarily guaranteed. Furthermore, it might not be the most significant emitters that take-up the reporting, so significant emissions reductions cannot be guaranteed. However the intention would be that the Government would encourage initiatives across UK business.
 - ii. **Option 2: Mandate under Companies Act for all Quoted companies.** Under company law, quoted companies are defined⁶ as those UK companies listed on the Main London Market. Statistics for the London Stock Exchange for 30 September 2010 indicate there are 1,101 companies that would be covered by this option. Under the Companies Act 2006, quoted companies are already obliged to report - to the extent necessary for an understanding of the business - on environmental issues in their business review⁷ and so some will already report on emissions and energy use in their annual report.
 - iii. **Option 3: Mandate under Companies Act for all large companies,** as defined by the criteria set in the Companies Act. This covers a greater number of companies than option 2 and will include some large private companies not captured by option 2. As companies may generate relatively small levels of emissions on an individual basis but

• ⁴ Carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

• ⁵ *The contribution that reporting makes to the UK meeting its climate change objectives: a review of the current evidence.*
<http://archive.defra.gov.uk/environment/business/reporting/pdf/corporate-reporting101130.pdf>

• ⁶ Section 385 of the Companies Act 2006

• ⁷ A quoted company must ensure that its business review "to the extent necessary for an understanding of the development, performance or position of company's business includes: ...information about environmental matters...."

when grouped together they may constitute a large proportion of UK GHG emissions. The Companies Act (2006) defines size using three measures - employment, gross assets and turnover. To be classified as a certain size the company must meet the threshold for that size band on at least two measures. Statistics shows that there are between 17,000 and 31,000 large companies in the UK.⁸ This analysis uses the central FAME estimate provided in the paper of 24,000 large companies.

- iv. **Option 4: Mandate GHG reporting under Companies Act for all companies whose energy consumption exceeds a threshold.** Adopting an energy use threshold would focus the reporting requirement on those firms with the largest UK emissions from energy use. This option is analysed using consumption of 6000MWh of half hourly metered electricity as a threshold. This threshold is the same as the eligibility criteria for the CRC. Based on registration data for the CRC submitted to the Environment Agency, around 2017 companies would be required to report. These companies will be reporting their UK energy use emissions under the CRC. Reductions could be driven by the policy requiring the reporting of previously unreported emissions: those associated with freight transport, non-CO₂ GHG emissions and the companies' international emissions.

3.9 There was strong engagement by the business community during the consultation process. Officials held or spoke at 25 events, meetings or workshops during the consultation period involving the CBI, the Freight Transport Association, Water UK, the British Retail Consortium, EEF (the manufacturers' association), Carbon Connect, the Institute of Environmental Management and Assessment, Carbon Smart, GC100 (representing Company Secretaries for the top UK companies), Climate Disclosure Standards Board, the Emissions Trading Group and Intellect Technology Association. Defra also ran events open to a range of companies and stakeholders. Events were held in London, Leeds, Birmingham, Edinburgh and Cardiff.

3.10 This impact assessment reflects the feedback received during the consultation process, and includes improved data on the costs and benefits of all four options. At the end of the consultation process some **2018 responses** had been received from individuals, companies, trade associations and other stakeholders. There was a good written response from the business community: **210 companies** and **59 trade associations** have responded. See Table 3 below for a detailed breakdown of the different respondents. The breakdown of these responses by type of stakeholder and by which of the four options they most favoured is given below in Table 3 below.

• ⁸ <http://www.bis.gov.uk/policies/business-law/corporate-governance/research/company-and-partnership-law>

Table 3: Results of public consultation on four options to encourage greater company reporting of GHG emissions.

Group	Option 1	Option 2	Option 3	Option 4	Other views	TOTAL
Trade Associations /Professional bodies	33	3	15	5	No view (2) Version of Option 3 with exemptions for companies in EU ETS, CRC and CCAs (1)	59
Not for profit organisations	2	1	4	2	No view (1)	10
Business fora/ Business and voluntary sector fora	1	0	4	0	No view as members split (1)	6
Investor forum	1	0	<u>1</u> ^[1]	0		2
Campaigning organisations	0	1	7	0		8
Local Authorities	0	0	4	1		5
Regulators	0	0	3	0		3
Members of Parliament	0	0	2	0		2
Companies (excluding investors)	41	7	142	5	Mandatory (7) Options 2+3 (1) Options 3+4 (1) Options 2+4 (1) No view (5)	210
Investors	1	1	2	<u>1</u> ^[2]	Options 2 or 3 or carbon-intensive companies with emissions over a threshold (1)	6
Individuals	1	4	1672	1	No view (29)	1707
TOTAL	80	17	1853	15		2018

[1] The Forum represents 53 Local Authority pension funds based in the UK.

[2] Hermes Equity Ownership Services responded on behalf of their clients: The BBC Pension Trust, HESTA, Super Fund (Australia), Lothian Pension Fund, The National Pension Reserve Fund of Ireland, PNO Media (Netherlands), Canada's Public Sector Pension Investment Board, VicSuper of Australia. Other fund managers did not disclose whether they were responding on behalf of their clients.

3.11 The consultation also invited comments on the assumptions made in the impact assessment and sought further information from companies. A number of companies provided further data. In addition, the Freight Transport Association (FTA) and the Institute of Environmental Management and Assessment (IEMA) carried out surveys of their members to help provide some of this information. This data has been used in updating this IA.

3.12 WWF-UK, the Aldersgate Group, and the Co-operative Group commissioned Adelphi Consulting to examine and comment on the consultation impact assessment. Officials discussed the review of the consultation IA with Adelphi Consulting and have made some amendments in this IA to take account of points raised, in particular, on wider freight transport costs and benefits and labour productivity,

3.13 The consultation IA explored the potential options for increasing the quality and consistency of reporting of GHG emissions by UK companies under the UK Companies Act, through either Government working to encourage greater company disclosure using various voluntary initiatives (option 1) or through regulatory means (options 2, 3 and 4). This updated IA reflects the views and data received during the consultation process.

3.14 The majority of both businesses and individuals who responded to the consultation supported mandatory reporting for all large companies but with a significant minority supporting a voluntary approach. Those companies who supported a voluntary approach did so either on the basis of concerns about the practical implications of a new reporting requirement for businesses or on the basis of doubts about the benefits of such a requirement.

3.15 The majority view from investors to the consultation was that a voluntary approach is not delivering clarity and consistency of information about emissions and that requiring disclosure of emissions information in a consistent format will promote market transparency and help drive innovation in managing and reducing emissions. A view supported by most companies.

4. Rationale for Intervention

4.1 Greenhouse gases are, in economic terms, an externality; that is, those who produce GHG emissions do not face the full cost of those emissions, in terms of their contribution to climate change, to the rest of society. Stern (2006)⁹ advocated three essential elements for the mitigation of climate change: a carbon price, technology policy and the removal of barriers to behaviour change.

4.2 Stern highlighted that even when measures to reduce emissions are cost-effective, there may be barriers preventing action. These may include a lack of information, transaction costs, and behavioural and organisational inertia. The PwC report (Review of the Contribution of GHG reporting to emission reductions and associated costs and benefits – see footnote 5) provides insights into the financial costs and benefits to companies from reporting, e.g. Walmart which identified significant energy and cost savings as a result of voluntary disclosure. The organisational inertia can be a result of the perception of transaction costs (such as time/hassle) that are higher than the reality. This complementary policy is required alongside overarching carbon pricing instruments to ensure cost-effective abatement of GHG emissions.

4.3 The reason for intervening in this area is to address some of the following barriers to action:

4.4 *Internal barriers within companies*

Split incentives between different parts of a company can result in internal barriers within companies which result in a lack of focus on energy efficiency gains despite economic benefits to the company of doing so. The evidence shows that there are significant internal barriers preventing action. The most significant barriers include a lower perceived priority of emissions management compared to other business critical or legally required activities, and a relative lack of access to capital for low carbon investments alongside internal limitations such as a requirement to secure returns on investment over short time periods. However, research amongst both practitioners active in GHG management and reporting and other practitioners identified a wide range of other barriers which combine together to slow down progress to emission management and reporting. Not all barriers were applicable to all businesses but the barriers frequently identified included problems with senior management support, perceived complexity of the task, concerns over quality of the data and a shortage of skills or expertise.¹⁰ CDP's experience of requesting voluntary reporting supported these conclusions by identifying concern over the availability or quality of internal data and lack of resources among the reasons given for not engaging with the CDP¹¹. Some responses to the consultation, from those that supported mandatory reporting, suggested that some of the benefits of corporate reporting arise from the fact that the issue of emission management is raised to Board level, unlike other energy policy interventions which may not get Board level attention. For example, the CBI response noted that: "*Emissions reports under a mandatory framework would be signed off by a senior officer of the company, guaranteeing board level attention..*" And, the Local Authority Pension Fund Forum noted in their response that "*Other issues that cannot be monetised are the benefits of increased transparency on emissions at Board level, and a greater understanding and positive incorporation of such metrics in supporting corporate strategy*".

4.5 *Lack of appropriate information for shareholders*

• ⁹ Stern, (2006), http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf

• ¹⁰ IEMA Special Report: GHG management and reporting. (page 27)

• ¹¹ PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits" in particular 5.3.13

Lack of appropriate information for shareholders to take in to account climate change risks in their investment decisions. Corporate reporting of GHG emissions has the potential to help investors evaluate climate change related risks when taking decisions about where and how to invest. However, despite existing voluntary approaches, such as the CDP's work and the provision of the Defra/DECC guidance, it is not currently the case that mainstream investment decisions are taking in to account climate change data. A literature review by Defra found evidence that climate disclosures by companies 'are not providing the information required to allow investors to properly assess the financial implications of climate change'¹². Research by the Environment Agency showed that only 22% of FTSE all-share companies were disclosing quantified figures on climate change and energy use in accordance with latest Government guidance¹³ although a far greater proportion reported quantified figures in some form. A survey by Deloitte of 100 listed companies looked at compliance with the Defra/DECCS guidance on GHG emissions and found that only 9% of those surveyed were reporting in line with this guidance¹⁴. Lack of consistency is a serious problem in corporate reporting at present, one which the introduction of mandatory reporting would help to solve. Organisations such as the CBI, the Co-operative Group and FairPensions who are campaigning for mandatory reporting stress the importance of 'comprehensive, reliable and comparable information'¹⁵. Although the CDP data is widely regarded as the most complete and comprehensive dataset on climate disclosure, there are still concerns raised about data quality. The top quality issue is the fact that it is voluntary¹⁶ and the CDP's investor report states that 'more consistent CDP responses from companies and broader company coverage would be much more useful to investors than having different sources for the same information'¹⁷. The economic literature has highlighted reporting as the "third wave" of environmental regulation and it has been shown that reporting can lead to significant emission reductions. The majority of investors who responded to the consultation explained that they wish to see mandatory reporting in order that they could have more consistent access to good quality information. One investor noted that "*Comparable carbon disclosure for all large companies in a readily extractable fashion will result in cost saving both in research budget and analyst time*". And "*We also spend significant analyst time on researching carbon emissions data and engaging with companies to encourage disclosure of this data*".

4.6 Benefits are not produced by other policy interventions

Currently, some large organisations may not monitor or report their emissions. Although such businesses may not be large emitters in comparison to those in energy intensive sectors, such as the energy sector, (who do tend to report), the overall contribution of such companies' emissions may still be significant. Also, those companies who do already monitor and report for EU ETS or CRC may only do so for CO₂ emissions, and this does not take into account the other greenhouse gases, such as the fluorinated gases, e.g. from refrigeration equipment, which contribute to climate change. Corporate reporting of greenhouse gases goes wider than current energy policies as it encourages a company to look at all its direct and indirect energy emissions, rather than just focussing on energy consumption. A number of responses to the consultation gave

• ¹² Sullivan (2006) and UN PRI (2009) both quoted in Defra (2010) The contribution that reporting of greenhouse gas emissions makes to the UK meeting its climate change objectives: a review of the current evidence. (page 27).

• ¹³ Environment Agency (2011) Environmental Disclosures. The third major review of environmental reporting in the statutory annual reports of FTSE all-share companies.

• ¹⁴ Deloitte (2010), A survey of carbon reporting practices among UK listed companies.

• ¹⁵ Open letter to Caroline Spelman. Published in the Financial Times 26 November 2010.

• ¹⁶ CDP (2009) Investor research project: Investor use of CDP data.

• ¹⁷ CDP (2009) Investor research project: investor use of CDP data. (page 13).

anecdotal evidence of corporate reporting generating significant emission and financial savings. Several respondents highlighted the existence of low and no-cost behavioural and managerial measures that could lead to significant financial savings, some between 10 and 20%.

The current UK guidance on GHG reporting aims to help companies that choose to do so provide information internally and externally in a consistent form so helping them to give businesses the ability to effectively monitor and manage their GHG emissions. Currently, companies who are reporting on emissions, as part of the business review of the Directors' report are likely to be reporting on the six Kyoto greenhouse gases and not just carbon dioxide. In addition, in line with the UK Government guidance (published by Defra/DECC in 2009), UK multinational companies are reporting on their global emissions (not just UK ones)¹⁸. Reporting of international, rather than just UK, emissions is important to allow investors to get a full understanding of the risks and opportunities that an investment presents.

4.7 The Government wants organisations to measure and report their GHG emissions, as reporting can help companies reduce their emissions, provide relevant information to investors and other interested parties, and contribute to the most cost-effective achievement of Government targets for GHG emission reductions by 2050.

5. Policy Coverage

5.1 UK companies are required to provide information in their Annual Reports for the benefit of their shareholders, etc. The minimum requirements for information that directors must disclose in their Annual Report and Accounts are set out in the Companies Act 2006. A number of UK companies already choose to disclose information on their GHG emissions within the Directors' Report in the Annual Report.

5.2 The UK guidance on measuring and reporting GHG emissions recommend that UK companies measure and report on their total scope 1 (direct emissions, e.g. fuel, processing and fugitive emissions) and scope 2 (energy indirect: primarily electricity) CO₂ equivalent emissions for the six greenhouse gases covered by the Kyoto Protocol. In line with financial reporting requirements where UK companies report financial information on their overseas operations, a company's GHG reports would also disclose, where appropriate, overseas emissions as well as UK emissions. This disclosure also follows the minimum requirements of the international standard, the GHG Protocol. However, this IA has only monetised the costs and benefits of measuring and reporting UK emissions relating to electricity and gas use and freight transport.

5.3 There will be a further consultation on the regulation that will require quoted companies to report.

• ¹⁸ Carbon Disclosure Project 2010 FTSE 350 Report

6. Coverage of Cost-Benefit Analysis (CBA)

6.1 The cost-benefit analysis only covers costs and benefits related to UK emissions from UK companies. This is in line with Green Book Guidance¹⁹ as costs and benefits should only be estimated for activities that impact on the UK economy. The Green Book also states that where non-UK impacts may switch the results of an analysis these should also be included, therefore an additional analysis of these impacts is included in a sensitivity analysis section after the initial costs and benefits are analysed (see paragraphs 10.19 to 10.24). These figures include additional uncertainties, and should be considered less robust than headline cost and benefit estimates.

6.2 2009 has been chosen as the base year for this IA because this was the year that Defra/ DECC published the voluntary guidance, 'Guidance on how to measure and report your greenhouse gas emissions'²⁰. (An impact assessment was published when a consultation on the draft Guidance took place in 2009 and data drawn on that 2009 IA was used in the baseline for the consultation IA and this IA). Further, given that the consultation stage IA used numbers in 2009 prices which stakeholders provided feedback on; this IA has kept the same price year to ensure consistency with the consultation IA.

6.3 The costs of reporting greenhouse gas emissions in company reports arise from the requirement to gather data on direct emissions (from industrial processes, fuel consumption in owned transport, etc) and indirect energy emissions (purchased electricity). Data will be required on a company's total operations, both within the UK and overseas. The survey carried out by IEMA during the consultation period asked companies for their company reporting costs. For those companies with overseas activities, the figures given in this survey would include the cost of measuring and reporting overseas emissions.

6.4 However, the costs in this IA are modelled and monetised for some UK on-site emissions (some direct and indirect energy), and freight transport only. For UK emissions cost and benefit estimates are modelled separately for three areas:-

- Carbon dioxide only related to on-site emissions, electricity and gas only
- Other GHG emissions related to electricity and gas
- GHG emissions related to freight transport, including road, water and air freight transport.

6.5 These are estimated separately in the costs and benefits sections below. The benefits are estimated for each of these areas separately using the proxies of employment and turnover for the different options. The benefits include the value of emission savings, financial energy savings, air quality improvements, less the costs of abating emissions. (The financial benefits from energy savings to companies less the abatement costs will determine the overall company benefits of reporting, which is linked to the emission reduction activities that companies undertake.) Note that the costs of abatement are included in the benefits side of the equation, as these costs are linked to the emission savings made, which will only be undertaken where a company expects financial benefits from reducing emissions, i.e. the energy savings less the abatement costs result in an overall saving (or net benefit) to a company. Process emissions, overseas emissions and non-freight transport costs have not been monetised.

¹⁹ The Green Book states "All impacts (including costs and benefits, both direct and indirect) on non-UK residents and firms should be identified and quantified separately where it is reasonable to do so, and if such impacts might affect the conclusions of the appraisal. Generally, proposals should not proceed if, despite a net benefit overall, there is a net cost" to the UK (for instance, after taking into account environmental costs): (Footnote 4, p. 21, Chapter 5)

²⁰ Available at <http://www.defra.gov.uk/environment/economy/business-efficiency/reporting/>

6.6 As reported in the front sheets **the following analysis does not provide central estimates for benefits.** Benefits are provided as a range. The range includes a High scenario with emission reductions of 4% over the appraisal period and a lower bound of zero. This is due to continued uncertainty regarding the percentage of emission reductions generated by the policy, and the degree to which companies will be able to deliver additional net cost savings from reducing emissions. Low benefits assume that there are no emission reductions for new reporters from the policy. The High scenario assumes a 4% reduction, over the appraisal period, in emissions is achievable for electricity and gas and transport related emissions. Evidence from the consultation and the PwC/CDP report suggests that there are clear benefits to measuring and reporting emissions. However, it has not been possible to determine a lower bound figure for the minimum benefits which an average company would see. For that reason, the lower bound has been set at zero.

6.7 **Competitiveness.** Similar developments on GHG reporting are taking place in other states. OECD's 2010 report on a transition to a low carbon economy noted the upward global trend in GHG reporting by companies and cited the 2010 decision by the Securities and Exchange Commission in the US as a recent example.

6.8 **The time horizon has been selected as 10 years.** This time horizon represents a reasonable appraisal period to model the impacts for legislation with no upfront costs. Benefits estimates would be expected to increase over a longer time horizon.²¹ A sensitivity analysis of benefits is provided modelling benefits and costs over a longer time period (see sensitivity test section 10).

