

<b>Title:</b>  Impact Assessment of options for company GHG reporting  <b>Lead department or agency:</b> Defra  <b>Other departments or agencies:</b> DECC, BIS	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DEFRA1334
	<b>Date:</b> 17/01/2011
	<b>Stage:</b> Consultation
	<b>Source of intervention:</b> Domestic
	<b>Type of measure:</b> Secondary legislation
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## Summary: Intervention and Options

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

Greenhouse gases (GHGs) are emitted by a wide range of activities. GHG emissions contribute to damaging climate change, but those responsible do not face the full cost of that damage. Businesses can save money by reducing their emissions, e.g. by minimising energy and resource use. Stern (2006) highlighted that 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. So complementary policy is needed alongside pricing instruments to ensure cost-effective emissions reduction. The aim of encouraging GHG reporting is to achieve behaviour change by giving organisations the information and tools to reduce emissions, and, by encouraging consistency in disclosure, to provide investors and shareholders with relevant information.

### What are the policy objectives and the intended effects?

A number of UK companies do already report some of their emissions under schemes such as the EU Emissions Trading System and CRC Energy Efficiency Scheme but such schemes currently cover only CO<sub>2</sub> emissions, and focus on high energy users only. There are other emission sources, such as transport, and other greenhouse gases that are not currently covered by existing schemes. Moreover, there are a large number of companies who undertake no monitoring or reporting of any emissions. A requirement for companies to report on GHG emissions would provide them with the information needed to manage their emissions, and would also provide shareholders/investors with comparable information that would enable them to judge whether a company's strategy adequately took account of the risks and challenges presented by climate change. The objective of requiring measuring and reporting of emissions would be to generate benefits in excess of the costs of implementing such a requirement.

### What policy options have been considered? 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 to businesses
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

**There is no preferred option**

**When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?**

It will be reviewed  
04/2015

**Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?**

Yes/No

**SELECT SIGNATORY Sign-off** For consultation stage Impact Assessments:

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

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

# Summary: Analysis and Evidence

# Policy Option 1

Description: Enhanced voluntary reporting scheme

Price Base Year 2009	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £0.0	High: £3.5	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£0.00	£0.00	£0.0
High	£0	£0.13	£1.1m
Best Estimate	-	-	-

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

It is assumed 3000 small companies and 200 large companies additionally undertake voluntary reporting

- Transport Related: PV Total Costs (Illustrative): £0m - £1.1m

### 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
High	-	£0.48	£4.6
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 based on two scenarios Low and Upper
- The full range of benefits has lower bound zero, and no central estimate.
- Estimated reduction in CO<sub>2</sub>e emissions: Low £0 – Upper £3.4m
- Financial savings to UK companies through reduced fuel use:  
Fuel savings – diesel: Low £0 - Upper £1.2m

### 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
- Air quality benefits have not been monetised

### Key assumptions/sensitivities/risks

Discount rate (%)

3.5

- Transport related cost estimates are illustrative, and highly uncertain at this stage
- The average cost of reporting transport related emissions (ie cost per tonne of emissions reported) is assumed the same as for reporting electricity and gas related emissions for large companies.
- Option assumes that through increased engagement, the take-up of voluntary reporting over the period 2011-2020 is increased by a maximum additional take-up of 3,000 small companies and 200 large companies above the baseline.
- Benefits and costs only relate to reduced transport emissions.
- It is assumed that there is a maximum of a 4% reduction in freight transport CO<sub>2</sub> emissions.
- It is assumed that firms do not undertake emission savings related to energy savings as it would not be cost beneficial.
- Economic theory predicts firms that voluntarily report will do so where there are benefits to that firm, therefore a lower cost estimate is used for voluntarily reporting costs.

Impact on admin burden (AB) (£m):			Impact on policy cost savings (£m):	In scope
New AB: N/A	AB savings: N/A	Net: N/A	Policy cost savings: N/A	Yes/No

# Summary: Analysis and Evidence

# Policy Option 2

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

Price Base Year 2009	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: <b>-£926</b>	High: £696	Best Estimate: -

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£0.01	£0.59	£5.1
High	£0.02	£108	£926
Best Estimate		-	-

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

Covers 1,101 companies

- One-off costs for companies to read and understand GHG reporting guidance: £14,000 - £17,000
- Electricity and Gas Related Costs: PV Measuring: £4.5m - £15.6m; PV Reporting: £0.6m -£4.2m
- Transport Related: PV Total Costs (Illustrative): £0 - £906m

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

- All international emissions reporting costs, to companies

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	£0	£0
High	-	£19.4 - £79.9	£179 – 701
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 based on three scenarios **Low, High and Upper**
- The **Low** scenario assumes **zero** benefits, and there is **no central estimate**
- Estimated reduction in CO<sub>2</sub> emissions: Low £0 - High £179m - Upper £179m
- Financial savings to UK organisations through reduced fuel use:
  - Energy savings – electricity: Low £0m - High £0m - Upper £1.3m
  - Energy savings – gas: Low £0m - High £0m - Upper £0.4m
  - Fuel savings – diesel: Low £0m – High £0m - Upper £519m
- For Upper bound savings approximately 75% of benefits occur as private benefits to companies

### 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

<b>Key assumptions/sensitivities/risks</b>	<b>Discount rate</b>	3.5
<ul style="list-style-type: none"> <li>• Transport related cost estimates are illustrative, and highly uncertain at this stage</li> <li>• The average cost of reporting transport related emissions (ie cost per tonne of emissions reported) is assumed the same as for reporting electricity and gas related emissions for large companies.</li> <li>• It is assumed that there is a maximum of a 2% reduction in CO<sub>2</sub> emissions, and related wider GHG emissions.</li> <li>• It is assumed that there is a maximum of a 4% reduction in freight transport CO<sub>2</sub> emissions.</li> <li>• Estimate of energy savings assumes 2/3<sup>rd</sup>s of emissions from electricity use and 1/3<sup>rd</sup> from gas. Road transport savings are assumed to be from diesel only.</li> </ul>		

<b>Impact on admin burden (AB) (£m):</b>			<b>Impact on policy cost savings (£m):</b>	<b>In scope</b>
New AB: N/A	AB savings: N/A	Net: N/A	Policy cost savings: N/A	Yes/No

# Summary: Analysis and Evidence

# Policy Option 3

Description: Mandate under Companies Act for all large companies

Price Base Year 2009	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: <b>-£6025</b>	High: <b>£549</b>	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£1.96	£94	<b>£808</b>
High	£1.96	£700	<b>£6,025</b>
Best Estimate	<b>Not provided -</b>	<b>Not provided -</b>	<b>Not provided -</b>

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

Covers 24,000 companies

- One-off costs for companies to read and understand GHG reporting guidance: £1.96m - £1.96m
- Electricity and Gas Related Costs: PV Measuring: £785m - £4,209m; PV Reporting: £20.7m - £206.6m
- Transport Related: PV Total Costs (Illustrative): £0 - £1,607m

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

- All international emission reporting costs, to companies

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional	£0	<b>£0</b>
High	Optional	£36 - 154	<b>£332 - 1,355</b>
Best Estimate	<b>Not provided</b>	<b>Not provided -</b>	<b>Not provided -</b>

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

- A range is given on benefits based on three scenarios **Low, High and Upper**
- The **Low** scenario assumes **zero** benefits, and there is **no central estimate**
- Estimated reduction in CO<sub>2</sub> emissions: Low £0m - High £330m - Upper £335m
- Financial savings to UK organisations through reduced energy use:
  - Energy savings – electricity: Low £0 - High £0 - Upper £74m
  - Energy savings – gas: Low £0 - High £0 - Upper £25m
  - Fuel savings – diesel: Low £0 - High £0 - Upper £921 m
- For Upper benefits approximately 75% of benefits are direct benefits to companies.

### 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

- **Transport related cost estimates are illustrative, and highly uncertain at this stage**
- **The average cost of reporting transport related emissions (ie cost per tonne of emissions reported) is assumed the same as for reporting electricity and gas related emissions for large companies.**
- It is assumed that there is a maximum of a 2% reduction in CO<sub>2</sub> emissions, and related wider GHG emissions.
- It is assumed that there is a maximum of a 4% reduction in freight transport CO<sub>2</sub> emissions.
- Assumes equal emissions for all large firms. Those covered by reporting schemes will have larger emissions therefore emission reductions from new reporters will be overestimated.

Impact on admin burden (AB) (£m):			Impact on policy cost savings (£m):	In scope
New AB: N/A	AB savings: N/A	Net: N/A	Policy cost savings: N/A	Yes/No

# Summary: Analysis and Evidence

# Policy Option 4

**Description:** Mandate GHG reporting under Companies Act for all companies meeting an energy consumption criteria (greater than 6,000MWh of electricity through Half Hourly Meters).

Price Base Year 2009	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: <b>-£1233</b>	High: £955	Best Estimate:

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low			£0.41	<b>£3.5</b>
High			£143.2	<b>£1233</b>
Best Estimate			<b>Not provided</b>	<b>Not provided</b>

**Description and scale of key monetised costs by ‘main affected groups’**

Covers 4,050 companies

- Electricity and Gas Related Costs: PV Reporting: £3.5m - £35m
- Transport Related: PV Total Costs (Illustrative): £0 - £1,198m

**Other key non-monetised costs by ‘main affected groups’**

- All international emission reporting costs, to companies

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-		£0	<b>£0</b>
High	-		£26 - 107	<b>£241 - 959</b>
Best Estimate			<b>Not provided</b>	<b>Not provided</b>

**Description and scale of key monetised benefits by ‘main affected groups’**

- A range is given on benefits based on three scenarios Low, High and Upper
- The Low scenario assumes zero benefits, and there is no central estimate
- Estimated reduction in CO<sub>2</sub> emissions: Low £0 - High £241 – Upper £241m
- Financial savings to UK organisations through reduced energy use:  
Fuel Savings Low £0 - High £0 - Upper £718m

**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

- Transport related cost estimates are illustrative, and highly uncertain at this stage
- The average cost of reporting transport related emissions (ie cost per tonne of emissions reported) is assumed the same as for reporting electricity and gas related emissions for large companies.
- It is assumed that there is a maximum of a 2% reduction in CO<sub>2</sub> emissions, and related wider GHG emissions.
- It is assumed that there is a maximum of a 4% reduction in freight transport CO<sub>2</sub> emissions.
- Estimate of energy savings derived from CO<sub>2</sub> emissions reduction estimate.
- As fuel and gas and electricity emissions use the same proxy, fuel related benefits are likely to be overestimated.

<b>Impact on admin burden (AB) (£m):</b>			<b>Impact on policy cost savings (£m):</b>	<b>In scope</b>
New AB: N/A	AB savings: N/A	Net: N/A	Policy cost savings: N/A	Yes/No

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?	UK				
From what date will the policy be implemented?	06/04/2012				
Which organisation(s) will enforce the policy?	Policy Option 1 – N/A. Other Policy Options – Financial Reporting Council				
What is the annual change in enforcement cost (£m)?	Negligible				
Does enforcement comply with Hampton principles?	Yes				
Does implementation go beyond minimum EU requirements?	Yes				
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)	<b>Traded:</b>		<b>Non-traded:</b>		
Does the proposal have an impact on competition?	No				
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?	<b>Costs:</b>		<b>Benefits:</b>		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	<b>Micro</b>	<b>&lt; 20</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Are any of these organisations exempt?	Yes	Yes	No	No	No

## Specific Impact Tests: Checklist

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

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

Does your policy option/proposal have an impact on...?	<b>Impact</b>	<b>Page ref within IA</b>
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	No	P37
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	P37
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	Yes	
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	Yes	P2-5 – Air
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	Yes	

<sup>1</sup> Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	No	
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	P37

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Enactment).

No.	Legislation or publication
1	Climate Change Act 2008
2	Companies Act 2006
3	'Guidance on how to measure and report your greenhouse gas emissions' Defra/DECC 2009
4	Report to Parliament: "The contribution that reporting of greenhouse gas emissions makes to the UK meeting its climate change objectives: a review of the current evidence". evidence' - 2010
5	

### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

The annual profile of costs and benefits for *each* option are included in the spreadsheet in Annex J. These include two scenarios Upper and Low, from the IA. As in the IA, there are no central cost and benefit estimates. The GHG profiles have not been updated at this stage as these use central estimates. These will be incorporated once a preferred option has been decided upon.

## Evidence Base (for summary sheets)

### Summary of IA and Summary Table of Costs and Benefits

This IA models four options for increasing GHG Reporting. These are: (1), Enhanced Voluntary Reporting; (2), Mandate Reporting for UK listed companies; (3), Mandate Reporting for all large companies; and, (4), Mandate Reporting using Energy Consumption Criteria. The policy covers the reporting by UK companies of GHG emissions for the six Kyoto gases. Corporate reporting of GHGs is done on the same basis as financial reporting i.e. for multinationals it is for both within the UK and abroad. It covers both scope 1 (direct) and scope 2 (indirect – from purchasing electricity) emissions. The intention is that by reporting these emissions, there will be resulting benefits including: (i) reductions in these emissions as well as the associated energy savings; (ii) improved information for investors to base their decisions on; as well as the potential for (iii) companies improving their reputations, branding opportunities, and exposure to climate change risks. There will be costs associated with realising these benefits.

Although the policy aspiration covers all of the elements as described above, it has only been possible to quantify and monetise some of them. In addition, 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. A reasonably broad coverage of potential savings from CO<sub>2</sub> related to electricity and gas use, CO<sub>2</sub> from road freight, and from wider GHGs has been modelled and monetised. This also covers the associated impacts with the energy and road fuel savings. A wide range has been placed around the anticipated benefits, given the extremely large uncertainties around the impact that reporting will have on reducing GHG emissions – this range is from no change through to reductions of up to 2% for most CO<sub>2</sub> and other GHGs emissions, and up to 4% for road freight. For costs, these reflect costs associated with CO<sub>2</sub> reductions and transport emissions. Transport related reporting costs are illustrative, and despite the lack of a robust data it is considered important at this stage that these are included so that headline figures are not skewed where transport related benefits are significant; the consultation period will be used to attempt to fill this gap in the evidence base. Costs associated with wider GHGs have not been monetised at this stage.

In the analysis three benefits scenarios are analysed. These are: (1), Upper; (2), High; and, (3), Low. Both Upper and High benefit scenarios use the highest estimate for possible emission reductions: 2% for electricity and gas related emissions and 4% for transport fuel related emissions. The Upper estimate assumes that companies make energy and fuel financial savings, as well as GHG reductions, at no cost – hence both GHG reductions and energy and fuel savings are valued. The High estimate assumes that the average cost to companies of reducing emissions is equal to the energy and fuel savings, related to these reduced emissions – hence only GHG reductions are valued. The analysis does not model the potential increasing costs of mitigating emissions as companies reduce emissions further. Low benefits assume that no emission reductions are motivated by the policy.

A key point to note also is that although the impacts described above have been modelled and monetised as completely as possible for scope 1 and 2 emissions, in terms of geographical coverage the international impacts have not been modelled/monetised (and this is part of the policy would potentially have large associated impacts). This IA provides, as an annex, a partial illustration of international impacts based upon the FTSE350, again with a wide range of anticipated costs and benefits due to



uncertainties<sup>2</sup>. In addition, it was not possible to quantify/monetise the impacts associated with improved investor information, reputations, branding, and climate change exposure.

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 disaggregated into the different impacts and using the three different scenarios on benefits. It also displays costs of reporting electricity and gas related emissions, and, less certain, costs of reporting transport related emissions. Net Benefits are displayed, firstly, for costs and benefits of reporting electricity and gas related emissions; secondly, 'robust' monetised costs and benefits, ie including transport related and electricity and gas related wider GHG benefits; and, thirdly, all monetised costs and benefits, ie including, less certain, transport related reporting costs.

For net benefits estimates these have been reported using maximum benefits and minimum costs and vice versa, to highlight that costs only exceed benefits under a few scenarios. The maximum benefits – minimum costs uses Upper benefits and Low costs, and therefore represents the highest net benefits attributable based on the evidence. The minimum benefits – maximum costs assumes Low benefits and Upper costs. Please see the evidence section for a more detailed picture on net benefits for each option.

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	Upper	0	2.1	115.3	0
		High	0	0.2	11.0	0
		Lower	0	0	0	0
	Wider GHGs	Upper	0	0.05	2.9	0
		High	0	0.05	2.9	0
		Lower	0	0	0	0
	Transport	Upper	4.6	699	1239	959
		High	1.2	179	318	241
		Lower	0	0	0	0
	Total	Upper	4.6	701	1358	959
		High	1.2	180	332	241
		Lower	0	0	0	0
Costs (£m)	Electricity and Gas Related	High	0	20	4418	35
		Lower	0	5.1	808	3.5
	Transport Related	High	1.1	906	1607	1198
		Lower	0	0	0	0
	Total	High	1.1	926	6025	1233
		Lower	0	5	808	3
Net Benefits (£m)	Electricity and Gas Related	Maximum Benefits - Minimum Costs	0	-3	-693	-3
		Minimum Benefits - Maximum Costs	0	-20	-4418	-35
Net Benefits (£m)	All Robust Monetised Costs and Benefits	Maximum Benefits - Minimum Costs	5	696	549	955
		Minimum Benefits - Maximum Costs	0	-20	-4418	-35
Net Benefits (£m)	All Monetised Costs and Benefits	Maximum Benefits - Minimum Costs	3	696	549	955
		Minimum Benefits - Maximum Costs	0	-926	-6025	-1233

<sup>2</sup> See Annex E.

***Numbers highlighted in red are negative values.***

## 1. Introduction

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 such information, as may be specified in the regulations, about GHG emissions from activities for which the company is responsible; or lay a report to Parliament explaining why this has not happened. This impact assessment assesses the different options for consideration in meeting that obligation.

Section 84 of the Climate Change Act requires a review to evaluate the contribution that reporting on GHG emissions is making to the achievement of the Government's climate change objectives. It also requires that the Secretary of State lay a report before Parliament, no later than 1 December 2010, setting out the conclusions of that review<sup>3</sup>. Much of the evidence cited in this impact assessment is taken from that report.

The Climate Change Act (section 83) required the publication of guidance on the measurement or calculation of GHG emissions to assist the reporting of such emissions by organisations. In September 2009, Defra, in partnership with the Department for Energy and Climate Change (DECC), published guidance for organisations on how to measure and report their GHG emissions<sup>4</sup>; this was accompanied by an impact assessment which appraised the likely costs and benefits of introducing such guidance. The objective of the 2009 guidance was to encourage behaviour change within any type/size of organisation, to manage and reduce their GHG emissions and by encouraging public disclosure, provide information to shareholders and investors.

The Defra/DECC guidance is based on, and aligns with the GHG Protocol<sup>5</sup>, the internationally recognised standard for the corporate accounting and reporting of GHG emissions. The Defra/DECC guidance was developed with significant stakeholder involvement and is used by a variety of companies<sup>6</sup> and has been used by the Carbon Disclosure Project (CDP) as the basis of this year's questionnaire. The IEMA "Special report on GHG management and reporting" concluded that the Defra/DECC guidance was being widely used by companies<sup>7</sup>. The guidance recommends that companies should report their direct emissions (scope 1), as well as indirect energy emissions, i.e. from purchase of electricity, (scope 2) and encourages companies to also report other indirect emissions (scope 3). It also recommends that companies should measure or calculate their emissions on a global basis and that companies should measure or calculate emissions from all six GHGs covered by the Kyoto Protocol.