6.9 **Investors.** Institutional investors such as insurance companies, pension funds, other asset owners and asset managers who responded to the consultation mainly favoured mandatory reporting²²²³.

6.10 Investors were asked to help with the costs and benefits in the consultation impact assessment. However, in the main little further cost-benefit information (with the exception of Aviva) was available. One investor noted that they spend significant analyst time on researching carbon emission data and engaging with companies to encourage disclosure of this data.

6.11 Reasons given by investors during the consultation for supporting a mandatory option for GHG reporting include that it would:

- help drive behavioural change in companies through focusing the board's attention on their overall corporate footprint as mentioned in the Rationale (section 4);
- allow investors to have confidence in the substance and quality of corporate reporting;
- give investors comprehensive, reliable and comparable information to factor carbon risk into their investment decisions, assisting them to make sustainable investment decisions;
- enable an assessment of how a company is progressing relative to prior years vis-a-vis absolute GHG reduction targets;

²¹ The major constituents of benefits are transport fuel and carbon savings and the DECC energy and carbon values estimate that average values would increase by 16% and 11% respectively. These changes would not impact on the choice between options, or switch options from being, or not being, cost beneficial.

²² **The Co-operative Financial Services**²² who responded as part of The Co-operative Group's overall response, **Aviva** and **Jupiter Asset Management Limited**, favoured option 3; **Scottish Widows Investment Partnership** favoured option 2, and **Hermes Equity Ownership Services**²² supported option 4. **Generation Investment Management** supported mandatory reporting, although not a clear preference between option 2 and 3. The one the exception to investor support for mandatory reporting was **SwissRe** (insurance/ reinsurance) which favoured voluntary reporting.

²³ Local Authority Pension Fund Forum – a voluntary association of 53 local authority pension funds with combined assets of over £100 billion – favoured option 3. British Private Equity and Venture Capital Association, which represents the majority of all UK-based private equity and venture capital firms and their advisers, favoured voluntary reporting.

- enables greater levels of comparability and benchmarking of businesses both within the same sector and between different sectors;
- help to overcome existing problems by consolidating multiple reporting requirements and the inconsistencies in the methodologies used, the frequent lack of clarity on what is actually included or excluded from the scope of businesses' reporting and limitations in the geographic scope of reporting and the limited reporting on emissions from companies' supply chains;
- reiterate importance of integrating emissions reporting into annual financial reporting cycles;
- allow asset owners to more closely question those less carbon efficient companies and engage to increase efficiency and achieve emissions reductions. It will also enable owners to better manage any carbon risk in UK holdings.

6.12 It was noted that the main conclusions outlined in the Stern Review were that 1% of global GDP should be invested a year to mitigate its effects, and that failure to do so could impact on the long-term absolute value of investment portfolios.

Updates to Modelling Since the Consultation Stage IA

This section briefly details the key changes to the IA post consultation

Updates to Costs

- 6.13 Annual on-site costs for new reporters have been reduced from a previous average cost estimate of £30k per firm for large new reporters, to an estimate of approximately £2k. This results in a significant fall in costs. Evidence: IEMA survey, consultation response, further analysis of Carbon Reduction Commitment Energy Efficiency Scheme (CRC) costs – see section 8.6 to 8.10 and annex D for more information.
- 6.14 Annual freight transport costs have also now decreased from an initial upper estimate of approximately £7k to approximately £2k per firm. This results in a significant fall in costs. Evidence: FTA survey, IEMA survey – see section 8.11 to 8.13 for more information.
- 6.15 Reporting costs have now been excluded, as these costs are subsumed within stated reporting cost estimates for IEMA and FTA cost estimates. Evidence: IEMA survey, FTA survey – see section 8.
- 6.16 Costs estimates are now central estimates.
- 6.17 Costs estimates are assumed to be identical for large companies across options 2, 3 and 4.
- 6.18 Cost estimates include a 2% annual decrease in costs after the first year for the first 5 years, to account for improvements in efficiency, based on the average improvement in labour productivity. Evidence: Adelphi report.

Updates to Benefits

- 6.19 On-site benefits have now been increased to a maximum reduction of 4% (with a gradual increase to 4% over the appraisal period, behaviour change). Evidence: consultation responses and internal analysis.
- 6.20 Transport benefits have now been refined (with a gradual increase to 4% over the appraisal period, behaviour change). Evidence: consultation responses.
- 6.21 The upper and high benefit estimates have been merged into one high benefit estimate. Previously, there was no data available on abatement costs, which reduces the overall financial benefits companies received. Estimates of abatement costs have now been incorporated into the model. Evidence: DECC's Non-Domestic Energy Efficiency Model
- 6.22 Freight transport emissions have been extended to cover additional water and rail freight emissions (increasing emissions coverage by approximately 69%). Aviation has not been included as this will already be reported in the baseline, under the EU Emissions Trading System (EU ETS). This increases the benefits for all options, but not costs as the costs of reporting freight emissions are already included in the IEMA cost estimate, which cover all costs to companies. Evidence: Adelphi report
- 6.23 Air Quality benefits from road related diesel emissions reduction, resulting in health benefits, have been included, this increases benefits to a minor extent.
- 6.24 Option 1 emission savings estimates have been updated using data from NERA/Enviros report²⁴, which provides disaggregated data on company energy use. This has allowed us to specify more accurately the benefits to voluntary reporters, as these organisations are likely to gain most financially from reporting. Evidence: NERA/Enviros report²⁵.
- 6.25 The estimate for the number of companies covered by the CRC has been reduced from 4050 to 2017, based on updated Environment Agency data. This increases benefits

²⁴ <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

²⁵ Table 7.1 and Table 5.5: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

to options 2 and 3, as it reduces the number of companies reporting in the baseline, and will reduce benefits to option 4 as fewer companies now report under this option. Evidence; data from Environment Agency.

Additional Sensitivity Analyses

6.26 Additional sensitivity tests have now been included: fuel prices, examining the impact of: retail energy prices and a 20 year appraisal horizon (see section 10).

7. The Baseline

1. 7.1 The baseline includes companies that are reporting under existing mandatory reporting requirements (for government policies that are already in place, or are due to be implemented) and companies either reporting voluntarily now or are expected to begin reporting voluntarily over the next 10 years (the time period covered in this IA). The baseline ensures that this IA does not attribute costs or benefits to companies that are currently reporting emissions. The costs and benefits reported later in the document refer to new reporters, i.e. *additional* companies that report. The baseline is identified separately for on-site emissions and freight transport emissions.

Baseline for On-site Emissions

- 7.2 UK policy for reporting on-site emissions is complex and therefore it is important to understand the existing activity, and in particular those policies that already require companies to report their emissions in some way. For companies already reporting there will either be no additional burden, or a lesser burden, if they subsequently undertake reporting in their Directors' Report. It is also assumed that mandatory reporting will not result in further reductions in GHG emissions linked to these reporting requirements.
- 7.3 The main existing UK reporting requirements for mandatory reporting are the EU Emissions Trading System (EU ETS), CRC Energy Efficiency Scheme (CRC) and Climate Change Agreements (CCAs). These are described in more detail within Annex A, which summarises UK policy requirements for the disclosure of GHG emissions. It is estimated that there are 2017 companies reporting under the CRC (2011 figures)²⁶. These companies will have the largest on-site energy consumption and so report carbon dioxide emissions related to their on-site energy use. DECC estimate that CCAs cover an *additional* 2150 companies, noting that some companies may report under both CCAs and CRC. The ETS requires reporting by installation (rather than by company) and is expected to cover only 76 companies within the UK. Furthermore, as *companies* may also be reporting their on-site emissions under CRC or CCAs, it is assumed that EU ETS does not increase the total coverage in the baseline. Using these figures it is estimated that the total companies already reporting through regulatory policies is 4167 companies (2017 CRC companies plus an additional 2150 CCA companies).
- 7.4 The IA then calculates the number of companies expected to be reporting voluntarily over the next ten years:
 - (1) The impact assessment produced for the publication of the UK guidance in 2009 estimated the take-up of voluntary reporting to 2019. It is estimated that approximately a further 1500 large companies will take-up voluntary reporting over the period. Current Environment Agency (EA) information²⁷ shows that 62% of FTSE all-share currently report their emissions but, crucially for investors looking to compare company reports, only 22% of FTSE all-share report their emissions in line with UK government guidance. The proportion of small firms estimated to undertake voluntary reporting is small (approximately 1% of all small companies), and their emissions are small compared to larger companies, therefore as this will not affect the results of this analysis it is assumed that no small or medium companies report emissions in the baseline²⁸.
 - (2) Companies that are large are more likely to report, due to economies of scale in reporting emissions, and greater drivers from branding benefits and from investors, as they are more likely to be quoted or have equity owned by large

²⁶ This estimate has reduced from the previous IA, based on improved information from EA/DECC. The previous IA used a figure of 4,050 companies.

²⁷ <http://www.environment-agency.gov.uk/business/topics/performance/124795.aspx>

²⁸ Furthermore, benefits and costs related to these organisations are not estimated within the IA

institutional investors. In addition, those companies already measuring their emissions for another regulation (e.g. CRC or CCAs) are more likely to report as there would be lower cost in terms of data collection. The IEMA survey data was used to estimate the proportion of large companies that are already reporting under CRC. 200 large companies responded, stating their company size and whether they reported under CRC. Of these 200 companies, 130 companies confirmed that they reported under CRC (65% of companies that answered these questions). This IA therefore assumes that 65% of companies will be reporting their on-site emissions in the baseline as a result of regulatory policies, and so 35% or 525 companies (of the 1500 companies) will be reporting voluntarily.

7.5 Adding together the 4167 regulatory reporters (paragraph 7.3) and the expected 525 voluntary reporters (paragraph 7.4), it is estimated that in total 4692 large companies may report their carbon dioxide emissions in the baseline over the next 10 years. Furthermore, it is assumed that these companies will not experience additional costs or benefits, in terms of energy savings, by reporting under the Companies Act. It is assumed that all voluntary reporters, in the baseline, are reporting at the beginning of the appraisal period (in reality voluntary reporting is beginning from a lower level and increases over the period) which would not alter the outcome of the analysis. This is a simplification of the likely impacts but concentrates this Impact Assessment on the largest impacts, which will be to new reporters. Table 4 below provides a summary of estimates of the number of companies covered by each of these emissions policies:

Table 4: Coverage of current baseline reporting

Scheme	Number of companies covered
CRC	2017
CCAs	An estimated additional 2,150 companies
Voluntary Reporting	525 new reporters (1,500 voluntary reporting companies in total)

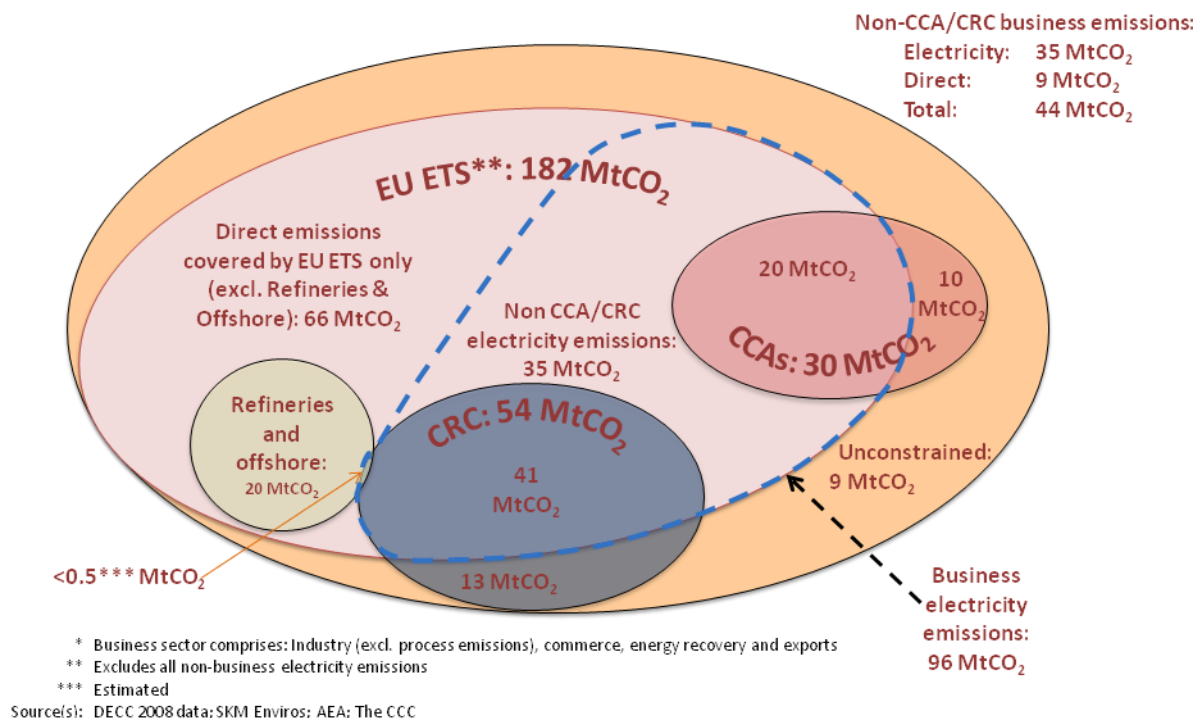
Estimates of on-site emissions not reported by companies under existing mandatory schemes and smart metering

7.6 It is also important to understand the emissions already reported in the baseline under existing policies, as well as the number of companies. From this data it is possible to estimate the likely emission reductions related to new reporting companies.

7.7 DECC have estimated the MtCO₂ emissions covered by existing energy policies, see Figure 1 below.

7.8 Emissions covered by EU ETS, CRC, and CCAs are already reported. The unconstrained direct (scope 1) carbon dioxide emissions for companies not covered by existing reporting policies are estimated at 9MtCO₂ of carbon dioxide. Furthermore, there are 35MtCO₂ of electricity related (scope 2) emissions, which companies will also have to report. These are covered within the EU ETS (as electricity generation companies will report these as scope 1), but companies using electricity will also have to report these in their annual accounts as scope 2 emissions. Therefore, it is estimated that there are a total of 44MtCO₂ of on-site business emissions that are not reported by businesses currently under existing mandatory schemes. On-site emission savings generated by this reporting policy will reduce this portion of the total emissions.

Figure 1: UK Emissions Covered by Existing Reporting Requirements



Note: These figures are estimated using best available evidence from DECC. They have been updated based on the most up to date evidence on emissions coverage from different policy areas. Many policies are still at the early implementation stage. Therefore these figures may be updated again.

7.9 Within the literature on reporting, a key driver of benefits has been attributed to increased information from providing information on energy use which can lead to identification of energy savings to businesses, alongside emissions reductions. Measuring emissions in order to report as part of voluntary or mandatory GHG reporting ensures that this information is available. However, smart metering also provides this information. By 2014, energy suppliers will be required to provide advanced metering to larger electricity sites (defined as those within profile classes 5-8) and larger gas sites (defined as those with consumption above 732MWh per annum). Since April 2009, such metering must be provided where a meter is newly installed or replaced, and in any case, should be installed by April 2014. It is expected that large organisations will have smart meters currently. Therefore, this IA assumes that all firms within the options considered have smart meters installed.²⁹

7.10 As stated in paragraph 7.4, the baseline assumes that there are 525 companies in the baseline reporting voluntarily. The emissions associated with these companies reporting their on-site emissions voluntarily (their freight emissions are covered in paragraph 7.15) are also therefore in the baseline.

Baseline for Freight Transport Emissions

7.11 There are an estimated 30.1 MtCO₂e emission of road freight transport emissions in the UK. There are an estimated 20MtCO₂e related to water freight transport and a further 0.9MtCO₂e related to rail.³⁰

²⁹ [http://www.decc.gov.uk/media/viewfile.ashx?filepath=what we do/supporting consumers/smart energy meters/file40456.pdf&filetype=4&minwidth=true](http://www.decc.gov.uk/media/viewfile.ashx?filepath=what%20we%20do/supporting%20consumers/smart%20energy%20meters/file40456.pdf&filetype=4&minwidth=true)

³⁰ These figures are based on Environmental Accounts data, which include UK fuel purchased overseas and excludes purchases of UK fuel by overseas residents. This especially impacts on shipping estimates of freight transport, due to operators purchasing fuel overseas.

- 7.12 Emissions related to aviation will be reported under the EU ETS from 2012. Therefore, no further benefits or costs related to reporting these emissions are reported below and all aviation emissions are assumed to be in the baseline.
- 7.13 Therefore total freight transport emissions not reported under existing mandatory schemes are 50.96MtCO₂e
- 7.14 There are no mandatory reporting requirements that currently exist for road, rail and freight transport emissions.
- 7.15 The UK guidance assumes there are 1500 large companies reporting in the baseline, which is approximately 6% of all large companies that report. This analysis assumes that 6% of large company freight emissions will already be reported in the baseline. Emissions information for freight transport is not available to the same detail as outlined for on-site emissions above. This IA, therefore, uses proxies to determine the emissions already reported in the baseline and those associated with newly reporting companies under each option (see paragraph 10.7 to 10.16). Total company freight transport emissions excluding companies reporting in the baseline are 47.8 MtCO₂e.
- 7.16 Emissions related to aviation will be reported under the EU ETS from 2012. Therefore, no further benefits or costs related to reporting these emissions are reported below and all aviation emissions are assumed to be in the baseline.

8. Evidence on Costs

- 8.1. The costs of reporting greenhouse gas emissions in company reports arise from the requirement to gather data on direct emissions (from industrial processes, fuel consumption in owned transport, etc) and indirect energy emissions (purchased electricity).
- 8.2. Under all the policy options, companies will need to gather and report data on their total operations but the costs in this IA are modelled and monetised for on-site emissions (direct and indirect energy), and freight transport operations only, which covers the major portion of company UK emissions. Process emissions, overseas emissions and non-freight transport costs have not been monetised.
- 8.3. The evidence on costs has been updated in light of additional internal analysis of the costs of reporting, and evidence gathered during the consultation period from workshops and written feedback. Taking the CRC cost estimate without stripping out the additional activities mentioned in annex D, resulted in a significant overestimate of the cost as in the consultation IA – this tallies with the majority of views in the consultation stage. Feedback from the consultation workshops suggested that the initial IA had underestimated the initial set-up costs while overestimating the ongoing reporting costs. Among the written consultation responses, 40% of responding companies and 65% of responding organisations (including trade associations) said that the estimated costs overall were too high with 46% of companies and 35% of organisations believing them to be too low. Respondents also highlighted the fact that the measurement and reporting of GHGs required by the US Environmental Protection Agency (EPA) was at around £5600³¹ much lower than the £30k estimated in the consultation IA and suggested that the cost of UK mandatory GHG reporting should be closer to this US figure.
- 8.4. During the consultation period, IEMA carried out a survey of their members, most of whom are businesses, (some 255 responses were received) which, among other things, gathered evidence on the costs and benefits of reporting. This survey found that for the 48 companies that provided data, 25% experienced management accounting and reporting costs³² below £5,000 (£1,500 for reporting costs only), 50% experienced management accounting and reporting costs below £15,000 (£5,000 for reporting costs only) and 75% had management accounting and reporting costs below £60,000 (£18,000 for reporting costs only). These costs include both on-site and transport emissions and include both SME responders and very large companies which are already measuring and reporting some emissions through schemes such as EU ETS and CRC. IEMA members represent a number of industry stakeholders e.g. Rolls Royce, National Grid, BT - to name just three - also provided individual responses.
- 8.5. Defra analysis of IEMA data on the costs for specifically large companies estimated that the median additional costs for reporting are £4000 per company (2011 prices), or £3772 (2009 prices). This estimate has been used in subsequent analysis as the central cost estimate for a newly reporting company, which has not previously reported either transport or on-site emissions³³. Given that companies responding to the IEMA survey were reporting their costs for reporting all their emissions (all scope 1 and 2 emissions), we have used this figure to create the total cost of reporting. However, this IA only monetises on-site electricity and gas and freight transport emissions, so the £4000 figure was then sense checked against estimates for both on-site gas and electricity emissions (paragraphs 7 to 8.10) and freight transport emissions (paragraphs 8.11 to 8.13).

³¹ Note the US EPA reporting requirement covers on-site emissions for electricity and gas, but not transport related emissions.

³² These costs include verification/assurance costs but exclude the capital cost of investment in energy efficiency measures.

³³ It is unclear whether this estimate incorporates overhead costs, if it does not, it may be on a separate basis to cost estimates applied from CRC, where all overheads are accounted for.

8.6. The CRC cost of £30,000 was an overestimate as it typically covers companies with more sites/emissions and includes additional activities.. The factors leading to this overestimate have now been stripped out which significantly reduces cost estimates (see paragraphs 8.7 to 8.10 and Annex D). In addition, through the consultation stage more up-to-date information from IEMA and the FTA became available that was more comparable to company reporting of GHG emissions. The cost estimates in this IA assumes total costs to an average company reporting of £4000, based on the data from IEMA, and this is then sense checked using a combination of adjusted CRC data (see paragraphs 8.7 to 8.10 and Annex D) and FTA data (paragraphs 8.11 to 8.13).

Ongoing Costs of Reporting On-Site Emissions

8.7. The CRC covers the largest energy using companies in the UK, which will already be reporting their UK emissions in the baseline. Data available from the CRC reporting scheme has been used to update cost estimates for reporting on-site emissions. The CRC requires companies to report their emissions, and provides a reasonable proxy for the costs of reporting under a mandatory reporting policy. However, the NERA/Enviros³⁴ report estimates that, on average, non-CRC companies would have fewer sites and lower emissions per site and thus will have lower average costs of reporting. Furthermore, the CRC is a much more complex scheme, and therefore includes a number of activities that are not relevant to company GHG reporting. Once these two factors are accounted for, average GHG reporting costs, in comparison to average CRC costs, are much lower than suggested in the consultation IA.

8.8. The NERA/Enviros³⁵ report provides benefits and cost estimates for different options for what became the CRC and includes a range of scenarios, including an option including all companies with Half Hourly Meters excluding SMEs, which is consistent with Option 3 of this IA. This is estimated to cover 4595 companies and result in total administrative costs of £41m per year (2005 prices).³⁶ (In 2005 a relatively small number of large companies would be covered by Half Hourly Meters, which is why the total number of companies covered under this scenario is smaller than under Option 3 in this IA.) DECC have provided an estimate of the annual administrative costs under CRC, as introduced, and this is estimated at approximately £27m per year (2005 prices), for an estimated 2484 companies.

8.9. The total administrative cost figures given by the NERA/Enviros report for 4595 companies, discussed above, have been used to calculate the average cost of reporting under the CRC for a company not covered by the CRC, as introduced. In 2005 prices this would be £6505 per annum per company; in 2009 prices, this becomes £7212³⁷. As this option excludes small and medium sized enterprises it should provide a reliable estimate of the average costs to large companies.

8.10. As discussed in paragraph 7, the CRC requires a number of additional activities to be undertaken which, as many respondents to the consultation pointed out, would not be needed for corporate reporting (see also annex D). A number of CRC activities have now been excluded from the costs of corporate reporting, including: developing a compliance strategy, understanding and taking part in an auction, trading activities, submitting data to co-ordinator and energy audit activities. The costs of understanding rules are also halved. This reflects the fact that corporate reporting is a much simpler activity than the

³⁴ Table 7.1 and Table 5.5: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

³⁵ Table 7.1 and Table 5.5: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

³⁶ NERA report Table 7.13 p.105.

³⁷ In 2005 prices the average cost is £6,505. This is then inflated using HMT gdp deflators. The NERA report can be found here: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

CRC scheme. This results in an estimate that the average time taken to report under mandatory GHG reporting would be 72% lower than that which would be required under CRC. The average cost of reporting is therefore estimated to be £1934 per company for new reporters.

Ongoing Costs of Reporting Freight Transport Emissions

8.11. The ongoing costs of reporting freight transport emissions have been estimated based on a survey of freight transport companies, conducted during the consultation period by the Freight Transport Association (FTA). The survey sought to understand the additional costs of GHG reporting in a manner consistent with the methodology used to estimate CRC costs. The survey asked FTA-member companies to estimate the time taken to perform a number of activities that could be related to reporting. These included: the costs of gathering data initially, collating that data centrally for internal reporting and additional costs related to publishing the data externally. There were 16 companies that provided costs for collating information internally and 3 companies that included costs related to publishing information externally. One result was excluded as the amount of time required and cost appeared to be a significant outlier. The average cost of internally collating data was estimated at £5271 and the median cost at £3000 per annum. As only 4 companies provided information on the costs of verification for external reporting, the figure for external reporting is not considered robust. However, the median of the additional costs of external reporting estimates was £2000 and the average additional £4500 cost. These figures suggest that reporting transport emissions may be relatively expensive in comparison to reporting on-site emissions and may reflect additional complications in collating data, and may reflect the fact that large freight logistics companies are likely to have multiple sites and will need to centrally collate data from a variety of sources.

8.12. The median has been selected as the more reliable estimate of transport costs for the larger proportion of firms. This reduces the likelihood that results related to large companies will skew the results. It is also consistent with NERA/Enviros data, where a relatively small proportion of firms have a significant number of sites, but the vast majority of firms have a smaller numbers of sites. For this IA, the median cost of £2000 for external reporting is also considered to best reflect the costs specifically for verification, although noting the issues with the small sample size. It appears likely that the additional external verification costs are unlikely to outweigh other reporting costs. This is also confirmed by CRC cost estimates, where the costs of verification are approximately 40% of total costs, which is consistent with a £2000 per company estimate.

8.13. This data (average cost of £5271 and median of £3000) is used to consider the magnitude of costs for a newly reporting company reporting transport related emissions. Not all companies will run freight operations. Data was not available on the number of companies under each option with freight transport operations. DfT road freight transport statistics 2009³⁸ estimate there are approximately 94,900 freight operators in the UK, which represents approximately 6% of companies³⁹. This suggests that relatively few companies will have their own freight transport operations which provide reassurance that the assumed £4000 (2011 prices) average cost per firm estimate used in the IA is reasonable (see paragraph 8.5), and that freight transport company costs may be relatively high on a per company basis, but should still fit within cost estimates applied in this IA (see paragraph 8.5).

Costs to Very Large Companies of reporting

8.14. It was recognised in the previous analysis that providing a flat cost rate for all Large companies would potentially underestimate costs for the options that principally

³⁸ Road Freight Statistics 2009, Table 4.6 page 80.
<http://www2.dft.gov.uk/pgr/statistics/datatablespublications/freight/goodsbyroad/roadfreightstatistics2009.html>
³⁹ <http://stats.bis.gov.uk/ed/sme/>

affect larger organisations (Options 2 and 4). This IA applies the average cost data from the IEMA survey to approximate the costs of larger firms. It is assumed that these costs will generally apply to companies covered by the CRC, as the largest on-site energy users, which are also likely to be the largest companies. The average cost estimate produced from IEMA data £15,641 per company (2011 prices), or £14,752 (2009 prices). The split between transport and on-site emissions cost assumes that costs fall in the same proportion as Option 3, i.e. 48% on-site and 52% transport.

Costs to Small and Medium Sized Companies of reporting

8.15. The total costs of reporting for medium and small sized companies are taken from the Defra Impact Assessment for Voluntary Reporting. The estimated annual cost for small companies is £1.9k per annum and for small companies £1.25k per annum (2009 prices). The proportion of the total costs for estimating on-site versus transport emissions are estimated using the same proportion of costs for each under Option 3. That is approximately 48% of costs are attributed to reporting on-site emissions and approximately 52% of costs are attributed to reporting transport

Transitional Costs to Reporting Emissions

8.16. The consultation Impact Assessment assumed that one-off reporting costs were only those associated with reading guidance related to reporting. Evidence from the consultation indicated that these were underestimated and the ongoing costs were overestimated. Companies identified a number of one-off costs that are likely to occur, including defining business boundaries, identifying initial sources of emissions, establishing reporting mechanisms and governance systems, developing or purchasing data management systems and others. Companies suggested that the ratio of one-off or transitional costs to ongoing costs could be somewhere between 1.3:1 and 4:1. For this IA, a transitional cost has been applied for one year on top of the annual costs which is twice the value of the ongoing costs, and means that costs in the first year are three times the annual cost in subsequent years (not factoring in generally efficiencies in labour productivity).

Costs for Adjusting Companies

8.17. A number of companies are already measuring and reporting their GHG emissions. We have made a simplifying assumption that the introduction of mandatory reporting will not lead to higher annual costs of measuring emission for these 'adjusting' companies. Defining the additional costs and benefits for companies making more minor adjustments was too subtle to be able to estimate based on the evidence available. This means the analysis may slightly underestimate costs and benefits, as it does not value more marginal changes to reporting that some companies may have to make. As these impacts are relatively small, it was not deemed proportionate to include these. This was supported by several consultation respondents who stated that the adjustment costs would be minimal. However, this was not a universal view as several respondents highlighted the costs of seeking additional assurance for their emissions data due to its inclusion in their Directors' Report as well as the costs of establishing new systems to collect and report non CO₂ emissions. It should be noted, however, that, with the exception of fugitive emissions, the calculation of non CO₂ emissions in CO₂e using Defra's emission factors should involve merely the use of a different emission conversion factor. This should be a straightforward calculation in comparison to other ongoing activities.

Overview of Central Cost Estimates

8.18. Table 5 provides an overview of central cost estimates. The costs are assumed to cover the total costs of reporting both on-site gas and electricity emissions and freight transport emissions, covering all modes of freight transport (i.e. not just road transport, but also water and rail).

	Company Size	Transition costs understanding rules and preparation	Average annual cost of data collation and verification
On-site Emissions: Electricity and Gas	Small	£1,209	£604
	Medium	£1,838	£919
	Large	£3,869	£1,934
	Very Large	£14,268	£7,134
Freight Transport Emissions	Small	£1,149	£574
	Medium	£1,746	£873
	Large	£3,677	£1,838
	Very Large	£15,237	£7,618

Efficiency Improvements to Companies Over Time

8.19. It is likely that companies will become more efficient at complying with regulations over time. This has been modelled as a decline in costs over the first five years of implementation of the policy, representing embedding of reporting practices and the identification of more efficient methods for obtaining, managing and verifying data over time. The Adelphi paper proposed an annual 2% reduction in ongoing costs for the first five years after implementation. The 2% efficiency improvements represent the estimated annual increase in labour productivity⁴⁰ for the economy. This efficiency improvement is unlikely to provide a realistic estimate of the efficiency improvements of admin based tasks, as it reflects wider efficiency improvements to society. However, it has been applied as a possible optimistic estimate of the likely efficiency improvements that may arise. Furthermore, although efficiency improvements to reporting are likely to increase there will be a limit to the efficiencies that can be realised, for this reason no further efficiencies are assumed after the five year period.

Other Freight Transport

8.20. Administrative costs related to reporting and abatement costs linked to emission reductions for water transport, aviation and rail have been monetised and included in headline figures for this IA.

Less Robust Monetised Impacts

8.21. Reporting company international emissions: The cost estimates provided here only apply to reporting UK emissions. Current data would not allow realistic estimation of costs and benefits relating to reporting international emissions. After the costs and benefits an illustrative section of costs and benefits is included, which is then incorporated into the high level costs and benefits figures. This shows that including international effects is likely to alter the balance of costs and benefits, however it is expected that these results will apply broadly equally to the three options.

Non-Monetised Costs

8.22. Non-freight transport: The costs and benefits of reporting non-freight transport are not included in this analysis. The analysis aims to pick up the main sources of emission for companies and assessed the costs and benefits related to these. It is not clear how the benefits related to other transport will differ from the freight costs identified in this report. These additional emission sources are assumed not to alter the balance of cost and benefits between options.

⁴⁰ "The Costs and Benefits of Mandatory Greenhouse Gas Reporting: An independent analysis of the Defra Impact Assessment", Adelphi July 2011. Commissioned by the Aldersgate Group, Christian Aid, the Co-operative and WWF-UK.

- 8.23. Assurance: It is not proposed to introduce a requirement for external assurance. The Companies Act requires all companies' annual accounts for a financial year to be audited in accordance with the provisions of the Act. Currently there is no statutory requirement to have environmental information audited and the financial auditors role with regard to the business review is limited to: assessing whether the information is consistent with the financial statements and informing the directors if he becomes aware of information that is required by law but has been omitted. Several companies suggested, when responding to the consultation, that if reporting were to be required in their Directors' Report, they would choose to seek a higher level of verification or assurance than at present which would increase costs for those companies.
- 8.24. The risk from not regulating for assurance or verification of data in the regulation is that companies might publish information that lacks credibility or is incomplete. However the risk is judged as low and it is expected that many companies will seek external assurance as Directors will wish to have confidence in the information and data they are publishing, for example, the CBI noted in their response to the consultation that: "*The information that businesses put into the public domain goes through vigorous internal checks to minimise the risk of reputational damage.*" And: "*..as such the CBI believes there is little need for the Government to add this requirement [verification/assurance] to a mandatory reporting framework*". Moreover, for those companies that participate in the EU ETS or the CRC, some of the information they publish on emissions will already have been the subject of audit. And even those that don't seek external assurance or audit would probably wish to internally verify information that they were publishing on the company's emissions performance.
- 8.25. The PwC research considered the direct cost to companies of reporting emissions which included assurance of data for those that carried this out. Although the research did not identify specific costs for assurance and verification, these costs were included in the total direct costs measured in the research. The IEMA survey cited earlier in the IA included the costs for verification/assurance in its management accounting and reporting costs but only internal verification in its reporting only costs (see paragraph 8.5). The central cost estimate for this IA is based on the reporting only cost.
- 8.26. Costs of monitoring and enforcement: The Companies Act annual reporting requirements are currently enforced by the Financial Reporting Review Panel (FRRP) which is part of the Financial Reporting Council (FRC). An additional requirement in the Directors' Report for GHG emissions reporting would expect to be enforced in a similar way and would not be expected to increase the workload for the FRRP. Therefore, it is considered that the cost of additional enforcement would be negligible.

Risks/Uncertainties

- 8.27. The widespread use of smart metering is likely to generate a significant amount of detailed information on Scope 2 emissions for firms, at little extra cost. The evidence on costs is based on CRC which assumes that smart metering is widely in place for electricity and gas emissions.
- 8.28. The costs in this IA have been updated as a result of responses by companies and other stakeholders to the consultation, based on their experience and judgement of similar processes. Nonetheless, there are continuing risks with the uncertainty of data given the lack of direct comparators (see para 8.6). Whilst the risk still exists - that the impact assessment might be under-estimating or over-estimating⁴¹ the costs of GHG reporting - that risk is judged to be lower than at the start of the consultation process.

⁴¹ Post consultation, Defra officials have been made aware by Business Application Software Developers Association (BASDA which are the industry body and provide the standards for systems such as Oracle and SAGE to interoperate and exchange business messages like orders and invoices) of developments which should make it

9. Analysis of Benefits

Exclusions from the analysis of benefits

- 9.1. For a company to report its direct and some of its indirect emissions as required by this policy, it will be measuring and reporting data on its total operations. However, the benefits in this IA are only modelled and monetised for some on-site emissions (electricity and gas only), and freight transport. Benefits from measuring process emissions, overseas emissions and non-freight transport benefits are not monetised.
- 9.2. There are intangible benefits to firms, e.g. from increased investment from improved information to shareholders, or increased sales from consumers, but these are not estimated.

Evidence on the potential for emission reductions

- 9.3. There is still significant uncertainty within the analysis regarding the level of emission reductions that will be achieved. Evidence, detailed in the following paragraphs, has been used to calculate the potential for technological emissions reductions (excluding behavioural measures) from on-site electricity and gas and freight transport that remains in the economy. Assumptions are then made about the level of reduction (within that potential) that GHG reporting could produce. These assumptions are based on internal DECC and DfT analysis and have been tested against evidence gathered in the consultation (paragraph 9.7), the IEMA survey (paragraph 9.5) and information from CDP (paragraph 9.6). Given the uncertainty in this assumption, the IA gives a range of between 0% and 4% emissions reduction.
- 9.4. Electricity and gas related GHG emissions reductions
- It is assumed that companies that currently report electricity and gas emissions under ETS, CRC or CCAs, or voluntarily, will not reduce those emissions further. Where companies do not currently report such on-site emissions, mandatory reporting could lead to future reductions.
 - Emission reductions of up to 4% are assumed for the total on-site emissions: related to electricity and gas and any other non-CO₂ GHG emissions. Benefits have been valued from the avoided cost of carbon from emission reductions. This has been calculated using information from the DECC Non-Domestic Energy Efficiency Model (discussed in paragraph 9.17).
 - i. This model estimates the take up of energy efficiency measures in the baseline, which would reduce the amount of technological potential remaining in the economy. However, it cannot define the new technologies that are likely to enter the market and therefore will underestimate future savings. There are a number of existing policies in the baseline to reduce emissions and savings related to these policies are excluded from the model. This is done by estimating the total savings resulting from these policies, and then removing the cheapest technologies related to these policies from the baseline. This assumes that existing policies will take up the cheapest abatement opportunities. The remainder represents the technological potential remaining. This is the amount that GHG reporting will target.

possible for the automatic reporting of Scope 1 carbon emissions by the vast majority of UK businesses. This could have a significant impact on reducing the costs to businesses of Scope 1 Carbon Accounting.