The Companies Act 2006 requires all companies, other than small, to prepare a business review as part of the directors' annual report. The purpose is to help shareholders assess how the directors have performed their duty to promote the success of the company. Quoted companies must also, to the extent necessary for an understanding of the company's business, include information on environmental, employee, social and community matters, as well as on contractual and other arrangements essential to the business. The current provisions on narrative reporting reflect European requirements<sup>8</sup> and the extensive debate and consultation on UK company law which led to the Companies Act 2006. The Coalition Government has separately consulted on the narrative reporting requirements of the

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<sup>3</sup> Defra (2010) report to Parliament, "Review of the contribution that reporting of greenhouse gas emissions makes to the UK meeting its climate change objectives".

<sup>4</sup> Defra/DECC (2009) Guidance on how to measure and report your greenhouse gas emissions. [www.defra.gov.uk](http://www.defra.gov.uk)

<sup>5</sup> The World Resources Institute/World Business Council for Sustainable Development's Greenhouse Gas Protocol: A corporate accounting and reporting standard (revised edition)

<sup>6</sup> Since publication of the guidance over 300 email enquiries have been received by Defra seeking clarification on issues concerning the emission factors and/or guidance.

<sup>7</sup> Chapter 7, Conclusions. The Institute of Environmental Management and Assessment "Special report on GHG management and reporting".

<sup>8</sup> The EU Accounts Modernisation Directive required all companies other than small to prepare a business review.

Companies Act (closed on 19 October). This is part of the process of implementing its commitment, to reinstate an Operating and Financial Review, to ensure that directors' social and environmental duties have to be covered in company reporting and investigate further ways of improving corporate accountability and transparency.

A large number of UK companies also do report some of their GHG emissions; many for legislative purposes under emission schemes such as the EU Emissions Trading System and CRC Energy Efficiency Scheme. There are over 4500 organisations in the CRC, although not all are companies. The EU ETS and the CRC are the main levers by which the UK will meet its climate change targets and are designed to deliver a significant proportion of the emissions reductions needed. These schemes require that organisations measure and report on certain emissions, but reporting is not the main aim of any of these schemes. Companies who participate in EU ETS and CRC may also provide information in their annual report to meet current requirements in the Companies Act 2006.

Annex A provides further details of the different reporting requirements placed on companies.

In addition to meeting regulatory requirements, many companies do recognise that there are benefits from reporting and therefore report their emissions voluntarily, e.g. to the Carbon Disclosure Project (an independent organisation which holds the largest corporate GHG emissions database in the world) or voluntarily in the annual report. A review of FTSE all-share annual company reports for 2009 showed that 62% of companies now report quantified figures on climate change or energy use (up from 29% in 2006). However, only 22% do so in accordance with Government guidance (up from 12% in 2006). The 2010 survey by IEMA, for their special report on GHG management<sup>9</sup>, found that there were a variety of standards and schemes used by organisations to support their management and reporting activities. Foremost amongst them was the Defra/DECC guidance, closely followed by the regulated schemes such as CRC and EUTS.

Organisations which measure and report emissions information have stated that they have found benefits from doing so. In many cases these benefits have involved direct financial savings from reducing energy or raw materials use, and as a result of the discipline of measuring which activities in the organisation give rise to emissions have triggered a re-examination of ways the organisation could operate more efficiently. Organisations also report more intangible benefits from measuring and reporting their emissions, noting that such disclosure is crucial to building their brand and enhancing their reputation. Other benefits identified by organisations reporting their emissions are that the need for the Board to sign off external disclosure brings a strategic focus to managing the organisation's emissions and that measuring emissions is a necessary first step to setting targets for reduction. Organisations cannot effectively manage what they do not measure and therefore many companies that do not currently measure their emissions may be missing opportunities for cost savings through reduced energy/resource use that could also generate significant GHG emission reductions. One of the key conclusions from the PwC/CDP report<sup>10</sup> was that: "Policies that encourage companies to better measure emissions will enable GHG emission reductions. External reporting is one such measure...". The PwC business survey reported that, for those that reported emissions, the driver considered "important" or "very important" for the most businesses was efficiency savings. Econometric analysis of the American electricity market suggests that reporting, with ratings, can have a significant impact on companies' GHG emissions. It showed that increasing the proportion of emissions firms reported, and the energy mix of electricity consumption, both reduced the amount of fossil fuel use and increased the amount of generation from clean energy sources. As the proportion of the company's sales subject to disclose

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<sup>9</sup> Chapter 2, GHG status report. The Institute of Environmental Management and Assessment "Special report on GHG management and reporting".

<sup>10</sup> PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits"

increase by 10%, the proportion of generation attributed to fossil fuels drops by 1.3% and the proportion of generation attributable to clean sources increased by 1.5%<sup>11</sup>.

Further than this, the failure to report, i.e. to publicly disclose emissions, may put shareholders or investors at a disadvantage as a lack of information might result in a misunderstanding of the risks or opportunities that an investment might present. Climate change is generally accepted amongst investors as presenting a variety of risks to investments such as physical, regulatory, reputational and litigation risks.<sup>12</sup> Failure to disclose emissions restricts information to directors, consumers and employees or other key influencers that may help drive behaviour change. The PwC business survey highlighted that brand building received the third most “important” or “very important” responses as a driver to reduce emissions (90% of companies gave one of these responses). It is likely that making this information available to these parties will provide some additional driver’s for change, beyond the provision of information on emissions.

**Consultation questions:**

- **If your company reports its GHG emissions, do you do so to:**
  - **Meet Companies Act requirements?**
  - **Respond to investor request?**
  - **Set public emissions reduction targets?**

However, for many companies there may be significant barriers to take-up of GHG reporting guidance (discussed further under ‘Rationale for Intervention’). Where there are barriers it has to be considered whether a mandatory requirement upon such companies would generate economic benefits, though GHG and energy reductions, in excess of the costs of such legislation.

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, and the appetite for this information amongst investors appears to be growing. In the economic literature public disclosure is often title the ‘third wave’ of environmental regulation<sup>13</sup>. The economic principle behind reporting is the correction of an information asymmetry where companies have data on emissions but other interested parties do not. Reporting ‘can trigger and intensify interactions among firms, workers, community groups, consumers and financial markets as well as regulators themselves.’ A common theme of the literature is that there are a variety of routes through which firms may be influenced to reduce emissions, which are not always clear, but that emission reductions appear to be driven by reporting<sup>14</sup>.

Investors, whilst not the only interested group, are one of the main users of corporate disclosures. Annually reported accounts and statements are one source of information which can be factored into investment analysis. The hypothesis is that increased availability of good quality, comparable climate change related information would lead to increased instances of such information being factored into investment decisions alongside traditional economic analyses. 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. There is increasing agreement amongst investors that regulation would help facilitate climate conscious investment. Initiatives such as the Carbon Disclosure Project (CDP)<sup>15</sup>, the UN Environment Programme Finance

<sup>11</sup> Delmas, “Information disclosure policies: Evidence from the Electricity Industry” (2007)

<sup>12</sup> Defra (2010) report to Parliament. See Research findings chapter of “Review of the contribution that reporting of greenhouse gas emissions makes to the UK meeting its climate change objectives”.

<sup>13</sup> Tietenberg, “*Disclosure Strategies for Pollution Control*”, Environmental and Resource Economics (1998)

<sup>14</sup> An important caveat is that many reporting schemes also involve the use of ranking and rating criteria that facilitates easy comparison of companies’ performance for non-experts, which supports and drives action by interested parties.

<sup>15</sup>The Carbon Disclosure Project (CDP) [www.cdproject.net](http://www.cdproject.net)

Initiative (UNEP FI)<sup>16</sup>, Global Reporting Initiative (GRI)<sup>17</sup> and the GHG Protocol<sup>18</sup> as well as investor groups such as the Institutional Investors Group on Climate Change (IIGCC)<sup>19</sup>, UN Principles for Responsible Investment (UNPRI)<sup>20</sup> and UK Sustainable Investment and Finance (UKSIF)<sup>21</sup> all identify the importance of and potential for investors to use climate change disclosures in investment analysis. (Section 4.2 and 4.3 of the Defra report to Parliament reviews the demand and use by investors of climate change information, particularly GHG emission reports.)

This Impact Assessment explores the potential options for extending mandatory reporting requirements, under the UK Companies Act, based on a review of evidence on the contribution of reporting of GHG emissions to the achievement of the Government's climate change objectives.

**Consultation questions:**

- **Does your company report on your GHG emissions?**
- **If so do it report:**
  - **In your Annual Report and Accounts?**
  - **To the Carbon Disclosure Project?**
  - **As part of EU ETS or the CRC?**
  - **Elsewhere?**

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<sup>16</sup> UNEP FI <http://www.unepfi.org/>

<sup>17</sup> GRI <http://www.globalreporting.org/Home>

<sup>18</sup> World Resources Institute and World Business Council for Sustainable Development joint initiative: the Greenhouse Gas Protocol <http://www.ghgprotocol.org/>

<sup>19</sup> IIGCC(2008) and IIGCC (2010)

<sup>20</sup> UNPRI (2008)

<sup>21</sup> UK SIF (2010)

## 2. Rationale for Intervention

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)<sup>22</sup> advocated three essential elements for the mitigation of climate change: a carbon price, technology policy and the removal of barriers to behaviour change.

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. Therefore, complementary policy may be required alongside overarching carbon pricing instruments to ensure cost-effective abatement of GHG emissions.

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

- Internal barriers within companies which hold back reporting despite economic benefits to the company of doing so
- Lack of appropriate information for shareholders to take in to account climate change risks in their investment decisions
- Benefits not produced by other policy interventions

### *Internal barriers within companies*

Despite the benefits to reporting companies outlined in the introduction to this Impact Assessment, the evidence shows that there are significant internal barriers preventing action. The most significant barriers include a lower perceived priority of GHG 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 GHG 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.<sup>23</sup> 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 CDP<sup>24</sup>.

### *Lack of appropriate information for shareholders*

A number of organisations have pressed the Government to introduce regulations to make reporting of GHG emissions mandatory by companies to improve the consistency in corporate reporting of emissions. 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'<sup>25</sup>. 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 guidance<sup>26</sup> 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

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<sup>22</sup>Stern, (2006), [http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/Executive\\_Summary.pdf](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf)

<sup>23</sup> IEMA Special Report: GHG management and reporting. (page 27)

<sup>24</sup> PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits" in particular 5.3.13

<sup>25</sup> 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).

<sup>26</sup> Environment Agency (2011) Environmental Disclosures. The third major review of environmental reporting in the statutory annual reports of FTSE all-share companies.

emissions and found that only 9% of those surveyed were reporting in line with this guidance<sup>27</sup>. 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’<sup>28</sup>. 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 voluntary<sup>29</sup> 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’<sup>30</sup>. 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.

### *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 CO<sub>2</sub> 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.

The current Defra/DECC 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. The Defra/DECC guidance contains twelve recommendations. These recommendations form the basis of the consultation on what regulations should contain, as a minimum, if introduced, i.e. it is proposed that companies would be required to measure or calculate emissions from the six Kyoto greenhouse gases; measure or calculate emissions their emissions on a global basis; report on total GHG emissions in carbon dioxide equivalent; and where an organisation uses standard emission factors, refer to the Defra/DECC emission factors. The issue of whether companies should just be required to report on their scope 1<sup>31</sup> and scope 2<sup>32</sup> emissions or also report on some or all of their scope 3<sup>33</sup> is also an issue that views are being sought on in the consultation. Verification of this data is also an issue where views are also being sought.

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)<sup>34</sup>. 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.

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.

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<sup>27</sup> Deloitte (2010), A survey of carbon reporting practices among UK listed companies.

<sup>28</sup> Open letter to Caroline Spelman. Published in the Financial Times 26 November 2010.

<sup>29</sup> CDP (2009) Investor research project: Investor use of CDP data.

<sup>30</sup> CDP (2009) Investor research project: investor use of CDP data. (page 13).

<sup>31</sup> Scope 1 emissions (direct emissions): emissions from activities owned or controlled by an organisation e.g. emissions from combustion in owned or controlled boilers, furnaces, vehicles; emissions from chemical production, etc.

<sup>32</sup> Scope 2 emissions (energy indirect): emissions associated with consumption of purchased electricity, heat, steam and cooling.

<sup>33</sup> Scope 3 (other indirect): emissions that are a consequence of a company’s actions which occur at sources which the company does not own or control.

<sup>34</sup> Carbon Disclosure Project 2010 FTSE 350 Report



### 3. Policy Coverage

Following the recommendations in the Defra/DECC Guidance, the IA assumes that companies would be required to measure and report on their total scope 1 (direct emissions, e.g. gas, petrol, processing and fugitive emissions) and scope 2 (energy indirect: primarily electricity) CO<sub>2</sub> equivalent emissions. This covers international emissions as well as UK emissions for companies covered by the reporting requirement. This follows the minimum requirements of the international standard, the GHG Protocol. These emissions are from owned and controlled sources and the data requirements are relatively low and should be from information that the company already possesses, such as from utility bills, fuel receipts and energy meter readings. Although the voluntary Guidance recommends that companies report on 'significant' scope 3 emissions (from sources such as business travel, waste, end use of products and emissions from suppliers), this recommendation is discretionary and many of these emissions are more difficult to measure and data on them harder to collect. Whether regulations introduced under option 2, 3 or 4 above require scope 3 emissions to be calculated and reported, in addition to scope 1 and 2 is an issue for the consultation. This is likely to be an issue where there are strong differences of views, given previous responses on this issue from a variety of stakeholders in the 2009 consultation on the GHG guidance.

The mandatory reporting options could potentially require inclusion of specified scope 3 emissions. The consultation will not propose that it should be mandatory for companies to measure and report on emissions from waste or end use of products which are currently difficult to ascertain. The specified scope 3 emissions that might be included in a reporting requirement are those which would require limited additional data collection, for example business travel or upstream 'indirect' emissions from fuels (emissions from extraction, processing and transportation of fuels).

### 4. Coverage of Cost-Benefit Analysis (CBA)

**The cost benefit analysis only covers costs and benefits related to UK emissions.** This is in line with Green Book Guidance as costs and benefits should only be estimated for activities that impact on the UK economy. Furthermore, with the current data available it would not be possible to define the baseline emissions and monetise costs and benefits with any degree of certainty. Annex E provides an illustrative example of possible costs and benefits on an international scale, although it does not take into account current legislation in the baseline.

For UK emissions cost and benefit estimates are provided separately for three areas:-

- Carbon dioxide related to electricity and gas
- Wider GHG emissions related to electricity and gas
- GHG emissions related to direct freight transport

These are estimated separately in the sections below. Firstly, costs related to reporting carbon dioxide and wider GHG emissions for the options are reported. Secondly, transport costs are estimated using the key assumption that costs of reporting transport emissions per tonne of carbon are the same for transport as for electricity and gas related emissions. Subsequently the benefits are estimated for each of these areas separately using the proxies of employment and turnover for the different options.

As reported in the front sheets **the following analysis does not provide central estimates for benefits or costs.** Benefits are provided as a range. The range includes two upper bound estimates – High and Upper – and a lower bound of zero. These relate to uncertainty regarding the percentage of emission reductions generated by the policy and the degree to which companies may be able to experience net cost savings from reducing emissions. Low benefits assumes that there are no emission reductions for new reporters from the policy. Both upper bound estimates assume a 2% reduction in emissions is achievable for electricity and gas related emissions, and a 4% reduction in emissions is achievable for transport related emissions. The Upper benefits scenario assumes that energy savings are made at no cost, i.e. the benefits to companies are the full value of the energy savings. The High benefits scenario assumes that the value of savings made are equal to the cost of making those savings, ie there are no benefits to companies from making energy savings. These values will be updated drawing on evidence from consultation to better understand the costs to companies, as well as using the consultation period to interrogate other potential sources of data on the potential benefits available to companies from efficiency savings within these areas.

**Competitiveness.** There has been considerable consultation and discussion with UK business on measuring and reporting of greenhouse gases, starting in 2009 when there was a three month consultation on the draft UK 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 last year as part of the work that PwC/CDP did on Defra's behalf to look at the benefits of reporting. (PwC's work was a key part of the Government's report on the benefits of reporting – see earlier footnote 3). The CBI, the EEF (the manufacturers' organisation), the Freight Transport Association, the Aldersgate Group and many others have all engaged positively with Government on this subject for the last two years and have offered to help with workshops with business when Defra consult on the options outlined in this assessment.

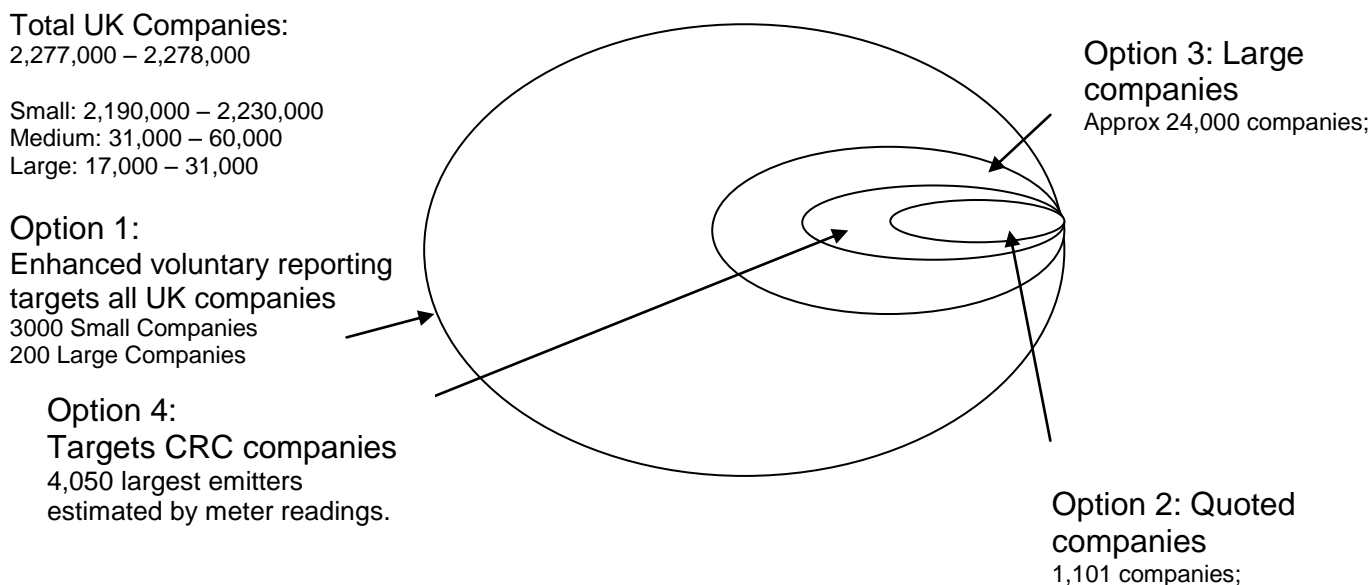
Similar developments on GHG reporting are taking place in other states. OECD's 2010 report on a transition to a low carbon economy noted the upward global trend in GHG reporting by companies and cited the 2010 decision by the Securities and Exchange Commission in the US as a recent example. Nonetheless, the consultation document is directly asking UK companies on their views on reporting which should help us understand if they have any issues with competitiveness. The consultation document also requests further information on the scale of emissions related to overseas activities and the costs and benefits of reporting overseas emissions to improve analysis of these impacts for the next IA stage. The IA states in the Policy Coverage section (above) that UK overseas activities are covered by the policy but the IA only covers costs to the UK at present. A partial quantification of global impacts is provided in Annex E.