- ii. Once the abatement related to existing policies is excluded, it is estimated that there are approximately 2.5TWh of cost-effective electricity savings that could be made in addition to existing policies to reduce emissions in buildings. This is equivalent to approximately 2% of electricity savings available in commercial and non-domestic buildings.
 - iii. For gas this estimates that there are approximately 11.6TWh of cost-effective electricity savings that could be made in addition to existing policies. This is equivalent to approximately 10% of gas savings available in the gas sector. These figures suggest that it is possible that there is a reasonable level of technological potential remaining in non-domestic buildings.
 - iv. This suggests that continued efficiency savings in the sector may become more limited. However, these estimates cover technological savings that can be made and do not include behavioural savings that could be realised in the sector. Consultation responses highlighted the role that behavioural and managerial efficiency measures could play.
- As discussed, reductions in electricity use will also result in wider GHG reductions for the other five Kyoto GHGs. There are an estimated 18MtCO₂e of additional wider GHG emissions related to business and industrial processes, this increases total emissions related to electricity and gas by approximately 8.5%. These wider GHG emission reductions are valued using the non-traded price of carbon⁴².

9.5. IEMA undertook a survey of its members to understand how reporting may deliver additional savings compared to other emissions reduction policies. This included a question on emissions reductions experience by reporting companies. The survey revealed an average emission reduction of 4% per annum for these companies. Of 98 companies that reported changes in emissions, 46 companies reported increases in scope 1 and scope 2 emissions and 52 reported decreases. Due to the wide variation in emission changes found in the survey, the net emission savings are not statistically significant, i.e. a statistician would not be able to confidently say they differ from the average change in emissions in the economy. Although not statistically significant, when compared to wider emission reductions in the economy over a similar period, the emission reductions went beyond those caused by the recession. For companies that reported over a longer period of four to five years, average emission reductions were significantly above the UK wide emission reductions by companies over this period. This indicates that reporting has led to additional emission reductions in the economy, although it is difficult to draw any robust conclusion on actual level of emission reductions from IEMA's survey.

9.6. A CDP report⁴³ assessing the reduction targets by companies shows that on average companies have stated targets for emission reductions of around 2.5% per annum. This also suggests that companies predict emission reductions will be made in real terms.

9.7. Of the written responses to the consultation, two thirds of respondents (both companies and other organisations) believed that the estimated benefits in the first IA were too low with just one third believing them to be too high. Companies gave estimates of the private benefits of their reporting of between £0.05m and £35m and GHG emission savings of between 6% and 29% over several years. It should also be noted that one company noted that savings had resulted from measuring and internal reporting rather than from external reporting.

⁴² The scope of emissions covered under the EU ETS will be slightly expanded from the beginning of the phase 3 to include perfluorocarbons from aluminium and nitrous oxide from the production of nitric and adipic acid.⁴² Once these wider GHG emissions are brought into the ETS reductions these should be valued at the traded price, however as the value of this change has a negligible impact on benefits this has not been modelled at the current time.

• ⁴³ https://www.cdproject.net/CDPResults/FTSE_100_Carbon_Chasm.pdf

- 9.8. Emission reductions of up to 4% are assumed for freight transport emissions. It is assumed that all fuel emissions are from diesel. These are valued using the non-traded price, as with gas.
- Work by Defra estimated that potentially 11% of transport emissions could be saved, at no/low cost, suggesting that there could be potentially significant reductions in this area⁴⁴. Subsequent work suggests that potentially one third of these savings may have been already realised by firms. Three other reports summarised below provide evidence that potential remains in the road freight sector for either negative or zero cost CO₂ abatement potential.
 - The CCC's initial report on UK Carbon Budgets in December 2008⁴⁵ suggests that in 2008, there was a significant potential for negative/zero cost abatement. The extended ambition scenario for vans indicate negative/zero cost abatement of 1.1 MtCO₂ per year by 2020 (Figure 7.20), and just over 0.8 MtCO₂ per year by 2020 for HGVs. Although it should be acknowledged that some of this potential may have been abated during 2009-2010, and there are likely to be some hidden costs associated with realising this potential (e.g. time costs) – this still provides broad reassurance that the 4% (equivalent to just over 1.5 MtCO₂ per year) road freight reduction that is judged to be feasible, through reporting emissions, at the highest end of the range as modelled in this IA, is plausible.
 - The second, published by DfT in 2009, is Low Carbon Transport: A Greener Future – A Carbon Reduction Strategy for Transport⁴⁶. This also indicates that potential for further abatement remains, e.g. through low rolling resistance tyres for HGVs, although we should note that this should not be added to the potential above due to the risk of double counting savings potential.
 - Finally, the CCC's report on the Fourth Carbon Budget in December 2010: The Fourth Carbon Budget – Reducing Emissions through the 20s⁴⁷. This suggests further abatement potential for HGVs (0.6MtCO₂ each year by 2020) although it is not clear whether or not these savings are achievable at zero cost.
 - Due to the uncertainty that exist on what the minimum level of behaviour change may be the Low emission savings are assumed to be zero, for freight transport related emissions.

Reduced energy and fuel use

- 9.9. Reduced carbon emission savings will also result in reduced energy and fuel bills. These have been valued using the current DECC central energy prices.
- 9.10. For Upper benefits, the value of reduced energy use is estimated from emission reductions. First, reductions in kWh of electricity and gas use are estimated from reduced carbon dioxide emissions. Second, the energy required to produce those emissions are estimated: for electricity this is 0.3939 kgCO₂ per kWh; for gas this is 0.184 kgCO₂ per kWh. Then the long run commercial variable element for the value of gas and electricity is applied to estimate the value of energy saved. For electricity this is 7.2p in 2012 rising to 8.02p in 2021. For gas this is 2.17p in 2011 rising to 2.41p in 2021 for gas (all in 2009

⁴⁴ Quantification of the Business Benefits of Resource Efficiency <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=14609>

⁴⁵ Building a Low Carbon Economy – the UK's contribution to Tackling Climate Change <http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf> Section 7.2 (pp 272-277)

⁴⁶ <http://www.official-documents.gov.uk/document/cm76/7682/7682.pdf> (pp 97)

⁴⁷ http://downloads.theccc.org.uk/s3.amazonaws.com/4th%20Budget/CCC-4th-Budget-Book_with-hypers.pdf Chapter 4 (pp 154,

prices). This is then used to estimate the value of energy savings for gas and electricity for each option. This follows the values used in DECC guidance for energy savings.⁴⁸

9.11. The Low benefits are zero as this assumes that a mandatory reporting policy does not result in emission reductions by private firms. As discussed earlier, the evidence from the consultation and the research by PwC/CDP suggests that measuring and reporting emissions does lead to emissions reductions. However, as it is has not been possible to quantify the lower bound of emission reductions, this figure has been left at zero.

9.12. As above, there is the possibility of fuel savings. It is assumed that road freight transport uses diesel. Reductions in emissions related to CO₂ will result from reduced fuel use. This IA estimates the value of reduced fuel based on the estimates of emission reductions. First, the emissions are attributed to diesel. Second, the fuel required to produce those emissions are estimated. Then the resource cost of fuel is applied, this excludes tax related to VAT or Fuel duty as these are a transfer cost. These are taken from current DECC IAG guidance and tables. The resource cost of fuel is estimated at 38.96p per litre for diesel. This follows DECC valuation guidance on energy prices and damage costs⁴⁹.

9.13. Benefits related to emission reductions and fuel savings related to freight on water, air and rail freight have been monetised and included in headline figures. DfT have provided estimates of the total emissions of these transport modes for the UK. This leads to a total increase in freight emissions covered by the IA of approximately 69%. There is a lack of evidence available on the potential for emission savings in these areas, and therefore a proxy has been used to estimate emission savings here. The potential savings in these transport modes are assumed to be up to 4% on average, as with road freight transport.

i. Total emission related to water transport: 20MtCO₂e

ii. Total emissions related to rail: 0.9MtCO₂e

Reduced Health Impacts

9.14. Reductions in fuel use lead to reduced air pollution, which reduces the damaging effects to health. The benefits of improved health impacts have also been valued using DECC guidance for reductions in electricity, gas and diesel. These benefits were also highlighted by consultation responses.

Costs to Companies of Reducing Emissions

9.15. There are also likely to be private costs to companies of reducing on-site emissions (also known as abatement costs), for example, the cost of installing more efficient equipment, are now explicitly modelled in the analysis. A policy of mandatory GHG reporting does not require companies to experience these costs but it is likely that companies wishing to pursue the financial benefits associated with reduced emissions will experience these costs. However, evidence from the consultation showed that reporting companies had experienced significant financial savings from implementing low and no cost efficiency measures. Some companies noted financial savings in the range of £0.05m to £35m over several years and so this IA may have overestimated the private costs of reducing on-site emissions. The estimates used in this IA are made based on the best available evidence on abatement costs from DECC and DfT. The estimates are made using data on the technologies that can reduce emissions for the non-domestic housing stock in a cost-effective way, excluding the technologies that are likely to have been taken up by existing policies already in place to reduce emissions. These cost

• ⁴⁸ http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx

• ⁴⁹ DECC IAG Tables 1 - 29

savings do not include behavioural responses (including the low/no-cost measures mentioned by consultation respondents) and therefore are likely to represent a conservative estimate of actual emission savings that companies can achieve.

9.16. Using these estimates it is possible to estimate the average ratio of benefits to costs for these products, i.e. if the present value benefits are £300 and the present value cost of the product is £100 then the ratio of benefits to costs would be 3. The average ratio across all products is used to estimate the abatement costs in comparison to benefits. This approach also provides an estimate of the technological potential cost-effective abatement existing in these markets.

The Costs of Reducing On-site Electricity and Gas Emissions

9.17. To estimate the costs of reducing electricity and gas emissions, this IA uses DECC's Non-Domestic Energy Efficiency Model. The model is focussed on savings related to buildings, which should define the largest proportion of gas and electricity related savings to companies covered under this policy. This lists the technologies that are available to reduce emissions, the emission savings and the costs of the technologies. The ratio between the private value of energy savings and the private costs of realising these savings can be used to specify the ratio of private costs to benefits for companies. More information on this model and how it has been used to estimate the potential for benefits from this policy can be found in paragraph 9.4.

9.18. Using the middle estimate of savings available for electricity related savings taken from this model, the average benefit to cost ratio for these products would 1.29:1. This means that for the central estimate financial savings to companies will be approximately 1.3 times higher than costs⁵⁰.

9.19. Using the middle estimate of savings for gas savings the average benefit to cost ratio for these products would 3.66:1. This means that for the central estimate financial savings to companies will be approximately 3.66 times higher than costs⁵¹.

Scenario	Electricity			Gas		
	Low	Middle	High	Low	Middle	High
Energy Savings Remaining TWh	0	2.5	5.5	4.4	11.6	18.8
Percentage of Total Energy Use	0%	2%	5%	4%	10%	16%
Ratio Benefits to Costs	0	1.29	1.56	1.70	3.66	4.41

The Costs of Reducing Road Freight Transport Emissions

9.20. The estimate of the costs of reducing freight transport emissions are on the same theoretical basis. However, the abatement opportunities in transport are not as well understood and are more complex. Transport emission savings can be realised through behavioural change, technological change, and also through logistical changes to the delivery of goods, minimising wasted journeys.

9.21. The DfT model⁵² applies to heavy goods vehicles (HGV) only. It also only applies to technological changes to vehicles that can realise savings and so ignores the behavioural savings available through driver training etc. It estimates that potentially 2.75% of current emissions could be saved through improved efficiency. On top of this, it estimates that the average cost of realising these reductions is approximately 27% of the benefit. This estimate does not include hidden costs such as time. DECC estimate that hidden costs can vary between 10 to 30% of the total investment costs of purchasing a new technology. In the absence of a better estimate of hidden costs, an assumption is made that the additional costs are 20% of the estimate used in the DfT model. Once the

⁵⁰ The results for the other scenarios are included in Table 35.

⁵¹ The results for the other scenarios are included in Table 36.

⁵² "Freight Carbon Reduction Cost Effectiveness Analysis"

hidden costs are included the total costs are approximately 33% of the total costs of abatement. This means that the ratio of benefits to costs is around 3.1 to 1.

Less robust monetised benefits

9.22. International Benefits: The benefit estimates provided here only apply to reporting UK emissions. However, a sensitivity analysis has been completed after the costs and benefits for international emissions.

Non-monetised benefits

9.23. Process emissions: The costs and benefits related to measuring and reporting process emissions are not included in this analysis. This analysis has tried to achieve proportionality by valuing the largest areas of company emissions, and therefore cover the largest impacts, and costs and benefits, related to companies.

9.24. Other transport emissions: The costs and benefits associated with non-freight transport emissions, i.e. those related to rail and road (non-freight) transport have not been monetised. This will impact on a relatively small amount of total UK emissions, although for some individual companies these emissions may play a relatively significant part in their total emissions impacts, i.e. transport companies.

9.25. Intangible benefits: There are a range of intangible benefits not monetised in this analysis. These include benefits resulting from the use of a consistent reporting methodology which some consultation respondents felt would enable better benchmarking and so drive further emission reductions from existing reporters.

9.26. Benefits from interested party preferences: These include benefits to companies from reporting emissions, including branding and reputational benefits as well as benefits of greater employee engagement. These benefits were highlighted by respondents to the consultation and were also highlighted within the PwC/CDP report. Further, it may also include benefits relating to investor preferences for 'green' investment and employee preferences to work for green companies. Responses from the public consultation supported the existence of these benefits.

9.27. Benefits from reduced investment risk: Large emissions may be a liability in the light of potential future legislation on climate change to limit emissions. As discussed in the background, corporate reporting will allow investors to identify the level of exposure to such risks, in an area which is gaining in profile. Consultees highlighted research by Mercer which stated that climate change could contribute 10% to portfolio risk⁵³.

9.28. Additional behaviour change from reporting wider GHG emissions: As firms report their total emissions this will give increased information to interested groups, investors, consumers, and other interested parties. This may provide additional benefits in terms of increased behaviour change. The impact on increased behaviour change has not been modelled which may provide some additional benefits.

• ⁵³ <http://www.mercer.com/climatechange>

10. Cost and Benefits of Reporting Emissions

10.1 Table 7 shows total numbers of companies impacted under each option, broken down by size and activity. For details of how these figures are arrived at please see Annex C.

		Option 1	Option 2	Option 3	Option 4
Total Companies Covered		100	1101	24000	2017
On-site: New Reporters	Small	0	63	0	0
	Medium	0	68	0	0
	Large	35	60	19308	0
	Very Large	0	0	0	0
Transport: New Reporters	Small	0	63	0	0
	Medium	0	68	0	0
	Large	35	64	20664	0
	Very Large	65	314	1896	1896

10.2 Option 1 the central estimate is that an additional 100 companies take up reporting with an upper bound of 200 additional companies take up reporting and a lower bound of zero. It is assumed that 65% of new reporting companies will already be reporting under an existing reporting requirement.

10.3 Option 2 is estimated using the employment numbers of companies as a proxy for their size. It also takes out a proportion of large companies based on an estimate of the proportion of large companies that will report under CRC, CCAs or Voluntary Agreements. Under transport it is assumed that 438 new large companies would have to report freight transport related emissions, as emission reporting in the baseline is low.

10.4 Option 3 assumes 24,000 new companies report. It assumes that there are 4,692 companies that will report on-site emissions (see Baseline). It assumes that 1,500 companies are reporting transport emissions voluntarily, although 65% of these companies are assumed to report in the baseline under mandatory reporting requirements.

Annual Costs for Each Option

10.5 The annual costs for each option have been calculated using the annual cost estimates provided per company and the number of companies impacted under each of the options. The annual cost estimates and the present value costs are provided for each of the options in the tables below.

		Number of Companies	Average Ongoing Admin Cost Per	Total Transition Costs	Total Ongoing Costs
On Site	Large	35	£1,934	£135,403	£67,702
	Very Large	0	£7,134	£0	£0
Transport	Large	35	£1,838	£128,686	£64,343
	Very Large	65	£7,618	£990,376	£495,188

Table 9: Annual Costs (£) Option 2 - Mandate under the Companies Act for all quoted companies

		Number of Companies	Average Ongoing Admin Cost Per	Total Transition Costs	Total Ongoing Costs
On-site	Low Emp	63	£604	£76,164	£38,082
	Medium Emp	68	£919	£124,958	£62,479
	Large	60	£1,934	£231,058	£115,529
	Very Large	0	£7,134	£0	£0
Transport	Low Emp	63	£574	£72,386	£36,193
	Medium Emp	68	£873	£118,758	£59,379
	Large	64	£1,838	£235,017	£117,508
	Very Large	314	£7,618	£4,783,669	£2,391,834

Table 10: Annual Costs (£) Option 3 - Mandate under the Companies Act for all large companies

		Number of Companies	Average Ongoing Admin Cost Per	Total Transition Costs	Total Ongoing Costs
On-site	Large	19,308	£1,934	£74,696,242	£37,348,121
	Very Large	0	£7,134	£0	£0
Transport	Large	20,664	£1,838	£75,976,023	£37,988,011
	Very Large	1,896	£7,618	£28,888,204	£14,444,102

Table 11: Annual Costs (£) Option 4 - Mandate under the Companies Act using energy threshold

		Number of Companies	Average Ongoing Admin Cost Per	Total Transition Costs	Total Ongoing Costs
Transport	Large	0	£1,838	£0	£0
	Very Large	1,896	£7,618	£28,888,204	£14,444,102

10.6 Table 12, below, shows the annual administrative and present value costs of reporting for each option over the 10 year appraisal period.

Table 16: Value of Administrative Costs (£) (Not Discounted)

	Option 1	Option 2	Option 3	Option 4
Year	Central	Central	Central	Central
2012	1,881,698	8,463,014	269,340,704	43,332,306
2013	614,934	2,765,691	88,019,838	14,160,884
2014	602,876	2,711,462	86,293,959	13,883,220
2015	591,055	2,658,296	84,601,920	13,611,000
2016	579,466	2,606,172	82,943,059	13,344,117
2017	568,104	2,555,071	81,316,725	13,082,468
2018	568,104	2,555,071	81,316,725	13,082,468
2019	568,104	2,555,071	81,316,725	13,082,468
2020	568,104	2,555,071	81,316,725	13,082,468
2021	568,104	2,555,071	81,316,725	13,082,468
PV	6,311,962	28,388,319	903,475,906	145,353,798

Estimating Company Emissions and Emissions Reductions for Each Option

10.7 The table below shows the estimated emission reductions achieved for on-site, other non-CO2 GHGs, and freight transport. It shows:

- i. total emissions of non-reporting companies broken down by on-site, other GHGs, and freight transport;
- ii. the percentage of these emissions attributed to the option;
- iii. the emissions of new reporting companies in tonnes CO2e;
- iv. and the estimated emission reductions shown by low and high bounds.

		On-site	On-site other GHGs	Freight Transport
Total emissions of non-reporting companies (MtCO₂e)		44	4	51
Option 1	% of total emissions attributed to option	0.3%	0.3%	4%
	Emissions of new reporting companies (tCO ₂ e)	141,647	12,075	1,809,044
	Estimated emission reduction*	low	0	0
	high	5,666	483	72,362
Option 2	% of total emissions	0.5%	0.5%	29%
	Emissions of new reporting companies (tCO ₂ e)	210,983	17,985	14,706,740
	Estimated emission reduction*	low	0	0
	high	8,439	719	588,270
Option 3	% of total emissions	35%	35%	52%
	Emissions of new reporting companies (tCO ₂ e)	15,572,696	1,327,509	26,330,610
	Estimated emission reduction*	low	0	0
	high	622,908	15,930,102	1,053,224
Option 4	% of total emissions	0%	0%	26%
	Emissions of new reporting companies (tCO ₂ e)	0	0	13,114,423
	Estimated emission reduction*	low	0	0
	high	0	0	524,577

*This represents the maximum estimated annual emission reductions.

10.8 See Annex C for further details.

Total tCO₂e savings

10.9 The total annual GHG savings from on-site and freight transport are provided in the table below (see Annex E for a detailed breakdown of savings).

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	15,702	0	119,486	0	345,847	0	104,915
2013	0	31,404	0	238,971	0	691,693	0	209,831
2014	0	47,106	0	358,457	0	1,037,540	0	314,746
2015	0	62,809	0	477,943	0	1,383,386	0	419,662
2016	0	78,511	0	597,428	0	1,729,233	0	524,577
2017	0	78,511	0	597,428	0	1,729,233	0	524,577
2018	0	78,511	0	597,428	0	1,729,233	0	524,577
2019	0	78,511	0	597,428	0	1,729,233	0	524,577
2020	0	78,511	0	597,428	0	1,729,233	0	524,577
2021	0	78,511	0	597,428	0	1,729,233	0	524,577

Monetised value of GHG savings

10.10 The monetised value of carbon dioxide savings is reported below. These are monetised using DECC carbon values for EU ETS and non-EU ETS emissions.

	Option 1		Option 2		Option 3		Option 4	
Year	Low	High	Low	High	Low	High	Low	High
2012	0	807,041	0	6,320,488	0	15,199,847	0	5,588,073
2013	0	1,638,293	0	12,830,591	0	30,855,689	0	11,343,789
2014	0	2,494,301	0	19,534,575	0	46,977,787	0	17,270,919
2015	0	3,375,621	0	26,436,792	0	63,576,605	0	23,373,310
2016	0	4,282,819	0	33,541,680	0	80,662,818	0	29,654,887
2017	0	4,347,061	0	34,044,805	0	81,872,760	0	30,099,710
2018	0	4,412,267	0	34,555,477	0	83,100,851	0	30,551,206
2019	0	4,478,451	0	35,073,809	0	84,347,364	0	31,009,474
2020	0	4,545,628	0	35,599,917	0	85,612,575	0	31,474,616
2021	0	4,640,640	0	36,221,923	0	89,155,945	0	31,999,193
PV	0	29,121,733	0	227,982,586	0	549,767,001	0	201,545,477

Electricity and Gas

10.11 Reductions in carbon dioxide emissions will be realised through reductions in electricity and gas use. It is assumed that two thirds of emission savings are related to electricity energy savings and one third of emission savings are related to gas energy savings. Energy savings are valued using the current DECC variable element for emission factors and the value of energy savings. (Annual electricity savings are provided in Annex E, table 31 and annual gas savings in table 32.)

Road Freight Diesel Savings

10.12 Road freight transport diesel emission savings will also lead to reductions in diesel use and benefits to businesses. (Annual diesel savings are provided in Annex E, table 33.) Fuel savings are valued using the current DECC variable element for emission factors and the value of energy savings.

	Option 1		Option 2		Option 3		Option 4	
Year	Low	High	Low	High	Low	High	Low	High
2012	0	2,415,450	0	18,423,499	0	52,582,398	0	16,186,115
2013	0	4,914,300	0	37,493,044	0	106,056,430	0	32,552,720
2014	0	7,467,388	0	56,971,993	0	159,988,399	0	48,887,488
2015	0	10,174,669	0	77,674,502	0	215,762,603	0	65,892,689
2016	0	12,995,656	0	99,277,980	0	272,675,752	0	83,272,087
2017	0	13,274,156	0	101,470,348	0	275,653,427	0	84,163,798
2018	0	13,561,735	0	103,749,505	0	278,526,111	0	85,110,246
2019	0	13,860,809	0	106,087,883	0	282,008,808	0	86,078,223
2020	0	14,162,865	0	108,474,255	0	285,142,970	0	87,068,471
2021	0	14,319,950	0	109,661,761	0	286,625,283	0	87,068,471
PV	0	89,002,253	0	680,464,151	0	1,843,806,980	0	563,036,495

Value of Air Quality Benefits

10.13 The air quality benefits are mainly due to health impacts, however they also factor in other non-health related benefits. These are provided for electricity, gas and diesel savings. Air quality benefits are valued using the current DECC air quality benefits estimates.

	Option 1		Option 2		Option 3		Option 4	
Year	Low	High	Low	High	Low	High	Low	High
2012	0	171,406	0	1,371,517	0	2,794,911	0	1,218,819
2013	0	351,550	0	2,813,391	0	5,725,832	0	2,500,254
2014	0	538,456	0	4,309,547	0	8,764,281	0	3,829,964
2015	0	740,059	0	5,924,453	0	12,025,993	0	5,265,436
2016	0	953,687	0	7,636,388	0	15,472,395	0	6,787,295
2017	0	982,910	0	7,872,129	0	15,921,639	0	6,997,176
2018	0	1,013,563	0	8,119,453	0	16,392,165	0	7,217,378
2019	0	1,045,307	0	8,375,612	0	16,879,062	0	7,445,452
2020	0	1,078,188	0	8,640,975	0	17,383,005	0	7,681,727
2021	0	1,099,752	0	8,813,795	0	17,730,665	0	7,835,362
PV	0	6,611,727	0	52,956,434	0	107,056,533	0	47,071,168

The Costs of Emissions Abatement

10.14 Companies will realise benefits from abatement, directly in terms of financial savings. However, on top of this there will also be costs associated with reducing emissions. These costs may be investment costs to provide more efficient technologies to reduce emissions, investment in training to encourage employees to reduce energy use through behaviour change, or investment in strategic planning to reduce emissions by acting in a more coordinated fashion. (See paragraph 9.15 through to 9.21.) These are included as a negative benefit, as companies will undertake emission reductions if it is profitable to do so, that is if the benefits of energy savings outweigh the additional costs of abatement, and the benefits section reports the benefits to society of emission reductions.

	Option 1		Option 2		Option 3		Option 4	
Year	Low	High	Low	High	Low	High	Low	High
2012	0	832,403	0	5,976,985	0	23,465,308	0	5,171,806
2013	0	1,693,085	0	12,162,823	0	47,394,749	0	10,401,282
2014	0	2,572,695	0	18,481,855	0	71,646,231	0	15,620,586
2015	0	3,503,064	0	25,194,062	0	96,650,258	0	21,054,107
2016	0	4,470,806	0	32,195,698	0	122,132,701	0	26,607,192
2017	0	4,563,298	0	32,901,428	0	123,469,542	0	26,892,113
2018	0	4,657,802	0	33,633,562	0	124,675,003	0	27,194,523
2019	0	4,758,315	0	34,388,100	0	126,332,265	0	27,503,812
2020	0	4,858,154	0	35,155,551	0	127,699,382	0	27,820,217
2021	0	4,913,058	0	35,542,002	0	128,690,998	0	27,820,217
PV	0	30,590,978	0	220,629,384	0	825,822,661	0	179,902,065

Total Benefits

10.15 The total annual monetised benefits and present value benefits are provided for each option below. These include: monetised emission savings, energy savings and air quality benefits less abatement costs.

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	2,561,493	0	20,138,520	0	47,111,847	0	17,821,201
2013	0	5,211,058	0	40,974,204	0	95,243,203	0	35,995,480
2014	0	7,927,450	0	62,334,260	0	144,084,235	0	54,367,785
2015	0	10,787,284	0	84,841,686	0	194,714,943	0	73,477,327
2016	0	13,761,356	0	108,260,350	0	246,678,264	0	93,107,076
2017	0	14,040,829	0	110,485,855	0	249,978,284	0	94,368,571
2018	0	14,329,763	0	112,790,873	0	253,344,124	0	95,684,307
2019	0	14,626,253	0	115,149,204	0	256,902,969	0	97,029,337
2020	0	14,928,527	0	117,559,596	0	260,439,168	0	98,404,597
2021	0	15,147,284	0	119,155,477	0	264,820,896	0	99,082,808
PV	0	94,144,734	0	740,773,787	0	1,674,807,853	0	631,751,075

10.16 The full list of tables detailing annual emission savings, energy savings, and monetised benefits are provided in Annex E.

Key Assumptions/Risks/Sensitivities

10.17 Assumptions

- Unemployment and turnover are a good proxy for company emissions.
- Emission reductions of up to 4% are achievable for electricity, gas and diesel related emissions.
- Median costs are the best estimate of average company costs from survey responses received.
- CRC companies have the highest total on-site emissions for UK companies.
- Voluntary reporting companies will be those obtaining the largest benefits from reporting.
- Average administrative reporting costs are the same for across all large companies, and not related to emissions.
- The potential for emission reductions from water and rail freight transport is the same as for road transport. The costs of abatement are also the same as for road transport.
- The abatement costs for emission reductions related to behavioural change are the same as for abatement using technological change.
- For transport that there are additional behavioural change reductions of approximately 1.25% compared to technological change only, i.e. 4% emission reductions less 2.75% cost effective technological potential. For electricity there are additional behavioural change technologies of approximately 2%, based on central estimates, in addition to remaining technological change remaining, i.e. 4% emission reductions less 2% cost effective technological potential remaining. For gas it appears that technological change can go further than existing policies in reducing emissions.
- 2/3 of emission savings are related to electricity and 1/3 of emission savings are related to gas.
- Adjusting companies do not realise costs or benefits, these are excluded as costs and benefits are likely to be relatively small, however detail on the magnitude of these costs is difficult to estimate, and as both costs and benefits will increase it is not clear this will switch the analysis in favour of any option.
- All freight transport fuel savings are from diesel. All water freight transport fuel savings are from diesel. All rail freight transport fuel savings are from diesel.

10.18 Risks

- The assumption that costs do not increase for larger companies, based on their size may underestimate costs, especially where the options are likely to include only a small number of the largest companies, specifically for option 2 and option 4.

Costs and Benefits of International Impacts

Costs of international reporting

10.19 Costs and benefits related to international impacts are not so well understood, as there is more limited information on these impacts. However data from the PwC/CDP has been used to provide an illustrative estimate of the costs and benefits of reporting for the largest FTSE listed companies. The PwC data includes a range of cost estimates for reporting. 52% of companies responding to the PwC survey are quoted companies, therefore an assumption is made that the largest 52% of cost estimates are related to these companies.

10.20 Costs are provided for measuring and reporting costs. For each activity they are provided in a range in the tables reported below.

Table 20: Illustrative Costs Per Firm of Measuring Emissions (£k)						
		Lower Bound	Lower Quartile	Median	Upper Quartile	Upper Bound
Set Up	Lower	50	50	75	125	250
	Upper	75	75	100	150	275
Annual	Lower	50	50	75	100	250
	Upper	75	75	100	125	275

Table 21: Illustrative Costs Per Firm of Reporting Emissions (£k)						
		Lower Bound	Lower Quartile	Median	Upper Quartile	Upper Bound
Set Up	Lower	25	25	50	75	250
	Upper	50	20	75	100	275
Annual	Lower	25	25	50	75	250
	Upper	50	50	75	100	275

10.21 This analysis uses the mid-point of that range and then sums the measuring and reporting costs to estimate a range of estimates of total administrative costs for quoted companies.

Table 22: Illustrative Costs Per Firm of Reporting Emissions (£k)						
		Lower Bound	Lower Quartile	Median	Upper Quartile	Upper Bound
Set Up	Lower	75	75	125	200	500
	Upper	125	95	175	250	550
Annual	Lower	75	75	125	175	500
	Upper	125	125	175	225	550

10.22 From CDP data it is estimated that of the FTSE 350 there are 108 companies not reporting to CDP, therefore it is assumed that there are 108 new reporting companies. Total present value costs are provided below.

Table 23: Illustrative FTSE 350 NPV Costs (£m)		
2010 Prices		
NPV Costs (£m)	Lower Bound	104
	Lower Quartile	102
	Central Estimate	156
	Upper Quartile	210
	Upper Bound	545

Benefits of International Reporting

10.23 The benefits of international reporting assumes that there are 108 new reporting companies. From CDP data it is possible to estimate the average emissions of companies not reporting, based on the average emissions of companies in that industry. It is estimated that FTSE350 companies have total scope 1 and scope 2 emissions of

652MtCO₂, which is more than the total UK economy, therefore benefits from any additional emission reductions are likely to be substantive. It is assumed that emissions from electricity, gas and diesel occur in the same ratios as for domestic UK emissions. It is also assumed that energy prices and abatement costs are the same, due to lack of better data. The emissions are valued using the traded price of emissions (DECC advises this for valuing international emissions).

10.24 The impact of including international emission costs and benefits are reported in the table below. These are likely to be significantly increase benefit to cost ratios. It is assumed that the impacts on Options 2, 3 and 4 are equal as it is likely that only the largest quoted companies will have significant international emissions to report. For Option 1 it is assumed that 50% of new voluntary reporters will be quoted companies, as they will benefit most from reporting.

Table 24: Present Value Summary of Costs and Benefits for Options including International Impacts for the FTSE350 (£m)

			Values include international impacts				
			International Impacts	Option 1	Option 2	Option 3	Option 4
Benefits (£m)	Electricity and Gas Related	High	10079	5047	10091	10930	5241
		Low	0	0	0	0	0
	Wider GHGs	High	0	0	0	20	0
		Low	0	0	0	0	0
	Road Freight Transport	High	1018	626	1968	2648	1341
		Low	0	0	0	0	0
	Less Abatement Costs	High	7381	3721	7602	8207	4018
		Low	0	0	0	0	0
	Total	High	3716	1952	4457	5371	2564
		Lower	0	0	0	0	0
Costs (£m)	Electricity and Gas	Central	N/A	1	2	376	0
	Road Freight Transport	Central	N/A	6	26	528	145
	Total	Central	156	162	184	1059	301
Net Benefits (£m)	All Robust Monetised Costs and Benefits	High	3561	1628	4273	4311	2263
		Low	-156	0	-184	-1059	-301

Numbers highlighted in red are negative values.

Impact of using retail prices of energy

10.25 The DECC variable electricity rate excludes taxes and uses the marginal cost of fuel, which would place demand on newer energy facilities that are consequently more efficient and where marginal costs are lower. (This is the recommended rate to use for cost benefit analysis). To understand the impacts of using retail rates the same assumptions are run again, using the retail rates for electricity, gas and diesel, which in 2012 are estimated at 10.6p/kWh, 3p/kWh and 121p/litre respectively.

Table 25: Sensitivity with Retail Energy Prices Present Value Summary of Costs and Benefits for Options

			Option 1	Option 2	Option 3	Option 4
Benefits (£m)	Electricity and Gas Related	High	12	17.4	1282	0
		Low	0	0	0	0
	Wider GHGs	High	0.2	0.28	20.4	0
		Low	0	0	0	0
	Freight Transport	High	287	2330	4171	2078
		Low	0	0	0	0
	Less Abatement Costs	High	30.59	221	826	180
		Low	0	0	0	0
Total	High	268	2127	4648	1898	
	Lower	0	0	0	0	
Costs (£m)	Electricity and Gas	Central	0.7	2.2	376	0
	Freight Transport	Central	5.6	26	528	145
	Total	Central	6.3	28	903	145
Net Benefits (£m)	All Robust Monetised Costs and Benefits	High	255	2099	3745	1752
		Low	0	-28	-903	-145
<i>Numbers highlighted in red are negative values.</i>						

Impact of using a 20 year appraisal period

10.26 This analysis estimates impacts of measuring costs and benefits over a 20 year time period. The major impact of extending the analysis is that benefits relative to costs increase. This is because the *real* costs of electricity, gas and diesel are in general expected to rise. The costs of electricity, gas and diesel are 7.9p/kWh, 2.4p/kWh and 42.7p/litre respectively, and these rise to 13.0p/kWh and 2.7p/kWh and 47.3p/litre by 2030. Extending the analysis over 20 years will increase benefits relative costs, also because it is assumed that there are some fixed costs of reporting. However, it should be noted that the *additional* costs and benefits of these options over a longer time period will decrease as energy and fuel costs increase as more companies would begin to report to realise the benefits.

Table 26: Sensitivity with 20 year appraisal period

			Option 1	Option 2	Option 3	Option 4
Benefits (£m)	Electricity and Gas Related	High	18	28.3	2085	0
		Low	0	0	0	0
	Wider GHGs	High	0.4	0.6	42.0	0
		Low	0	0	0	0
	Freight Transport	High	239	1945	3232	1610
		Low	0	0	0	0
	Less Abatement Costs	High	63	453	1859	350
		Low	0	0	0	0
Total	High	194	1521	3500	1260	
	Lower	0	0	0	0	
Costs (£m)	Electricity and Gas	Central	1	3.4	582	0
	Freight Transport	Central	8.7	41	817	225
	Total	Central	10	44	1400	225
Net Benefits (£m)	All Robust Monetised Costs and Benefits	High	174	1477	2101	1035
		Low	0	-44	-1400	-225

Numbers highlighted in red are negative values.

Impact of excluding benefits from wider freight transport

10.27 This analysis assumes that the upper bound emission savings achieved in rail and water freight transport would be of a similar magnitude to the savings achieved by road freight transport (4%). As less evidence has been gathered on the magnitude of savings it has not been possible to estimate the potential for savings in these modes that may be driven by this policy. The sensitivity analysis shows the ratio of costs and benefits if these modes are excluded.

Table 27: Excluding benefits related to wider freight transport

			Option 1	Option 2	Option 3	Option 4
Benefits (£m)	Electricity and Gas Related	High	8	11.5	851	0
		Low	0	0	0	0
	Wider GHGs	High	0.2	0.3	20.4	0
		Low	0	0	0	0
	Freight Transport	High	69	561	962	479
		Low	0	0	0	0
	Less Abatement Costs	High	20	133	678	106
		Low	0	0	0	0
Total	High	57	440	1155	373	
	Lower	0	0	0	0	
Costs (£m)	Electricity and Gas	Central	1	2.2	376	0
	Freight Transport	Central	5.6	26	528	145
	Total	Central	6	28	903	145
Net Benefits (£m)	All Robust Monetised Costs and Benefits	High	44	411	252	228
		Low	0	-28	-903	-145

Numbers highlighted in red are negative values.

11. Preferred Option and Implementation Plan

11.1 The preferred option is Option 2.

Timetable for implementation:

11.2 Autumn 2012 – Publish formal written consultation on the detail of the draft regulations. The date of implementation will be considered during the consultation on the regulations.

11.3 2013 – Lay statutory instrument in Parliament.

11.4 Late 2013/early 2014 – “Guidance on how to measure and report your greenhouse gas emissions” to be revised to highlight regulatory obligations as well as continue to encourage additional voluntary reporting.