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, however sensitivity tests have shown this would not materially affect the results and would not impact on the choice between options.<sup>35</sup>

## 5. Options for Appraisal

The Climate Change Act gives powers to the Secretary of State to introduce regulations for reporting on GHG emissions under the directors report section of the Companies Act 2006 (s.416(4)). Options for mandating companies to report have been considered in terms of company definitions under the Companies Act (the Act categorises businesses according to their size or their position as a quoted company). A fourth option looks at the use of an energy threshold. The IA covers four options plus the do-nothing option. The coverage of each option in terms of the number of companies is laid out below.

Figure 1: Coverage of Options



<sup>35</sup> 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.

### **Option 0: Do nothing**

This is the baseline against which other options are defined.

### **Option 1: Enhanced voluntary reporting**

Option 1: 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 sectoral initiatives across UK business. There are several potential ways of enhancing a voluntary reporting scheme through activities such as:

- a) Increasing awareness of reporting guidance and the outreach to businesses – increased publicity/campaigns to increase awareness of Defra/DECC guidance
- b) Increase support for and collaboration with CDP – as the largest and most widely recognised voluntary reporting initiative, there may be an opportunity to further encourage reporting and making reports public, through CDP's activities as well as working with other NGOs who are interested in this area
- c) Sector specific voluntary agreements – to target emissions intensive sectors although there might be overlap here with climate change agreements which work on a sector basis.

### **Option 2: Mandate under Companies Act for all Quoted companies**

Option 2: Covers all quoted companies as defined in the Companies Act. As already mentioned the latest EA report shows that 62% of FTSE all-share now report their emissions but, crucially for investors looking to compare company reports, only 22% of FTSE all-share report their emissions in line with government guidance. 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 review<sup>36</sup> and so some will already report on emissions and energy use in their annual report. Given this requirement, it is therefore surprising that the number reporting quantifiable information on climate change and energy use is not higher than 62%. In addition, many companies (especially in the FTSE 350) already report voluntarily to the CDP and some, which are dual listed in the US, will already be required to prepare emission reports by the US Securities and Exchange Commission. Although it is important to note that not all companies that report to the CDP also report on emissions in their annual report. Depending on the business, some companies will also report under EU Emissions Trading Scheme and the Carbon Reduction Commitment (CRC) as well. This option will not capture large private companies. Under company law, quoted companies are defined<sup>37</sup> 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.

### **Option 3: Mandate under Companies Act for all large companies**

Option 3: 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 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

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<sup>36</sup> 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....."

<sup>37</sup> Section 385 of the Companies Act 2006

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.<sup>38</sup> This analysis uses the central FAME estimate provided in the paper of 24,000 large companies.

#### **Option 4: Mandate GHG reporting under Companies Act for all companies whose energy consumption exceeds a threshold**

Option 4: Companies exceeding an energy consumption 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. This threshold has been chosen because of the benefits of regulatory consistency, limiting the added complexity to the regulatory environment and allowing easy identification of those companies which should report. However, the threshold could be set higher (or lower) to decrease (or increase) the number of companies required to report. Based on registration data for the CRC submitted to the Environment Agency, around 4050 companies would be required to report. All of these companies will be reporting their UK energy use emissions under the CRC. Newly reported emissions would be limited to international emissions, freight transport emissions and non-CO<sub>2</sub> GHG emission. Reductions could be driven by the policy requiring the reporting of previously unreported emissions: those associated with freight transport, non-CO<sub>2</sub> GHG emissions and the companies' international emissions.

## **6. Evidence on Costs**

### *Evidence on Monetised Costs*

Estimates of costs are only provided for the costs of measuring and reporting businesses non-transport scope 1 and scope 2 carbon dioxide emissions. This information is largely taken from CRC for large companies. Costs for small companies are estimated from the Defra/DECC GHG reporting impact assessment since there is very limited evidence on costs of reporting for small companies.

A summary of estimated costs of reporting CO<sub>2</sub> emissions is provided in the table below. Further cost information is provided in Annex B.

Table 2: Costs of GHG reporting by company

Company Size	New/Adjust	One-off costs		Average additional annual cost of measuring emissions		Average additional annual cost of reporting emissions	
		Lower	Upper	Lower	Upper	Lower	Upper
Small	New	£36	£70	£1,250	£1,250	£36	£70
	Adjust	£0	£0	£0	0	£36	£70
Medium	New	£80	£80	£1,900	£1,900	£70	£100
	Adjust	£0	£0	£0	£0	£70	£100
Large	New	£120	£120	£5,600	£30,000	£100	£1,000
	Adjust	£0	£0	£0	£0	£100	£1,000

The key monetised costs are:

### Electricity and Gas Related Reporting Costs

- One-off Costs
  - This represents the administrative cost of reading and understanding the guidance. For a company that already monitors and reports its emissions, this is assumed to require half

<sup>38</sup> <http://www.bis.gov.uk/policies/business-law/corporate-governance/research/company-and-partnership-law>

the time of a newly reporting company to whom some of the concepts and terms may be unfamiliar.

- Annual Cost of Measuring Electricity and Gas Related CO2 and Wider GHG Emissions
  - It is assumed that costs are significantly higher for newly reporting companies as they will face the full cost of setting up emissions measurement systems. A significant range is provided for costs given the uncertainty. The lower bound estimate is taken from the US EPA estimate of reporting costs for Large companies estimated at £5,600 per annum. The estimate for administrative costs under the CRC Energy Efficiency Scheme, provided above, are used as a proxy for the upper bound costs. Once data on fuel use is obtained this can easily be transformed into wider GHG emissions using the Defra/DECC guidance which automatically estimates wider GHG emissions once energy use data is provided. Therefore, it is likely that there will be no further costs of estimating wider GHG emissions. To provide a conservative estimate of reporting wider GHGs a minor adjustment has been made to reporting costs, increasing the upper bound of reporting costs to £30,000 per company.
  - A table breaking down the activities that make 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. The CRC scheme covers actions which are additional to those that would be required under company reporting. The additional activities include developing a compliance strategy, understanding and taking part in an auction, trading activities. For this reason the upper bound cost estimates provided below are conservative (i.e. likely to be relatively high). Please see Annex I for more detailed descriptions of the actions to better understand the estimates of time taken. Post-consultation the aim is to use the CRC data to refine cost estimates for industry, therefore please use these estimates as benchmarks to feedback on the cost estimates included in this analysis.

Table reproduced from the Impact Assessment on the Implementation of the CRC<sup>39</sup>

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

Number of sites operated by organisation	1	2	3	4	5	6-10	11-50	50+
Understanding the rules	3	3	3	3	4	4	4	4
Initial collection and analysis of energy data	3	3	4	4	4	4	7	13
Developing a compliance strategy	1	1	1	1	1	1	3	5
Understand and take part in Auction	2	2	2	3	3	4	5	6
Trading activities	2	2	2	2	2	3	4	5
Submitting data to coordinator	1	1	1	2	2	3	4	5
Verifying data (external costs)	3	4	5	6	7	10	14	19
<b>Total person-days</b>	<b>14</b>	<b>15</b>	<b>18</b>	<b>20</b>	<b>22</b>	<b>27</b>	<b>40</b>	<b>57</b>

### Management costs of participation

**£7,000   £7,500   £9,000   £10,000   £11,000   £13,500   £20,000   £28,500**

- 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.
- Annual Cost of Reporting Emissions Data
  - The additional annual cost of external reporting has been estimated at between £100 and £1,000 (for adjusting companies this is an average of around 10% of the actual cost of

<sup>39</sup> [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/lc\\_uk/crc/policy/policy.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/policy/policy.aspx)

measurement). This reflects an estimated administrative cost representing between 4 and 35 hours of employee time. This is estimated to be roughly equal between adjusting companies and new reporters as it only requires submission of the emissions data. The cost of reporting for small companies has been estimated at between 2 and 4 hours of employee time.

**Consultation Questions:**

- **Do these monetised costs seem reasonable?**
- **Have you any further information to add to the above?**

## Transport Related Emissions Reporting Costs

- Annual Cost of Reporting Emissions Data
  - The costs of reporting transport related emissions are extremely uncertain at this point. Data on the costs of collating transport emissions could not be reliably estimated from the PwC/CDP report. The options laid out here include those with large potential transport related benefits, therefore not including any transport cost estimates at this stage would have heavily skewed headline net benefits, towards those with largest transport benefits.
  - This analysis makes the assumption that the costs of reporting transport GHG emissions are the same per tonne of emissions as for reporting electricity and gas related emissions. Information, based on discussions with organisations representing freight transport companies over the preceding two years, suggests that freight companies will have data on fuel use, as fuel is the largest cost of a transport organisation and so it tends to be closely monitored. This suggests that estimating and reporting transport emissions could be cheaper than reporting on site emissions – as fuel can easily be converted into GHG emissions using the Defra/DECC emission factors. Where companies do not have fuel data or mileage data, and only have data on expenditure on fuel, this may mean that the costs of reporting would increase as companies must convert this into fuel use before estimating costs. However, it is expected to be unlikely that the additional burdens would be greater than for those used from CRC, as the CRC estimates include additional activities that are not required under this policy. The consultation period will be used to directly test these assumptions with relevant companies to better understand current reporting practices, and the differences in costs of reporting transport emissions.
  - These are estimated using the large company costs related to reporting electricity and gas carbon dioxide emissions. The key assumption is the average cost of reporting transport related emissions, per tonne of emissions, is the same as for reporting electricity and gas related emissions. Firstly, estimates of the costs of reporting by all large companies are made. Secondly, these are divided by one quarter, as transport related GHG emissions are one quarter the size of carbon dioxide related emissions. This is then used to estimate the costs related to all large companies, ie Option 3 reporting transport related emissions. For the other three options, the ratio of transport related emissions for that option compared to option 3 is used to proportionately lower the costs for each of these options.
  - Annex G discusses this process in more detail.

**Consultation Questions:**

- **Do costs related to transport emissions appear plausible?**
- **Have you any further information to add to the above?**
- **Please see the consultation document for more detailed questions related to your transport costs. Defra wish to hear from you.**

*Non-monetised Costs*

- 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. Annex E provide some illustrative estimation of the potential costs to UK companies of reporting internationally.
- Costs to Companies of Reducing Emissions
  - The private costs to companies to reduce emissions are not explicitly modelled, but are implicitly valued in the benefits calculations and can easily be exposed. As an example for Option 2 for the High benefits scenario the transport related benefits are zero, which assumes that the costs of reducing emissions are £519m which is equal to the value of the fuel savings in the Upper Scenario, also £519m. Therefore the additional costs to companies of reducing emissions in the High scenario are the value of energy savings in the Upper scenario.
  - In practice it is expected that there will be private cost to firms to reduce emissions so the final cost estimate will be between the implicit costs modelled in High and Upper. These may take the form of investment costs in more efficient technologies, training costs to encourage more efficient behaviour in employees, and/or missed opportunity costs from diverting attention away from other beneficial activity. Consultation responses will be used to better understand the costs to companies, and to understand which scenario is closer to reality. The consultation period will also be used to interrogate other data sources on the costs to companies of reducing emissions such as technological potential data and industry marginal abatements costs.
- Emissions Verification
  - The Defra/DECC reporting guidance does not require companies to undertake external or internal verification of emissions data. However, it does states that companies may wish to do so and recommends that companies contact an assurance expert in order to work out what level of assurance may be appropriate in their case. For the mandatory options in this IA, it is assumed that companies would only be required to perform internal verification and not seek third party assurance. Evidence to date suggests that the level of third party assurance gained by companies on their reports on GHG emissions is low. However, the Department seeks the views of reporting, and potentially reporting, companies about the cost and usefulness of third party assurance in this area.
  - The Companies Act requires all companies' annual accounts for a financial year to be audited in accordance with the provisions set out in the Act. Currently, there is no statutory requirement to have environmental information audited. However any environmental disclosure within annual financial statements should be included in the scope of the financial audit where it is material. 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.

- 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). FRRP review 300 out of 20,000 accounts each year and investigate any complaints received. The FRRP does not have any remit to look at reporting companies in any depth; they conduct desk reviews only and much of the Panel's work is comparing. An additional requirement in the director's 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.

**Consultation question:**

- **Do these non-monetised costs seem reasonable?**
- **Can you provide cost information on any of the above?**

*Risks/Uncertainties*

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, this assumes that smart metering is widely in place for electricity but not gas emissions. It is therefore possible that costs are overestimated as collating information on gas emissions in future is less costly.



## 7. Analysis of Benefits

### *Key assumptions on benefits*

Benefits are monetised for electricity and gas related carbon dioxide and wider GHG savings, transport related CO<sub>2</sub> and wider GHG savings and the associated energy and fuel savings. There are two principal uncertainties within the analysis regarding the emission reduction and the degree to which companies benefit from energy savings, this is discussed in more detail below. In the Upper benefits estimates approximately three quarters of benefits are from private cost savings.

The intangible benefits to firms from increased investment from improving information to shareholders, or increased sales from consumers are not estimated.

- 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 emissions further. Where companies do not currently report, mandatory reporting could lead to future reductions. Emission reductions of up to 2% are assumed for the total carbon dioxide and related wider GHG emissions. The benefits of reducing carbon dioxide and wider GHG emissions related to electricity and gas are reported separately in the following tables. Benefits have been valued from the avoided cost of carbon from emission reductions. The evidence on emission reduction is reported in Annex C.
  - The existence of smart metering means the benefits from extra information are already realised in the baseline. For emissions related to electricity, reductions in electricity use will mean the UK purchasing fewer EU ETS allowances and this saving is assimilated as a benefit. For gas, the value of carbon savings from a reduction in gas consumption uses the non-traded carbon prices under DECC's new carbon valuation methodology. Emission reductions have been valued using current DECC guidance<sup>40</sup>. It is assumed 1/3 of emissions are associated with gas and 2/3 of emissions are associated with electricity, this is consistent with the CRC IA.
  - As discussed reductions in electricity use will also result in wider GHG reductions for the other five Kyoto GHGs. There are an estimated 18MtCO<sub>2</sub>e of additional wider GHG emissions related to business and industrial processes, this increases total emissions related to electricity and gas by approximately 8%. These wider GHG emission reductions are valued using the non-traded price of carbon. The scope of emissions covered under the EU ETS will be slightly expanded from the beginning of the phase 3 to include perflourcarbons from aluminium and nitrous oxide from the production of nitric and adipic acid.<sup>41</sup> 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.<sup>42</sup>
- Fuel related Emissions
  - Emission reductions of up to 4% are assumed for transport emissions. As there is no equivalent to smart metering in place for transport, the additional information gained by reporting emissions may also be used to manage emissions implying greater potential

<sup>40</sup> [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/lc\\_uk/valuation/valuation.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx)

<sup>41</sup> <http://www.environment-agency.gov.uk/business/topics/pollution/113457.aspx>

<sup>42</sup> The value of the change for Option 2 is estimated at ~£5k over 10 years, total GHG related benefits are £179m over this period. This is principally because wider GHGs related to electricity make up a small portion of benefits for each option.

emission reductions. Only road freight transport emissions have been estimated, these are the most significant part of freight transport emissions. Furthermore, these are understood best. 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 area<sup>43</sup>. Subsequent work suggests that potentially a third of these savings may have been realised by firms. Three other reports summarised below provide evidence that potential remains in the road freight sector for either negative or zero cost CO<sub>2</sub> abatement potential.
  - The CCC's initial report on UK Carbon Budgets in December 2008<sup>44</sup> 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 MtCO<sub>2</sub> per year by 2020 (Figure 7.20), and just over 0.8 MtCO<sub>2</sub> 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 MtCO<sub>2</sub> 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 Transport<sup>45</sup>. 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 20s<sup>46</sup>. This suggests further abatement potential for HGVs (0.6MtCO<sub>2</sub> 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 the Low emission savings are zero, for both electricity and gas related and transport related emissions.
- Reduced Energy Use
    - There is also the possibility that companies may benefit from reducing emissions. Emissions are directly related to energy use. Therefore by reducing emissions firms will also experience reductions in energy or fuel expenditure. Alternatively, if firms are already acting to minimise the costs of energy use it would be expected that any further emission reductions would come at increased costs to firms and therefore it would not be appropriate to value the energy savings to companies.
    - This leads to two assumptions for upper bound benefits: Upper and High. The Upper estimate assumes that companies make energy and fuel financial savings, as well as GHG reductions, at no cost – hence the value of energy and fuel savings are included in benefits. The High estimate assumes that the average cost to companies of reducing emissions is equal to the energy and fuel savings, related to these reduced emissions –

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<sup>43</sup> 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>

<sup>44</sup> 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)

<sup>45</sup> <http://www.official-documents.gov.uk/document/cm76/7682/7682.pdf> (pp 97)

<sup>46</sup> [http://downloads.theccc.org.uk.s3.amazonaws.com/4th%20Budget/CCC-4th-Budget-Book\\_with-hypers.pdf](http://downloads.theccc.org.uk.s3.amazonaws.com/4th%20Budget/CCC-4th-Budget-Book_with-hypers.pdf)  
Chapter 4 (pp 154, 186)

hence the energy and fuel savings are not included in benefits. (The assumptions used in the two scenarios on electricity, gas and diesel savings are discussed further in Annex F.)

- For Upper the value of reduced energy use is estimated from emission reductions. Firstly, reductions in kWh of electricity and gas use is estimated from reduced carbon dioxide emissions. Secondly, the energy required to produce those emissions are estimated: for electricity this is 0.43 kWh per tCO<sub>2</sub>; for gas this is 0.184 kWh per tCO<sub>2</sub>. 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 7.8p in 2011 rising to 8.4p in 2020. For gas this is 2.2p in 2011 rising to 2.4p in 2020 for gas. 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, which exclude tax. This ensures consistency with other policies implemented in this area, including tax would increase benefits estimates, however this would not impact on the choice between options in this analysis.<sup>47</sup>
- The Low benefits are zero as this assumes that a mandatory reporting policy does not result in emission reductions by private firms
- Reduced Fuel Use
  - As above, there is the possibility of fuel savings. It is assumed that road freight transport uses diesel. Reductions in emissions related to CO<sub>2</sub> will result from reduced fuel use. This IA estimates the value of reduced fuel based on the estimates of emission reductions. Firstly, the emissions are attributed to diesel. Secondly, the fuel required to produce those emissions are estimated: for diesel this is 2,6413g per litre from Defra/DECC reporting guidance<sup>48</sup>. Then the resource cost of petrol is applied, this excludes tax related to VAT or Fuel duty as these are a transfer cost. The resource cost of fuel is estimated at 42p per litre for diesel<sup>49</sup>. This follows DfT guidance and ensures that the results generated are consistent with other transport schemes appraised using this guidance. This is also consistent with the DECC appraisal methodology.