Engagement with stakeholders:

11.5 Engagement will continue with stakeholders, building on the successful engagement during summer 2011. Defra will continue to work closely with DECC, BIS and the Financial Reporting Council. In order to ensure that companies are aware of the regulation, Defra will work with industry groups including the Quoted Companies Alliance, the Confederation of British Industry, the British Chamber of Commerce, the Aldersgate Group and the Institute of Environmental Management and Assessment, the Institute of Chartered Accountants for England and Wales and the Association of Chartered and Certified Accountants.

12. Post Implementation Review

Basis of the review:

12.1 The policy will be reviewed in October 2015. The Government has committed to reviewing the costs and benefits of regulation for quoted companies ahead of a decision in 2016 on whether to widen the regulation to include all large companies⁵⁴.

Objective:

⁵⁴ BIS launched a public consultation in September 2011 proposing changes to the narrative reporting framework. The implementation of regulation on GHG reporting will be linked to the implementation of any changes to narrative reporting as a result of BIS's current consultation. It will be necessary to ensure that the Post Implementation Review for GHG reporting is linked to any PIR of changes to narrative reporting.

12.2 The objective is to provide advice to Ministers on the impact of regulation to require quoted companies to report their GHG emissions in the Directors' Report of their annual report. In particular it will update the assumptions made on costs and benefits in this Impact Assessment and will consider whether the policy is fulfilling its objective cost-effectively and whether or not it should be rolled out further.

Approach and rationale:

12.3 In order to meet this objective, the Review will consider the following issues:

- a. The use investors/owners have made of information reported.
- b. Monetising the costs and benefits experienced by investors/owners.
- c. Costs and benefits for companies.
- d. Emissions reductions resulting from this policy (see information on econometric evaluation).
- e. Whether Government intervention is still required or whether the market may have changed in the intervening period including considering international developments in this area.
- f. The level of enforcement activity required by the Financial Reporting Council, taking into account wider potential changes in narrative reporting (BIS, the FRC and others routinely collect and analyse data on company annual reports and this review will utilise this information).
- g. Wider impacts experienced by companies and investors.
- h. The potential to monetise impacts not monetised in this Impact Assessment including the costs and benefits of reporting international emissions.
- i. The potential for simplification of the regulations.

12.4 The Review will include:

- a. Quantitative and qualitative research with companies and investors.
- b. An econometric evaluation of emissions reductions.
- c. Analysis based on the results of this evaluation and research.

12.5 A Review Stage Impact Assessment will be published following the review.

12.6 The Review's quantitative and qualitative research will follow the approach below:

- a. Gathering stakeholder views using a variety of methods.
- b. Working with stakeholders to update the results of surveys previously carried out on the costs and benefits of greenhouse gas reporting with a focus on the costs actually experienced by companies as well as the benefits that companies attribute to the process of reporting.
- c. Building on the research carried out in the preparation of Defra's 2010 report to Parliament.
- d. Draw upon additional analysis on the costs of the CRC as well as the actual costs experienced by companies reporting emissions through the new regulation gathered in the research already outlined. In doing so, the Review will recognise the policy differences between GHG reporting and the CRC to ensure costs are accurately updated.

12.7 One of the key uncertainties highlighted in the Final Impact Assessment is the level of behaviour change and emissions reductions that can be expected. Gathering data to answer this question is the main aim of the econometric evaluation. The econometric evaluation of emission reductions which will gather data from quoted companies reporting under this new regulation. Where possible it will seek to identify the presence

of a direct link between reporting and emissions reductions. The evaluation will take the following approach:

- a. It will monitor the emissions of reporting companies (both quoted companies reporting post-regulation and those who were reporting pre-regulation).
- b. It will review the available evidence sources and will define an appropriate counterfactual taking into account practicality and data availability.
- c. Where possible, it will identify and control for companies previously reporting under existing Companies Act requirements, those reporting under existing emission schemes, i.e. CRC, and those measuring and reporting for the first time under the new regulation.

Baseline:

12.8 This would correspond to Option 0 in this IA but we would look to update the baseline data prior to introducing regulation.

Success criteria:

12.9 Owners have better information on which to judge the climate change strategy and impact of the company and are able to direct the activities of the company appropriately. All quoted companies are reporting their emissions to the minimum standard in the regulation and investors report being able to use this information to make investment decisions which take into account climate change risk. The evidence indicates that GHG reporting has led to actions that have led to emissions reductions. The Review Stage IA shows a net benefit to the policy.

13. One In One Out

13.1 The consultation process was used to gather further evidence to support the identification of a preferred option. Option 2 is the preferred option and will require a regulatory OUT with an equivalent annual of £3.4m. A regulatory OUT has been identified but has not yet been validated.

14. Small Firms Impact Test

14.1 We have carried out a small firms impact test. Options 1 will not impact small firms except in a voluntary way. Option 2 (the preferred option) has the potential to impact small firms which are listed on the London Stock Exchange. It would not impact more heavily on small businesses than on other firms. Option 3 will not impact small firms as it restricts regulation to large firms. Option 4 is unlikely to impact small firms because the largest users of energy in the UK are highly unlikely to be small firms.

15. Competition Assessment

15.1 We have carried out a competition assessment and concluded that the policy proposals in this impact assessment will not have a negative impact on competition.

16. Sustainable Development Impact Test

Stage 1

1. Environmental Standards

1a. Are there any significant environmental impacts of your policy proposal (see Wider Environment Specific Impact Test)?

Yes
If the answer is 'yes' make a brief note of the impacts below:
We would expect some improvement in air quality due to companies reporting their GHG emissions assuming that behaviour change follows this reporting resulting in reduced emissions, from process and fuel use. `

1b. If you answered 'yes' to 1a., are the significant environmental impacts relevant to any of the legal and regulatory standards identified?
No
If the answer is 'yes' make a brief note of the relevant standards below:

If you answered 'yes' to 1b, have you:
1c. Notified the Government Department which has legal responsibility for the threshold and confirmed with them how to include the impacts appropriately in the analysis of costs and benefits?
1d. Informed ministers where necessary?
1e. Agreed mitigating or compensatory actions where appropriate?

2. Intergenerational impacts

2a. Have you assessed the distribution over time of the key monetised and non-monetised costs and benefits of your proposal? This assessment can be included in your Evidence Base or put in an annex.
No

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2b. Have you identified any significant impacts which may disproportionately fall on future generations? If so, describe them briefly.

No

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If you answered 'yes' to 2b. , have you:

2c. Informed ministers where necessary? If so, provide details.

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2d. Agreed mitigating or compensatory actions where appropriate? Provide details.

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Stage 2

3. The purpose of the second stage is to bring together the results from the impact assessment with those from the first stage of the SD test. The following questions are intended to reflect the uncertainties in the cost benefit analysis and help you consider how to proceed in the light of further evidence from the first stage of the SD test.

3a. Indicate in the appropriate box whether the balance of monetised costs and benefits is:

Strongly positive	Moderately positive	Roughly neutral / finely	Moderately negative	Strongly negative
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		balanced		
		X		

3b. Indicate in the appropriate box whether the balance of non-monetised costs and benefits is likely to be:				
Strongly positive	Moderately positive	Roughly neutral / finely balanced	Moderately negative	Strongly negative
	X			

3c. Indicate in the appropriate box whether the results of the SD questions 1-3 are, on balance, likely to be:				
Strongly positive	Moderately positive	Roughly neutral / finely balanced	Moderately negative	Strongly negative
	X			

3d. Indicate in the appropriate box whether, overall, the balance of the monetised and non-monetised costs and benefits and the sustainability issues is considered to be:				
Strongly positive	Moderately positive	Roughly neutral / finely balanced	Moderately negative	Strongly negative
	X			

3e. Provide an explanation of the final result from 3d, explaining, for example, how you have compared monetised and non-monetised costs and benefits and how you have resolved any conflicts between the cost-benefit results and the SD results.				
Although the monetised costs and benefits were finely balanced, it was not possible to monetise the expected benefits from wider reduction in global GHGs where companies are multinational and the value of reduction in wider GHG emissions beyond CO ₂ (it was only possible to monetise CO ₂ reductions). Given the fact that these are expected to be positive, we conclude that the sustainable development impacts are expected to be positive overall.				

Annex A: Existing UK environmental disclosure requirements set out in company law

Companies Act 2006 (Enhanced Business Review)

Currently, the Companies Act 2006 (section 417) requires that all companies, other than small, include a business review in their directors' report. The purpose of which is to inform members of the company and help them assess how the directors have performed their duty to promote the success of the company. The business review should include a fair review of the company's business and its principal risks and uncertainties. In the case of a quoted company, the Business Review must – to the extent necessary for an understanding of the business - include information about environmental matters, including the impact of the company's business on the environment. The Companies Act does not prescribe what information on environmental matters should be disclosed or how but if a business does not contain information about environmental matters it must mention the omission and explain it.

Existing schemes requiring UK Company GHG emissions disclosure

EU Emissions Trading System (EU ETS)

This is a cap and trade system which covers CO₂ emissions from electricity generation and the main energy intensive industries. In 2009, it covered approximately 964 UK installations. For the UK the total verified EU ETS emissions in 2009 was 231.9MtCO₂, around 48% of total UK CO₂ emissions in 2009. It is assumed that there will be no additional benefits in terms of increased CO₂ emission reductions for firms covered by the EU ETS when mandatory reporting is introduced. There will be some scope for increased emission reductions in terms of non-CO₂ greenhouse gases and wider emission sources such as freight emissions.

CRC Energy Efficiency Scheme (CRC)

The CRC Energy Efficiency Scheme is a mandatory cap and trade scheme that captures CO₂ emissions from large non energy-intensive organisations in the UK. It is estimated that it covers 54MtCO₂ (around 10% of total UK CO₂ emissions), with around 90% coming from the private sector. The estimated number of companies that would qualify for full participation was assumed to be around 4500 (DECC, 2010) and this was the figure used in the consultation IA. However, the actual number of companies now registered under the CRC are **2017** and so figures for the baseline and for option 4 have been adjusted accordingly. It is assumed that there will be no additional impact in terms of increased CO₂ emission reductions for firms covered by CRC when mandatory reporting is introduced. There will be some scope for increased emission reductions in terms of non-CO₂ greenhouse gases and wider emission sources such as freight emissions.

Climate Change Agreements (CCAs)

There are Climate Change Agreements (CCAs) with 54 sectors covering around 5,000 target units and around 10,000 facilities. Through the CCAs, energy-intensive industries, from steel, chemicals and cement to agricultural production, can obtain a discount in the Climate Change Levy (a tax on energy delivered to non-domestic users in the UK), provided they meet agreed targets for improving their energy efficiency or reducing their carbon emissions. CCAs set the terms under which eligible companies may claim the levy reduction. To comply with CCAs, sites must monitor report and verify CO₂ emissions, but there is no requirement for this information to be disclosed publicly. Approximately, 360 operators covered by the EU ETS are also covered by CCAs. The future of CCAs is currently under consideration. It is assumed that there may be a small additional impact in terms of reduced CO₂ emissions for these firms, where firms covered by CCA do not report information publicly. There will be

scope for increased emission reductions in terms of non-CO₂ greenhouse gases and wider emission sources such as freight emissions.

Annex B: Evidence on Voluntary Reporting

Defra's 2010 report to Parliament on the "*Review of the contribution that reporting of greenhouse gas emissions makes to the UK meeting its climate change objectives*" presents a range of evidence from a number of sources on corporate reporting. This section of the impact assessment draws on the evidence in that review.

One of the papers referred to in the Defra review was specially commissioned with PricewaterhouseCoopers (PwC) in partnership with the Carbon Disclosure Project (CDP) to review the contribution of reporting to GHG emissions reductions and associated costs and benefits⁵⁵. Evidence from the PwC/CDP report suggests that an increasing number of companies are reporting their emissions, with the key drivers (other than regulatory compliance) highlighted as being: reputation management; a belief that it is the responsibility of companies to be socially responsible; better risk management; investor interest; and, as a basis to minimise stakeholder demands for information.

In a 2010 survey of members of the Institute of Environmental Management and Assessment (IEMA), 50% of respondents said that they have started reporting their carbon footprints since 2006, suggesting that GHG reporting is a growing trend. The five largest sectors where respondents worked were Construction (10.6%), Manufacturing (11.4%), Consultancy (22.5%), Public Administration (8.7%), and Professional Scientific and Technical Services (10%). 23% of respondents were major/FTSE companies, 42% were large, 20% were SMEs and the remainder were micro. Approximately 75% of respondents indicated that they aim to build a positive environmental reputation that exceeds legal requirements.

The CDP highlights that since the first CDP report in 2003, the quantity and quality of data disclosed has advanced significantly (see chapter 5 of the PwC/CDP report referred to above for further details of CDP and its work). This is also reflected in data in the latest Environment Agency review of environmental disclosure by FTSE all-share which shows an increase since their last review in 2006 when only 29% reported figures on climate change or energy use whereas in the latest 2009 report 62% reported figures. However it is likely that the introduction of legislation to implement the EU Accounts Modernisation Directive has also had an impact in increasing the number of companies reporting on environmental issues such as emissions and energy use. In 2009, CDP received the highest response rate to date, the highest level of disclosed emissions, and greater detail on the activities being undertaken by the largest corporations around climate change mitigation and adaptation. 236 FTSE 350 companies responded to CDP 2009, 2 more than 2008, maintaining an overall response rate of 67%. The increase in response rate for the FTSE 100 was more marked, up by 4% to 95.

The 2010 CDP reports that 113 companies within the FTSE350 use Defra/DECC guidance to estimate CO₂ emissions. Further, that a total 130 companies within the FTSE all share report using Defra/DECC guidance. It has been assumed that these firms have no additional costs for collecting and reporting the GHG's as they already use the required method. It is probable that firms using the guidance would report in some form, and likely they would report to CDP if reporting on a wider set of GHG emissions. Therefore we have assumed this represents the total number of firms that follow Defra/DECC guidance. It is expected there will be some additional cost generated from having to report the information, in an additional instance, however at this stage it has not been possible to monetise this additional effort and they are likely to be relatively small in comparison to other costs identified within the IA.

The 2009 impact assessment of Defra/DECC's guidance on measurement and reporting of GHG emissions considered both the costs and benefits of reporting in accordance with the

• ⁵⁵ PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits".

guidance. Within this impact assessment assumptions were made regarding the number of companies estimated to take-up measuring and reporting under the guidance for the period 2009-2011. It was assumed that in the year 2009/10, 8,200 companies would take-up the guidance (2,200 large companies, 2000 of which would simply be adjusting to this method of reporting rather than completely 'new reporters'; and 6,000 small companies, of which 3,000 are 'adjusting' and 3,000 are 'new reporters'). In the year 2010/11 it was assumed that an additional 200 large companies would report along with 3,000 additional small companies. The latest EA report on Environmental Disclosures that looked at the reports of FTSE all-share found that only 62% of companies referred to climate change.

Based on the evidence above, estimates have been produced of the number of companies likely to take-up voluntary reporting (not as any result of legislative compliance) to 2020. The assumptions are based upon those made for voluntary take-up by 'new reporters' in the period 2009-2011 within the impact assessment for Defra/DECC's guidance.

As evidence suggests that there has been strong growth in emissions reporting, it is assumed that a significant number of companies would start to report voluntarily under the baseline scenario where no mandatory requirement, beyond what is already required by current policy, is put in place. Table 2 below presents the assumptions that have been made with regards to the take-up of voluntary reporting by 2020. The table refers to only newly reporting companies and is based on take-up rates for the Defra/DECC guidance only rather than any other reporting methods (evidence from the PwC suggests that a high share (around 34%) of reporting companies use this methodology for GHG reporting).

Annex C: Companies impacted under each Option

Option 1 Enhanced Voluntary Reporting

It is assumed that engaging in activities to enhance voluntary reporting could increase the rate of take-up by an additional 10% for large companies above the upper bound that would take up the guidance without intervention. The upper bound estimate of voluntary reporting was 30,000 small firms and 2,000 large firms, Therefore it is assumed that potentially an additional 200 large firms will report. The central assumption is that an additional 100 companies report. The lower bound assumption is that 0 additional companies report.

Enhanced voluntary reporting	Small	Medium	Large
Additional companies (to the baseline) reporting under this Option (2012-2021)	0	0	0-200 (100 firm central estimate for costs)

Option 2 – Mandatory Reporting for Quoted Companies

The number of companies reporting under Option 2 has been calculated by: i) split quoted companies into Small employment, Medium employment or Large employment ii) determine how many of each group are already reporting iii) determine the potential cost of reporting to companies in this group.

- i. Using Companies House data on turnover and number of employees to define whether companies have employment and turnover equivalent to small, medium, or large sized companies.
- ii. For on-site emissions, it is assumed that this group includes companies that are already reporting under EU ETS, CRC and CCAs, and therefore a proportion of these companies are excluded. Finally, *additional* voluntary reporting companies, not reporting under mandatory reporting schemes, are also excluded. The companies remaining, after these companies have been excluded, are the new reporting companies.
- iii. The costs of reporting are then estimated by multiplying the number of new reporting companies by the estimated costs of reporting for that size of companies.

There are 1101 UK companies listed on the London Stock Exchange. A matching analysis was undertaken for companies listed on the UK Main London Stock Exchange against records at Companies House and 983 companies were matched. Of these 983, 540 companies have provided data on employment numbers in one of the preceding four years and 625 companies have provide turnover information. This information has been used to estimate emissions based on the proportion of total employment.

The majority of quoted companies not providing data will be trusts and investment vehicles these will often record employment and turnover under their parent firm and have low employment and turnover estimates. It is assumed that these trusts report their emissions under their parent company and therefore that there are no further costs to these organisations.

As noted in section 8 on the baseline, 2017 firms are covered by CRC. As employment and turnover are used as a proxy for emissions this means that firms with the highest employment and turnover are assumed to report under CRC, and this employment and turnover needs to be excluded. It is estimated that this represent firms with greater than 693

employees⁵⁶. Additionally, 12% of the remaining large companies are assumed to already report CO₂ emissions either voluntarily or under CCAs, a further 8 firms.

The remaining companies reporting are likely to be large in terms of turnover and revenue, and therefore qualify as large companies under the Companies Act but will have relatively small employment. This suggests that their costs are likely to be more closely represented by the estimates made for small companies. Therefore, it is assumed that these companies will have costs equivalent to small or medium sized companies, if their employment falls within these bands. The estimate for each of these is provided below.

Of the companies reporting it is estimated from their employment that there will be 438 large companies, 68 medium and 63 small. Of the large there will be 370 large companies reporting under CRC and a further 8 under CCAs and voluntarily. This leaves an additional 60 large employment companies that would newly report under this option. As CRC companies are likely to be the largest, and there is evidence these companies will have larger costs than other companies covered, these companies are assumed to have a higher cost of reporting and are defined as ‘very large’ companies.