**Consultation question:**

- **Do these assumptions on monetised benefits seem reasonable?**
- **Can you provide any information on benefits?**

*Non Monetised Benefits*

- International Benefits
  - The benefit estimates provided here only apply to reporting UK emissions. This is consistent with Green Book Guidance that states that only costs and benefits to the UK should be estimated. Further, current data would not allow realistic estimation of costs and benefits. Annex E provide some illustrative estimation of the potential costs to UK companies of reporting internationally.
- Intangible Benefits
  - There are a range of intangible benefits not monetised in this analysis.
- Benefits from Interested Party Preferences

<sup>47</sup> [http://www.decc.gov.uk/en/content/cms/statistics/analysts\\_group/analysts\\_group.aspx](http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx)

<sup>48</sup> <http://www.defra.gov.uk/environment/business/reporting/pdf/100805-guidelines-ghg-conversion-factors.pdf>

<sup>49</sup> Estimates from DfT Webtag Guidance <http://www.dft.gov.uk/webtag/>

- These include benefits to companies from reporting emissions, these include branding and reputational benefits. These benefits were highlighted within PwC/CDP report. Further, it may also include benefits relating to investor preferences for 'green' investment and employee preferences to work for green companies.
- 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 to this reporting, will allow investors to identify the level of exposure to such risks, in an area which is gaining in profile.
- Other Freight Transport
  - Benefits related to emission reductions and fuel savings related to water transport, aviation and rail have not been monetised. There is little evidence available on the potential for emission savings in these areas. As costs have not been estimated for measuring transport emissions it has not been proportionate to estimate the benefits related to the other forms of freight transport emissions.
  - Total emission related to water transport: 20MtCO<sub>2</sub>e
  - Total emission related to aviation: 1.3MtCO<sub>2</sub>e
  - Total emissions related to rail: 0.9MtCO<sub>2</sub>e
- 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 this may provide some additional benefits.

**Consultation question:**

- **Do these non-monetised benefits seem reasonable?**
- **Are you able to provide information on any of the above?**

## 8. Estimating Emissions Coverage of Options

Within the scope of this exercise it has not been proportionate to obtain direct data on the carbon dioxide emissions of newly reporting firms. Two proxies have been used to estimate the emissions of newly reporting firms turnover and employment. It is assumed that carbon dioxide emissions are proportionately related to levels of employment and turnover. Data is commonly available on these two measures. Once the emission coverage of these firms for emissions related to gas and electricity use and fuel use have been estimated the assumptions laid out previously are used to estimate emission reductions for each option. More detail on the methodology used is laid out in Annex H.

## 9. Cost and Benefits of Reporting Carbon Dioxide Emissions by Option

As mentioned previously, the currently available data does not allow a cost benefit analysis to be performed for measuring and reporting GHG emissions by companies.

### Option 0 - Business as Usual

There are no costs and benefits for this option as this is the baseline against which other options are defined.

A number of existing reporting requirements exist for carbon dioxide emissions. These are identified below. Furthermore, recently smart meters have become widely installed and provide a significant amount of information to help companies manage emissions and to allow measurement. These are also discussed below. As companies are already reporting these emissions it is assumed that mandatory reporting will not result in further emission reductions for the emissions linked to these reporting requirements.

#### *Current policy requirements for reporting of carbon dioxide emissions*

This is covered in more detail within Annex A, which summarises UK policy requirements for the disclosure of GHG emissions. Table 1 below provides a summary of estimates of the number of companies covered by each of these emissions policies:

Table 3: Coverage of current emission schemes with requirements for UK companies to monitor/report emission

Scheme	Number of companies covered	External reporting by company or installation	Coverage of emissions type	Coverage of total UK CO <sub>2</sub> emissions
EU ETS	964 installations <sup>50</sup> in 2009	✓	CO <sub>2</sub> only	48%
CRC	4,500 participating fully; (90% of these are companies)	✓	CO <sub>2</sub> only for full participation; details of energy usage for information disclosure	10% (majority of these emissions are from the private sector ~90%)
CCAs	Around 5,000 companies (signed up in 2000)	*	CO <sub>2</sub> but may not be reported on company basis and no mandatory external reporting	4 - 5% (2.5% is overlap with EU ETS)

#### *Estimates of the number of companies covered by Existing Carbon Dioxide Reporting Requirements*

As reported above it is assumed 4,050 (90% of the organisations participating in CRC) largest emitting companies report carbon dioxide emissions under the CRC. DECC estimate that CCAs cover an additional 2,150 companies. The ETS requires reporting by installation and therefore companies may also report under CRC or CCAs. In total it is estimated that these firms will report their UK carbon dioxide emissions in the baseline.

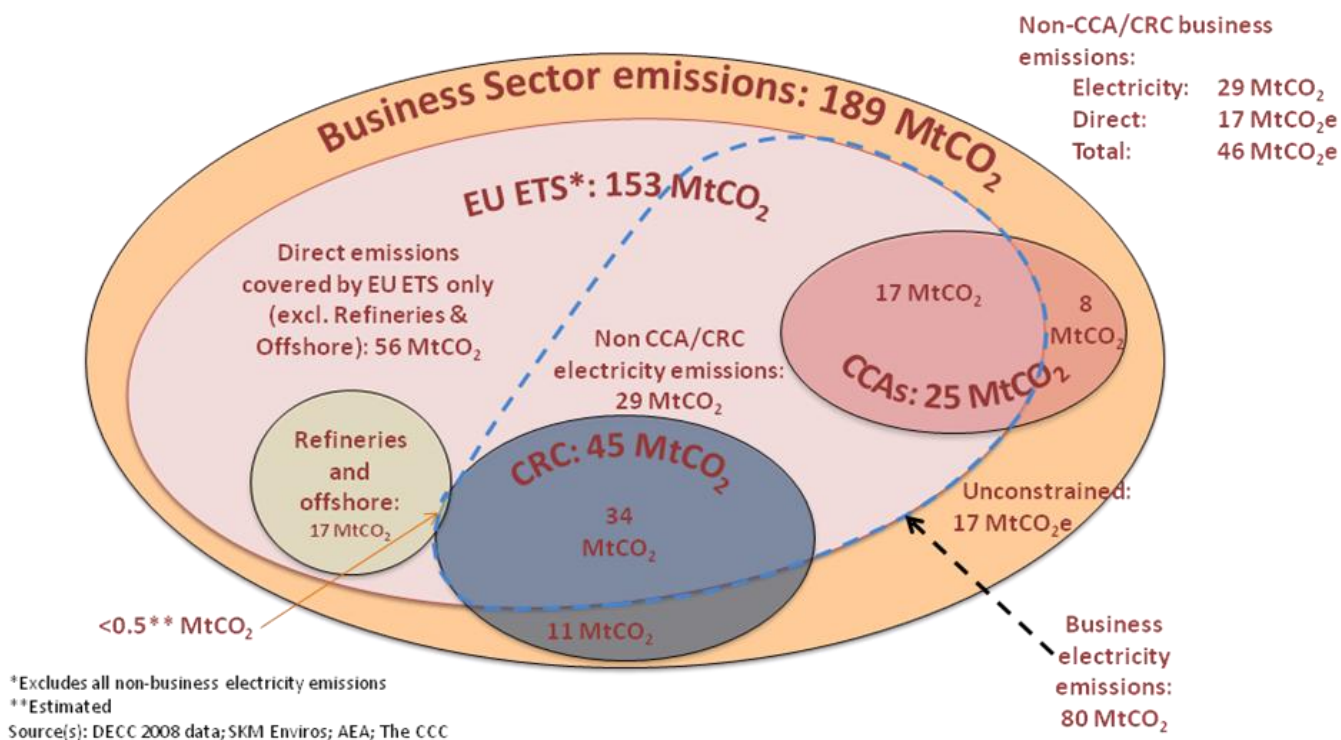
#### *Estimates of Voluntary Reporting*

The Defra/DECC guidance IA estimated the take-up of voluntary reporting. It is estimated that approximately a further 1,500 large companies will take-up voluntary reporting over the period in the baseline. This is from an estimated 1,000 to 2,000 large companies undertaking voluntary reporting. The proportion of small firms estimated to undertake voluntary reporting is small (approximately 1% of all small companies) therefore as it will not affect the results of this analysis it is assumed under option 0 that no small or medium companies report. It is estimated that in total 7,700 large companies may report their carbon dioxide emissions in the baseline. It is assumed that these companies would not reduce their emissions further by reporting under the Companies Act.

#### *Estimates of emissions covered by these reporting requirements*

DECC have estimated the MtCO<sub>2</sub> emissions not covered by existing policies, reported in the table below. The emissions from those companies covered by existing reporting requirements are assumed to not be reduced by a mandatory reporting requirement. The unconstrained emissions for those companies not covered by existing reporting policies are estimated at 17Mt of carbon dioxide.

Figure 2: UK Emissions Covered by Existing Reporting Requirements



Note: These figures are estimated using best available evidence from DECC. Due to updated information becoming available, it is expected that these will be refined post consultation.

### Smart Metering

Within the literature on reporting, a key driver of benefits has been attributed to increased information from mapping emissions providing information on energy use which can lead to identification of energy savings to businesses, alongside emissions reductions. Energy suppliers are currently 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 most large organisations would have smart meters currently. This IA assumes that all firms within the options considered have smart meters installed.<sup>51</sup>

The implications for mandatory GHG reporting is that advantages associated with additional information on energy use in the UK, would already be provided from smart metering. Therefore, when considering emission reductions it is important to disregard this information driver. Therefore, the key drivers of emission reductions considered within this IA will be from increased reporting to directors, investors, consumers and key influencers within the public that could then drive behaviour change.