Table 30: Impact of Option 2 – Newly Reporting Quoted Companies

Option 2: All Quoted companies	Small Employment	Medium Employment	Large Employment
Number of new reporting companies	63	68	60

Option 3 Large Companies

The number of companies reporting under Option 3 has been calculated by:

- iv. Using employment and turnover as a proxy for the emissions produced by a company as used for Option 2
- v. As above, the largest companies are assumed to already be reporting under CRC and a further estimate is made of the number of companies already reporting through CCAs or voluntarily. This allows a calculation of the number of new reporters under this option.
- vi. All companies under this Option are large by Companies Act definitions and so are all treated as Large in the context of this IA in terms of calculating their costs and benefits.

The 2,017 largest companies by these measures are excluded as they are assumed to be within the CRC. A further 2,150 large companies are assumed to be in CCAs and 1,500 companies to voluntarily report using Defra/DECC guidance. This leaves 16,300 large companies not reporting.

From the information above the following estimates have been made:

⁵⁶ The employment of these companies is estimated using a combination of BIS data on SMEs, which provides employment and turnover information for these companies, and more detailed data from IDBR on the number of companies under different employment bands. The latter source estimates there are 690 companies with greater than 1000 employees, and 2,105 companies with 500-1000 employees. After the largest 2017 companies, it is estimated that companies employing fewer than 693 employees will report under this option. Additionally, companies that are reporting under CCAs or reporting voluntarily are also excluded. It is estimated that 12% of non-CRC large companies will be reporting under CCAs or voluntarily and so a further 12% of companies with reported employment of greater than 250 employees are also excluded, assuming they report in the baseline.

Table 31: Impact of 3 – Large Companies	
Option 3: All large companies	Number of large companies
Total number of large UK companies	Approx 24,000 (Range from 17,000 to 31,000)
Estimate of large companies engaged in some form of monitoring or reporting	4,692

Option 4 – Mandatory Reporting Using Energy Consumption Criteria

The number of companies reporting under Option 4 has been calculated by:

- vii. Using Environment Agency data on the number of companies registered as full participants within the CRC. (Subsidiary companies, which are registered separately in the CRC from their parent, have been aggregated in considering number of companies affected by this policy, in line with financial reporting requirements).
- viii. Due to the assumption that companies with the greatest emissions are those with the highest turnover and employment, all companies under this Option are assumed to be Large in the context of this IA for calculation of their costs and benefits.

According to registration data for the CRC there are approximately 2017 companies. All of these companies would be reporting their emissions associated with on-site energy use through either the CCA or the CRC.

Table 32: Impact of Option 4: Electricity consumption greater than 30,000MWh	
Total number of companies consuming more than 6,000MWh	2017
Proportion already reporting CO ₂ under the CRC or CCAs	100%

Newly reported emissions are limited to emissions associated with owned or controlled transport (including freight), emissions of the five non CO₂ Kyoto gases, process emissions and emissions associated with the companies' international activities.

As all companies under Option 4 already report their carbon dioxide emissions under CRC the additional costs of reporting under this option are only related to reporting emissions in company reports and the cost of reporting the newly reported emissions outlined above.

Estimating Company Emissions and Emission Reductions for each option

As option 1 encourages voluntary reporting, it is likely that the companies that choose to report under this option have the greatest emissions as they will most likely receive the greatest private benefit from reporting. NERA/Enviros⁵⁷ data in relation to the CRC (detailed below) is used to define the companies that report under this option, as these companies are expected to have the highest benefits in relation to their costs.

Estimates of company on-site emissions

The NERA/Enviros report⁵⁸ provides estimates of the number of companies that fall within different bands of energy use and number of sites owned. This data includes the estimated electricity and gas use of a proportion of companies.

⁵⁷ Table 7.1 and Table 5.5: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

⁵⁸ Table 7.1 and Table 5.5: <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

The data is combined to estimate the companies that would have overall net benefits from emission reductions if they experienced a 2% emission reduction⁵⁹. A company's net benefits from a 2% emission reduction (energy savings less abatement costs) are compared to the administrative costs of reporting and companies with a net benefit are assumed to be the ones that would be most likely to report on-site emissions voluntarily. The average electricity and gas use of these companies is estimated to provide an estimate of the potential emission savings for new voluntary reporters.

This provides an estimate that Option 1 reporters will have an average electricity use of 3.4MWh and average gas use of 3.7MWh per annum. It is estimated that the total emissions coverage of these companies would cover approximately 8% of non-reported on-site scope 1 and scope 2 emissions.

As noted above Options 2, 3 and 4 use estimates of employment and turnover as proxies for relative emissions per company. To understand the *additional* emission reductions under each option it is important to exclude emissions related to companies that will be reporting in the baseline. This is done below using assumptions for each option.

- Option 2: The data on employment and turnover has been obtained by carrying out a matching analysis for companies listed on the UK Main Index against their employment and turnover data held at Companies House.⁶⁰ From the data available the total employment and turnover of companies with less than 693 employees is calculated, these companies cover 39,000 employees and turnover of £17bn. This represents 0.2% of employment and 0.7% of turnover, that is not related to companies that are assumed to report in the baseline.
- Option 3: This is estimated using data on SMEs from BIS⁶¹. As above, it assumes that the 2017 largest companies are reporting in the baseline. As with Option 2 it also assumes that 12% of the remaining large companies report under CCAs or voluntary reporting, which includes the 2150 companies reporting under CCAs and 525 voluntary reporters (not covered by other regulations on this). This estimates there are 4.7m employees and £897 trillion turnover related to large companies not reporting under existing reporting requirements, and this equivalent to 29% of employment and 42% of turnover that is not related to companies that are assumed to report in the baseline.
- Option 4: All companies under Option 4 already report in the baseline, therefore there are no estimated on-site emission savings related to these companies.

Estimating Company Freight Transport Emissions

Detailed data on freight transport emissions from companies is not available. This IA has therefore used employment and turnover as proxies for the amounts of emissions produced by different companies. It is assumed that companies voluntarily reporting their transport emissions will be those with the greatest amount of emissions and so the emissions related to these companies are removed under all options.

Information from Companies House and BIS data on SMEs⁶² is used to estimate the number of companies by size likely to be new reporters under each Option. This is then

⁵⁹ 2% is an applied assumption to identify the companies that benefit the most from emission reductions, it is half the upper bound of emission reductions used in this IA

⁶⁰ The employment of these companies is estimated using a combination of BIS data on SMEs, which provides employment and turnover information for these companies, and more detailed data from IDBR on the number of companies under different employment bands. The latter source estimates there are 690 companies with greater than 1000 employees, and 2,105 companies with 500-1000 employees. After the largest 2017 companies, it is estimated that companies employing fewer than 693 employees will report under this option. Additionally, companies that are reporting under CCAs or reporting voluntarily are also excluded. It is estimated that 12% of non-CRC large companies will be reporting under CCAs or voluntarily and so a further 12% of companies with reported employment of greater than 250 employees are also excluded, assuming they report in the baseline.

⁶¹ <http://stats.bis.gov.uk/ed/sme/>

⁶² <http://stats.bis.gov.uk/ed/sme/>

used to calculate the emissions relating to new reporters under each option. The 4% reduction is then applied to these emissions to show the emission reduction for new reporters.

Companies that voluntarily report transport emissions as with on-site emissions are likely to experience high benefits in relation to their costs. The IA assumes that the NERA/Enviros⁶³ data (defining companies that are likely to benefit from emission reductions under CRC) can be used as a proxy for the companies that are likely to benefit from transport reporting.

The methodology estimated the MWh of electricity per firm for CRC companies, and compares this to the MWh of electricity per firm for non-CRC companies. The ratio of electricity emissions of the two groups is used to estimate the ratio of emissions for companies voluntarily reporting under Option 1 versus companies reporting under Option 3. The estimated ratio of emissions is approximately 8 times larger than non-CRC companies, and this is used as a crude proxy for the relative emissions of voluntary reporters under Option 1 compared to those not reporting voluntarily.

For the remaining options, employment and turnover data is again used to attribute the relative amount of employment and turnover to the different options considered. This is summarised in table 13. It is assumed that 1,500 of the total 24,000 companies voluntarily report their transport emissions (6% of large companies).

- Option 2: The estimated UK employment and turnover of quoted companies is based on employment and turnover data from Companies House. It is estimated that employment and turnover are 6.7m and £1030 billion per annum, equivalent to 29% and 32% of total employment and turnover respectively. It is assumed that 6% of transport emissions will be reported in the baseline.
- Option 3: The estimate of the UK employment and turnover of large companies is estimated from BIS SME data⁶⁴. Employment is estimated at 11.1m and turnover at £1.9trillion, which makes up 49% and 61% of total employment respectively. It is assumed that 6% of transport emissions in this option will be reported in the baseline.
- Option 4: The estimate of UK employment and turnover of CRC companies is estimated using BIS SME data⁶⁵. It is expected that CRC companies are large due to their high emissions. However the link between freight transport emissions on-site emissions would not be expected to be very strongly linked. Average employment and turnover figures for companies of greater than 500 employees are used as a proxy for transport related emissions. It is estimated that employment and turnover are 5.7m and £969 billion per annum, equivalent to 25% and 30% of total employment and turnover respectively.

		Option 1	%	Option 2	%	Option 3	%	Option 4	%	Total Proxies for Non-reported Emissions
On-Site	Employment ('000s)	N/A	N/A	36	0.2%	4,766	29%	0	0%	16,456
	Turnover (£m)	N/A	N/A	15,955	0.7%	897,856	42%	0	0%	2,146,815
Transport	Employment ('000s)	719	1.9%	6,729	29%	11,129	49%	5,703	25%	22,819
	Turnover (£m)	128,608	2.1%	1,039,401	32%	1,991,370	61%	969,121	30%	3,240,329

⁶³ <http://www.decc.gov.uk/assets/decc/what%20we%20do/a%20low%20carbon%20uk/crc/policy/nera-enviros-report-060428.pdf>

⁶⁴ <http://stats.bis.gov.uk/ed/sme/>

⁶⁵ <http://stats.bis.gov.uk/ed/sme/>

Profile of On-Site Emission Reductions

The on-site emission reductions assume a maximum emission reduction of 4%. Feedback during the consultation period suggested that the profile of benefits was unrealistic, as not all benefits would be realised in the first year. The profile has been smoothed, assuming that benefits increase up to 4% over the first five years. The 4% represents an upper bound estimate of the average behaviour change of new reporting firms. In reality it may be that the maximum additional behaviour change is realised over a longer period and that greater levels of emission reduction are achieved after this period. The annual on-site carbon dioxide emission reductions are provided in Annex E, Table 29.

Non-CO2 on-site GHG Emission Reductions

Reductions in carbon dioxide emissions will lead to savings in other GHG emission savings as well. It is estimated that non-CO2 GHGs related to business emissions are approximately 8.5% of their carbon dioxide emissions, in CO₂e terms. This 8.5% has been added to the CO₂ emissions savings. These GHG savings are provided in Annex E, table 30.

Profile of Freight Emission Reductions

The freight emission reductions assume a maximum emission reduction of 4%. Feedback during the consultation period suggested that the profile of benefits was unrealistic, as all benefits would not be realised in the first year. The profile has been smoothed, assuming that benefits increase and reach a maximum over the first five years. The 4% represents an upper bound estimate of the average behaviour change of new reporting firms. In reality it may be that the maximum additional behaviour change is realised over a longer period.

Other Freight Transport Emission Savings

There are additional emissions related to other freight transport modes, such as water, air and rail freight. DfT estimate that the UK emissions for these transport modes are the following:

- Total emission related to water transport: 20MtCO₂e
- Total emissions related to rail: 0.9MtCO₂e

This leads to an increase in estimated emissions covered by 69%. This analysis assumes that similar emission reductions related to these transport modes are also achievable. These have been added to the road freight emissions savings. The annual freight GHG emission reductions are provided in Annex D, table 33.

Annex D: CRC activities and average cost calculation for large companies

1. The following shows the adjustments made to the CRC cost estimates that resulted in average cost to a large reporting company falling from £30k in the consultation IA to £2k. Paragraph 8.7 explains that the CRC original estimate reduced for two reasons: (i) CRC typically covers more sites/emissions, (ii) lots of activities needed stripping out as not relevant for GHG reporting.

2. Average cost of a reporting under the CRC for a company not covered by the CRC***:

1	2	3	4
	NERA/Enviros Report CRC estimates ⁶⁶	DECC estimates annual cost under CRC	Column 2 minus 3
Number of companies	4595	2484	2,111
Administrative costs (£m)	41	27	14

***see paragraphs 8.7 to 8.9 for more information

From column 4 of the above table average cost of CRC for a non-CRC company is £6,505 (2,111/14) per annum in 2005 prices (£7212 in 2009 prices).

3. Working out Administrative time for a reporting company: a table breaking down the activities that made up the basis of cost estimates for the CRC is provided below. This is broken into a number of discrete actions and the time taken to perform each.

Table reproduced from the Impact Assessment on the Implementation of the CRC⁶⁷

Average management commitment (in person days) due to scheme participation

Number of sites operated by organisation	1	2	3	4	5	6-10
Understanding the rules	3	3	3	3	4	4
Initial collection and analysis of energy data	3	3	4	4	4	4
Developing a compliance strategy	1	1	1	1	1	1
Understand and take part in Auction	2	2	2	3	3	4
Trading activities	2	2	2	2	2	3
Submitting data to coordinator	1	1	1	2	2	3
Verifying data (external costs)	3	4	5	6	7	10
Total person-days	14	15	18	20	22	27

Management costs of participation

£7,000 £7,500 £9,000 £10,000 £11,000 £13,500

- Source: NERA/Enviros estimates.
- Note: The Cost estimates assume a daily cost of £500 / person-day input. The discrepancies in the totals are explained by roundings in the person days.

⁶⁶ see paragraphs 8.8 for more information

⁶⁷ http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/policy/policy.aspx

See consultation IA annex I for more details on the above CRC activities.

4. Feedback from the consultation stage was highly critical of the use of CRC costs as not being directly comparable for this IA, given the wider range of activities that the CRC covers. The CRC scheme covers actions which are additional to those that would be required under company reporting, such as developing a compliance strategy, understanding and taking part in an auction, trading activities, submitting data to coordinator and verifying data. For the purposes of this IA the additional activities mentioned have been stripped out. Further, as para 8.10 mentions, understanding the rules have been halved (as CRC is a much more complicated and prescriptive scheme than corporate reporting) so, from the table above, for 50+ companies 4 person days becomes 2. The admin time for a company reporting GHG emissions is then 26% (15/57) factoring in time for verification this become 27%.

5. Taking the average cost of reporting for a non-CRC company from paragraph 2 above and multiplying this with paragraph 4, i.e. down-rating cost to take account of the administrative time for a company reporting GHG emissions, and then up-rating the figure to 2009 prices we get, £1934 (circa £2k).

Annex E: Table of impacts

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	1,133	0	1,688	0	124,582	0	0
2013	0	2,266	0	3,376	0	249,163	0	0
2014	0	3,400	0	5,064	0	373,745	0	0
2015	0	4,533	0	6,751	0	498,326	0	0
2016	0	5,666	0	8,439	0	622,908	0	0
2017	0	5,666	0	8,439	0	622,908	0	0
2018	0	5,666	0	8,439	0	622,908	0	0
2019	0	5,666	0	8,439	0	622,908	0	0
2020	0	5,666	0	8,439	0	622,908	0	0
2021	0	5,666	0	8,439	0	622,908	0	0
Total	-	45,327	-	67,515	-	4,983,263	-	-

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	97	0	144	0	10,620	0	0
2013	0	193	0	288	0	21,240	0	0
2014	0	290	0	432	0	31,860	0	0
2015	0	386	0	576	0	42,480	0	0
2016	0	483	0	719	0	53,100	0	0
2017	0	483	0	719	0	53,100	0	0
2018	0	483	0	719	0	53,100	0	0
2019	0	483	0	719	0	53,100	0	0
2020	0	483	0	719	0	53,100	0	0
2021	0	483	0	719	0	53,100	0	0

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	1,918	0	2,857	0	210,851	0	0
2013	0	3,836	0	5,713	0	421,703	0	0
2014	0	5,754	0	8,570	0	632,554	0	0
2015	0	7,672	0	11,427	0	843,406	0	0
2016	0	9,589	0	14,283	0	1,054,257	0	0
2017	0	9,589	0	14,283	0	1,054,257	0	0
2018	0	9,589	0	14,283	0	1,054,257	0	0
2019	0	9,589	0	14,283	0	1,054,257	0	0
2020	0	9,589	0	14,283	0	1,054,257	0	0
2021	0	9,589	0	14,283	0	1,054,257	0	0

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	2,058	0	3,065	0	226,208	0	0
2013	0	4,115	0	6,129	0	452,415	0	0
2014	0	6,173	0	9,194	0	678,623	0	0
2015	0	8,230	0	12,259	0	904,830	0	0
2016	0	10,288	0	15,324	0	1,131,038	0	0
2017	0	10,288	0	15,324	0	1,131,038	0	0
2018	0	10,288	0	15,324	0	1,131,038	0	0
2019	0	10,288	0	15,324	0	1,131,038	0	0
2020	0	10,288	0	15,324	0	1,131,038	0	0
2021	0	10,288	0	15,324	0	1,131,038	0	0

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	14,472	0	117,654	0	210,645	0	104,915
2013	0	28,945	0	235,308	0	421,290	0	209,831
2014	0	43,417	0	352,962	0	631,935	0	314,746
2015	0	57,889	0	470,616	0	842,580	0	419,662
2016	0	72,362	0	588,270	0	1,053,224	0	524,577
2017	0	72,362	0	588,270	0	1,053,224	0	524,577
2018	0	72,362	0	588,270	0	1,053,224	0	524,577
2019	0	72,362	0	588,270	0	1,053,224	0	524,577
2020	0	72,362	0	588,270	0	1,053,224	0	524,577
2021	0	72,362	0	588,270	0	1,053,224	0	524,577

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	5,731,626	0	46,595,613	0	83,423,716	0	41,550,648
2013	0	11,527,165	0	93,710,810	0	167,777,684	0	83,564,625
2014	0	17,311,431	0	140,734,357	0	251,967,563	0	125,496,875
2015	0	23,333,101	0	189,687,904	0	339,612,870	0	169,150,161
2016	0	29,487,278	0	239,718,668	0	429,186,803	0	213,764,032
2017	0	29,803,039	0	242,285,672	0	433,782,708	0	216,053,104
2018	0	30,138,184	0	245,010,250	0	438,660,730	0	218,482,689
2019	0	30,480,952	0	247,796,803	0	443,649,711	0	220,967,538
2020	0	30,831,606	0	250,647,470	0	448,753,478	0	223,509,559
2021	0	30,831,606	0	250,647,470	0	448,753,478	0	223,509,559

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	31,060	0	46,263	0	3,414,685	0	-
2013	0	63,051	0	93,914	0	6,931,812	0	-
2014	0	95,995	0	142,984	0	10,553,683	0	-
2015	0	129,913	0	193,505	0	14,282,651	0	-
2016	0	164,827	0	245,509	0	18,121,113	0	-
2017	0	167,300	0	249,192	0	18,392,930	0	-
2018	0	169,809	0	252,930	0	18,668,824	0	-
2019	0	172,356	0	256,724	0	18,948,856	0	-
2020	0	174,942	0	260,575	0	19,233,089	0	-
2021	0	197,109	0	293,593	0	21,670,135	0	-
PV	0	1,366,361	0	2,035,189	0	150,217,780	0	-

Table 41: Value of Wider GHG Emission Reductions (£) - Not Discounted

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	5,145	0	7,664	0	565,653	0	-
2013	0	10,445	0	15,557	0	1,148,276	0	-
2014	0	15,902	0	23,686	0	1,748,250	0	-
2015	0	21,521	0	32,055	0	2,365,965	0	-
2016	0	27,304	0	40,669	0	3,001,818	0	-
2017	0	27,714	0	41,279	0	3,046,845	0	-
2018	0	28,129	0	41,899	0	3,092,548	0	-
2019	0	28,551	0	42,527	0	3,138,936	0	-
2020	0	28,980	0	43,165	0	3,186,020	0	-
2021	0	29,463	0	43,884	0	3,239,121	0	-
PV	0	185,569	0	276,404	0	20,401,456	0	-

Table 42: Value of Electricity Savings (£) - Not Discounted

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	138,131	0	205,745	0	15,186,112	0	0
2013	0	279,968	0	417,011	0	30,779,652	0	0
2014	0	425,440	0	633,691	0	46,772,906	0	0
2015	0	574,312	0	855,435	0	63,139,881	0	0
2016	0	725,593	0	1,080,768	0	79,771,720	0	0
2017	0	733,603	0	1,092,699	0	80,652,380	0	0
2018	0	739,653	0	1,101,710	0	81,317,511	0	0
2019	0	750,853	0	1,118,392	0	82,548,805	0	0
2020	0	758,470	0	1,129,737	0	83,386,192	0	0
2021	0	769,140	0	1,145,631	0	84,559,264	0	0
PV	0	4,905,972	0	7,307,424	0	539,362,705	0	0

Table 43: Value of Gas Savings (£) - Not Discounted

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	44,556	0	66,366	0	4,898,457	0	0
2013	0	90,220	0	134,382	0	9,918,740	0	0
2014	0	136,994	0	204,053	0	15,061,165	0	0
2015	0	184,883	0	275,382	0	20,326,039	0	0
2016	0	233,888	0	348,376	0	25,713,695	0	0
2017	0	236,678	0	352,531	0	26,020,369	0	0
2018	0	239,473	0	356,694	0	26,327,681	0	0
2019	0	242,274	0	360,866	0	26,635,620	0	0
2020	0	245,081	0	365,047	0	26,944,214	0	0
2021	0	247,894	0	369,237	0	27,253,456	0	0
PV	0	1,582,702	0	2,357,428	0	174,002,309	0	0

Table 44: Value of Freight Emission Reductions (£) - Not Discounted

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	770,836	0	6,266,562	0	11,219,508	0	5,588,073
2013	0	1,564,798	0	12,721,120	0	22,775,602	0	11,343,789
2014	0	2,382,404	0	19,367,906	0	34,675,854	0	17,270,919
2015	0	3,224,187	0	26,211,232	0	46,927,989	0	23,373,310
2016	0	4,090,688	0	33,255,501	0	59,539,886	0	29,654,887
2017	0	4,152,048	0	33,754,334	0	60,432,984	0	30,099,710
2018	0	4,214,329	0	34,260,649	0	61,339,479	0	30,551,206
2019	0	4,277,544	0	34,774,558	0	62,259,571	0	31,009,474
2020	0	4,341,707	0	35,296,177	0	63,193,465	0	31,474,616
2021	0	4,414,069	0	35,884,446	0	64,246,689	0	31,999,193
PV	0	33,432,609	0	271,792,485	0	486,611,028	0	201,545,477

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	2,232,763	0	18,151,388	0	32,497,829	0	16,186,115
2013	0	4,544,113	0	36,941,651	0	65,358,039	0	32,552,720
2014	0	6,904,953	0	56,134,249	0	98,154,327	0	48,887,488
2015	0	9,415,474	0	76,543,685	0	132,296,683	0	65,892,689
2016	0	12,036,175	0	97,848,837	0	167,190,337	0	83,272,087
2017	0	12,303,875	0	100,025,119	0	168,980,678	0	84,163,798
2018	0	12,582,608	0	102,291,100	0	170,880,919	0	85,110,246
2019	0	12,867,682	0	104,608,624	0	172,824,384	0	86,078,223
2020	0	13,159,315	0	106,979,470	0	174,812,564	0	87,068,471
2021	0	13,302,917	0	108,146,894	0	174,812,564	0	87,068,471
PV	0	82,513,579	0	670,799,300	0	1,130,441,966	0	563,036,495

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	171,406	0	1,371,517	0	2,794,911	0	1,218,819
2013	0	351,550	0	2,813,391	0	5,725,832	0	2,500,254
2014	0	538,456	0	4,309,547	0	8,764,281	0	3,829,964
2015	0	740,059	0	5,924,453	0	12,025,993	0	5,265,436
2016	0	953,687	0	7,636,388	0	15,472,395	0	6,787,295
2017	0	982,910	0	7,872,129	0	15,921,639	0	6,997,176
2018	0	1,013,563	0	8,119,453	0	16,392,165	0	7,217,378
2019	0	1,045,307	0	8,375,612	0	16,879,062	0	7,445,452
2020	0	1,078,188	0	8,640,975	0	17,383,005	0	7,681,727
2021	0	1,099,752	0	8,813,795	0	17,730,665	0	7,835,362
PV	0	6,611,727	0	52,956,434	0	107,056,533	0	47,071,168

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	12,170	0	18,128	0	1,337,998	0	-
2013	0	24,643	0	36,706	0	2,709,272	0	-
2014	0	37,420	0	55,736	0	4,113,908	0	-
2015	0	50,500	0	75,220	0	5,551,991	0	-
2016	0	63,886	0	95,158	0	7,023,612	0	-
2017	0	64,648	0	96,293	0	7,107,379	0	-
2018	0	65,411	0	97,430	0	7,191,320	0	-
2019	0	66,176	0	98,569	0	7,275,433	0	-
2020	0	66,943	0	99,711	0	7,359,724	0	-
2021	0	67,711	0	100,856	0	7,444,193	0	-
PV	0	432,310	0	643,924	0	47,528,164	0	-

Year	Option 1		Option 2		Option 3		Option 4	
	Low	High	Low	High	Low	High	Low	High
2012	0	713,415	0	5,799,752	0	10,383,743	0	5,171,806
2013	0	1,451,940	0	11,803,639	0	20,883,275	0	10,401,282
2014	0	2,206,279	0	17,936,079	0	31,362,383	0	15,620,586
2015	0	3,008,443	0	24,457,326	0	42,271,587	0	21,054,107
2016	0	3,845,812	0	31,264,772	0	53,420,848	0	26,607,192
2017	0	3,931,348	0	31,960,140	0	53,992,900	0	26,892,113
2018	0	4,020,409	0	32,684,169	0	54,600,067	0	27,194,523
2019	0	4,111,496	0	33,424,667	0	55,221,045	0	27,503,812
2020	0	4,204,679	0	34,182,203	0	55,856,310	0	27,820,217
2021	0	4,250,563	0	34,555,219	0	55,856,310	0	27,820,217
PV	0	26,364,833	0	214,334,559	0	361,200,109	0	179,902,065

Annex F: How costs have changed from consultation IA

The annex shows a step by step breakdown of option 2 costs, both for the consultation and the final IA. This explains how the costs have changed since the consultation – For onsite emissions, costs of reporting have now been reduced significantly in line with evidence from the consultation. Transport costs of reporting have come down very significantly also, post consultation, where previously a crude approximation had been required in the absence of any firm pre-consultation evidence – i.e. pre-consultation the CRC proxy was too crude, the proportion of larger firms affected was overestimated, as was the number of firms that the policy would affect. Note the crude approach taken in the consultation IA provides an aggregate transport cost figure without taking into account company size and average company cost; by mapping the aggregate figure calculated to the number of companies in option 2 – the consultation IA implicitly assumed an average transport cost per company of £82k if all 1101 companies were affected.

Here is a detailed step by step breakdown of the consultation and final IA costs:

Consultation IA cost figure breakdown:

Total PV cost for the high range of option 2: £926m - £906m of which is transport cost and £20m of which is onsite costs. Nb. The low range formula is the same to work out the £5.1m PV costs, with the exception that transport costs are £0 and onsite costs uses a lower bound of £5,600 for a large company costs as opposed to £30k (as below, see annex D for more details) for a large company to derive the average cost of a company.

Breakdown of the transport PV costs: £906m

- 1) Total cost per large company is £31k (includes £30k measuring + £120 one off costs + £1k reporting) – source is CRC data⁶⁸.
- 2) Multiply 1) above, with total large companies covered by option 3, which is 24k, this gives an estimates of the annual total cost £747m undiscounted for 24k large companies
- 3) Multiply 2) above, by 25%⁶⁹ to reflect transport cost as percentage of total, which gives annual transport cost of £187m for 24k large companies
- 4) **Apply 3) over 10 years and discount = £1,607m – this is a total transport cost for all 24k companies**
- 5) To apply 4) to each option the proportion of transport emissions as a percentage of total emissions attributable to it is used – for Option 2 transport emissions of 31% (for quoted companies as a % of total emissions for option 2) as a proportion of option 3 transport emissions of 55% (for the 24k large companies as a % of total emissions for option 3) = 56.4%
- 6) £906m = 4) multiplied by 5) from above.

That is estimates of the cost of reporting transport emissions are based on large company reporting costs pro-rat'd by % of emissions covered by transport (a crude assumption is made here see footnote 2) in comparison to total emissions for electricity and gas related emissions.

Breakdown of onsite PV costs: circa £20m:

- 1) £20m (broken down by £16m cost to new reporters + £3.6m cost to firms having to adjust i.e. those already covered by other policy)

Cost to new reporters

- 2) New reporters PV cost £16m = 17k one off costs + 16m ongoing costs
- 3) 16m ongoing PV costs is £1.9m annual cost (broken down by measuring onsite costs = 1.8m to new reporters + reporting onsite costs = £65k)

⁶⁸ An estimate of the total costs of large companies reporting electricity and gas related emissions is made using the newly reporting cost estimates.

⁶⁹ Based on DfT Freight Estimates

- 4) **Measuring onsite cost** to all new reporters of 1.8m (broken down by company size, £100k to small firms + £121k to medium firms and £1.6m to large firms.
- 5) Measuring overall cost by company size from 3) above, is the measuring cost for an average company (small =£1,250, medium = £1,900, large = £30k) multiplied by No. of companies effected (small = 80, medium = 64, large 53)
- 6) **Reporting onsite costs** from 3) above, £65k (same way as calculating 5 above, with cost for reporting in this case, for small firms = £70, medium firms = £100, large firms = £1000)

Cost to adjustors

- 7) Adjustors PV cost of £3.5m of just reporting the emissions which is an annual cost of £421k (broken down by small firm =£36k and large firm =£385k)
- 8) Reporting cost per company, average reporting cost (small = £70, large £1000) multiplied by the No. of companies effected (small = 519, large = 385)

Final IA cost figure breakdown:

Total PV central cost for option 2: £28m - £26m of which is transport cost and £2.2m of which is onsite costs. The change in methodology from the consultation IA is based on feedback from the consultation stage and new data.

Breakdown of transport PV costs: £26m:

- 1) £26m is total transport PV cost and the annual cost is £2.6m (this is broken down by company size, small = £36k, medium £59k, large = £118k, very large = £2.4m)
- 2) Cost by company size from 1) above is calculated by admin cost for an average company (small = £574, medium = £873, large, £1,838, very large = £7,618) multiplied by No. of companies (small = 63, medium = 68, large = 64, very large = 314) – Information from London Stock exchange and Companies House from BIS data on SMEs is used to estimate the number of companies by size likely to be new reporters under each Option (see annex C for more information)
- 3) To work out the average cost per company used in 2 above. The admin cost per company uses the cost per large comp £2k or (£1,934 – this is equivalent to £1,838 from point 2 above but in a different price year) to work out the average cost for small, medium and large companies. Also the £1,934 is 48% of 4k. The 48% is then multiplied by the average cost per company of reporting (Small = 1250, medium = 1900 and very large = 15641 from IEMA) to work out the admin cost for an average company in 2.

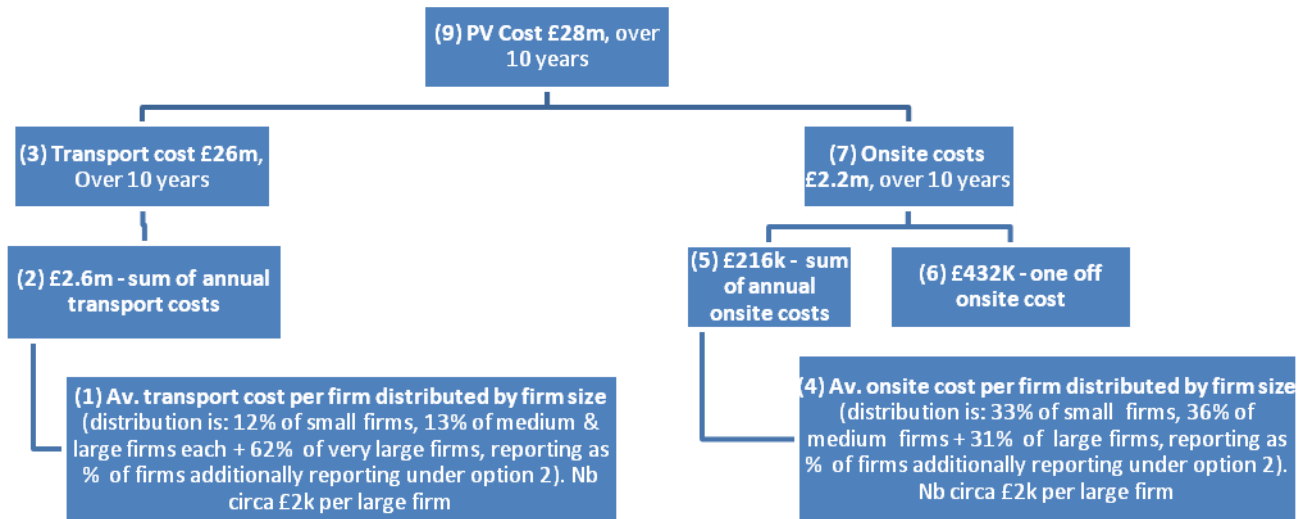
Breakdown of onsite PV costs: £2.2m:

- 4) £2.2m total PV onsite cost (is broken down by £432k one off costs, and ongoing annual costs of £216k)
- 5) £216k ongoing annual cost per comp broken down by company size (small = £38k, medium = £62k, large = £116k)
- 6) To work out 5 above is similar to point 3 but without a price year adjustment so cost for an average company (small = £604, medium = £919, large = £1934) is multiplied by No. of companies (small = 63, medium = 68, large = 60) - Information from London Stock exchange and Companies House from BIS data on SMEs is used to estimate the number of companies by size likely to be new reporters under each Option (see annex C for more information).

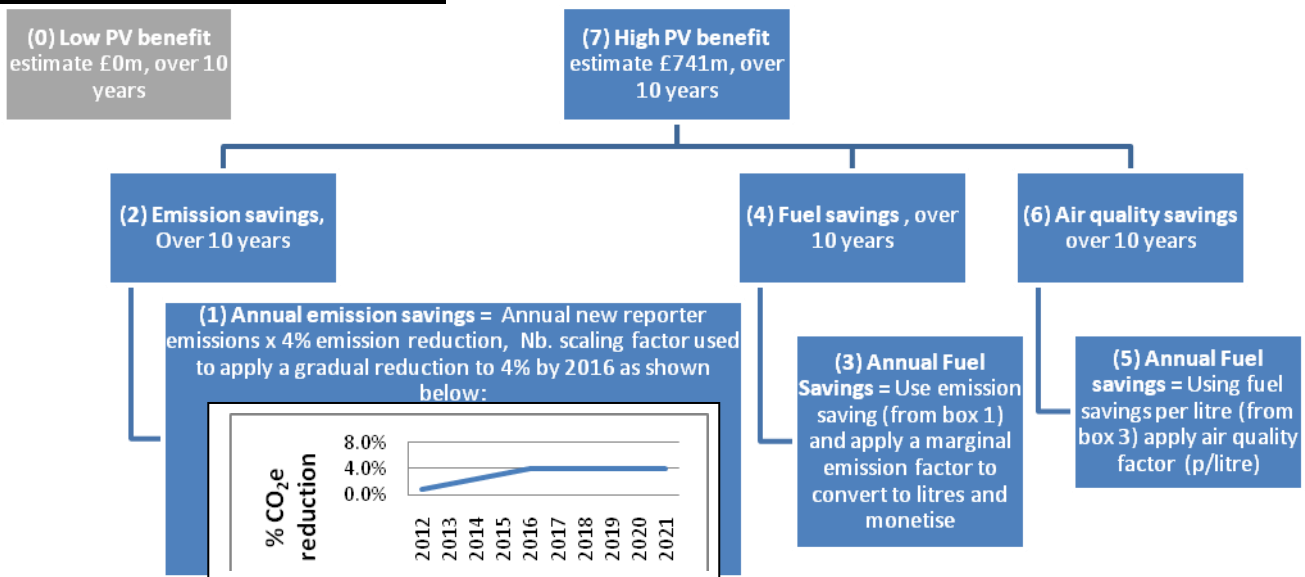
Annex G: Mind-map of Final IA Cost/benefit analysis for Option 2

The Baseline includes some companies in option 2 that are already reporting CO₂ emissions due to existing policies (EU ETS, CRC and CCA) that overlap with some of the GHG reporting and some companies who are voluntarily reporting. We then assess the additional benefit of reporting CO₂ emissions, and further benefits from reporting wider GHG and transport emissions. Nb. Some impacts (e.g. international costs/benefits) are outside the scope of this IA.

Additional costs of option 2



Additional benefits of option 2



Reason for the difference between consultation (high end) and final IA (central) cost estimates:

- For transport costs the Consultation IA (CIA) overestimates; average transport cost to a large company (Implicit £82k in CIA vs. £2k in this IA), number of large companies effected (CIA assumes all large whilst the final IA assumes a distribution see box 3 in cost section above), and the number of companies effected (CIA assumes all whilst final IA assumes half);
- The overestimate on the onsite costs in the CIA is mainly driven by higher costs per company in the pre-consultation vs. final IA (e.g. £30k vs. £2k for large firms) and by a slightly larger distribution of firms affected than the final IA.