### Estimate of Take up of Road Freight Transport Voluntary Reporting

<sup>51</sup> <http://www.ofgem.gov.uk/e-serve/sm/Documentation/Documents1/DECC%20-%20Impact%20assessment%20-%20Domestic.pdf>

As noted above, road freight transport is the only element of direct freight emissions with monetised benefits. This analysis assumes that there is no reporting in the baseline. Currently there are policies in place to encourage voluntary reporting of freight emissions, however it is understood that this covers a relatively small portion of road transport freight emissions.

#### *Estimated Employment and Turnover Covered by Firms in Option 0*

As discussed previously for each option the options use employment and turnover as a proxy for company emissions for each of the options below. Subsequently, the amount of employment and turnover related to companies reporting under existing reporting requirement (CRC, CCAs and Voluntary Reporting) must be excluded these values are reported below.

Total employment in private sector: 22,819,000

Total turnover in private sector: £3,240 bn

Estimated employees covered by firms included in CRC: 8,523,000, 37% of total employment

Estimated turnover covered by firms included in CRC: £ 1,486 billion, 46% of total turnover

Estimated employees covered by CCAs and Voluntary Reporters: 476,000, 2% of total employment

Estimated turnover covered by CCAs and Voluntary Reporters: £ 92 billion, 3% of total employment

Estimated employees covered by existing reporting requirements (CRC, CCA and Voluntary): 8,999,000, 39% of total employment.

Estimated employees covered by existing reporting requirements (CRC, CCA and Voluntary): £ 1,578 billion, 49% of total employment

As the amount of employment and turnover covered in the baseline, by existing reporting requirements has been defined it is possible to define the amount of employment and turnover not covered by these reporting requirements.

Employment not covered by CRC, CCAs or Voluntary Reporting: 13,819,000

Turnover not covered by CRC, CCAs or Voluntary Reporting: £1.661 bn

#### **Option 1 Enhanced Voluntary Reporting**

It is assumed that engaging activities to enhance voluntary reporting could increase the rate of take-up by an additional 10% 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 there is potentially 3000 small firms reporting and 200 large firms.

It was not possible to include unquantified, but potentially significant, benefits such as brand building and improved stakeholder relations in the model. The estimates produced from using a model based on UK based CO<sub>2</sub> emissions suggests it is not cost beneficial for small, medium or non-reporting large companies to report in terms of energy cost savings versus costs, therefore no additional take up is assumed. However, it should be noted that whilst the modelling is based on the quantifiable data currently available, other evidence (e.g. the IEMA Special Report on GHG management and reporting<sup>52</sup>) does show that a range of companies including small, medium and some micro are measuring and reporting their emissions, suggesting that there are benefits. IEMA data does show that small and medium sized companies are less likely to take up reporting than large companies, which is consistent with modelling.

There are potential significant benefits related to transport emissions, although no costs have been estimated at present. Any scheme involving voluntary reporting would be expected to generate net benefits, therefore the benefits related to transport emissions are reported for illustrative purposes.

Table 4: Impact of Option 1 – Enhanced Voluntary Reporting

Enhanced voluntary reporting	Small	Medium	Large
Additional companies (to the baseline) reporting under this Option (2011-2020)	0-3000	0	0-200

#### *Key Assumptions for Option 1*

- Resources are available in Defra/DECC to support enhanced reporting initiatives
- 200 large and 3000 small companies report.
- It is estimated that there are not private benefits for firms to newly collate energy emissions because the relative benefits will not be as significant as the relative costs. Therefore it is assumed that firms will not take up this option.

#### *Costs for Reporting Electricity and Gas Carbon Dioxide Emissions*

As noted above, the modelling suggests that it is not private beneficial for firms not currently reporting under existing reporting requirements to begin reporting. Therefore, it is assumed that UK firms do not report this information, unless they are already reporting it under existing mandatory reporting requirement. The modelling does suggest it could be beneficial for firms to additionally report transport emissions, as firms are more likely to have large transport emissions and they can utilise the information to make significant financial savings.

#### *Illustrative Costs of Mandatory Reporting Transport Related Emissions*

- The process for estimating these costs are laid out in Annex G. These are estimated from the costs to large companies of reporting electricity and gas carbon dioxide emissions. Then, fitted to each option based upon the relative amount of freight transport related wider GHG emissions.
- Transport Related Annual Reporting Costs: Low Costs: £0m; Upper Costs: £0.1m

<sup>52</sup> 2010 IEMA Special Report on GHG management and reporting (see Chapter 2 on status report)



## PV Total Costs: PV Low Costs: £0m; Upper Costs: £1.1m

### Benefits

- Electricity and Gas related Carbon Dioxide Emissions Coverage of Newly Reporting Firms
  - There are no benefits related to reduction in emissions related to electricity and gas emissions.
  - This provides Upper benefits of £0m and High benefits of £0m.
- Reduction in Wider GHG Emissions
  - No monetised benefits related to wider GHG emissions.
- Transport Emissions Coverage of Firms
  - It is estimated that 200 large companies and 3000 small companies will report freight transport related emissions.
  - Option 1: Estimated employment: 0.041m, 0.18% of total employment (~22.8m).
  - Option 1: Estimated turnover: £7.34bn, 0.23% of total turnover (~£3,240bn).
  - Mid-point: 0.20%
  - Using the estimates above it is estimated that option 1 will capture 0.20% of the road freight transport emissions in the private sector. This is equivalent to 0.061 MtCO<sub>2</sub>. Upper benefit estimates assume an emissions reduction of 4% for these firms, equivalent to 0.002MtCO<sub>2</sub>.
- *Benefits from Reduction in Freight Transport Emissions*

#### Option 1: Fuel related Emission Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	2445	2445
Value of emission reductions (£m) 2011	0	0	0.1
Value of diesel fuel savings (£m) 2011	0	0	0.4
Total Transport Benefits (£m) 2011	0	0	0.5

This provides Upper benefits of £0.5m and High benefits of £0.1m.

As transport benefits represent all benefits. Total benefits are identical to transport related benefits for this option.

## PV Benefits: Low Benefits: £0m; High Benefits: £1.2m; Upper Benefits: £4.6m

The modelling suggests that the potential private benefits to companies from energy savings from centrally measuring and reporting carbon emissions are smaller than the costs, therefore no additional reporting of energy and gas related emissions is assumed. There may, however, be other unquantifiable benefits such as brand building and improved stakeholder relations that will encourage voluntary reporting.

### Option 2 – Mandatory Reporting for UK Main Listed Companies

There are 1,101 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 Company House and 983 companies were matched. It has been assumed that those not matched are smaller

firms. 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 listed 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. Therefore, excluding the benefits associated with these firms not reporting would not be expected to impact on estimated costs and benefits.

#### *UK Main Listed Companies Already Reporting Electricity and Gas Related Emissions under Option 0*

As noted under Option 0, 4,050 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, it is estimated that this represent firms with greater than 400 employees, approximately 373 firms (please see Annex H for an explanation of how this is estimated). Further, 2,150 firms are covered by CCAs and approximately 1500 companies voluntarily report, therefore approximately 18% of the remaining large companies are assumed to already report CO<sub>2</sub> emissions under Option 0, a further 12 firms. Summing together these companies gives an estimated 385 companies currently reporting emissions related to gas and electricity.

Of the remaining companies the number of small medium and large companies has been estimated using the company act definitions. The estimate for each of these is provided below.

Table 5: Impact of Option 2 – Newly Reporting Quoted Companies

Option 2: All Quoted companies*	Small	Medium	Large
Number of new reporting companies covered by Option 2	80	64	53

That leaves 519 companies that are not currently reporting, and not identified as small, medium or large firms. These are either companies that were not picked up within the matching analysis or those that did not report turnover or employment data. It is assumed that these companies report under their parent firm. It is assumed there is a nominal reporting cost to show that they are not required to report their emissions in their annual reports, therefore these are treated as adjustors.

#### *Costs of Mandatory Reporting Electricity and Gas Related Carbon Dioxide Emissions*

The cost estimates are provided below, for one-off and measuring and reporting costs. The lower and upper bound annual costs are estimated by summing the respective costs for both new reporters and existing reporters.

#### Option 2: Mandate under the Companies Act for all quoted companies

		Costs	Number of Companies	One-off costs	Measuring Emissions	Reporting emissions	Annual Costs
New Reporters	Small	Upper	80	£5,600	£100,000	£5,600	£105,600
		Lower	80	£2,880	£100,000	£2,880	£102,880
	Medium	Upper	64	£5,120	£121,600	£6,400	£128,000
		Lower	64	£5,120	£121,600	£4,480	£126,080
	Large	Upper	53	£6,360	£1,590,000	£53,000	£1,643,000
		Lower	53	£6,360	£296,800	£5,300	£302,100
Adjustors	Small	Upper	519	£0	£0	£36,330	£36,330
		Lower	519	£0	£0	£18,684	£18,684
	Large	Upper	385	£0	£0	£385,000	£385,000

	Lower	385	£0	£0	£38,500	£38,500
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- Electricity and Gas Related Annual Reporting Costs: Low: £0.59m; Upper: £2.30m

#### *Illustrative Costs of Mandatory Reporting Transport Related Emissions*

- The process for estimating these costs are laid out in Annex G. These are estimated from the costs to large companies of reporting electricity and gas carbon dioxide emissions. Then, fitted to each option based upon the relative amount of freight transport related wider GHG emissions.
- Transport Related Annual Reporting Costs: Low Costs: £0m; Upper Costs: £105m

#### *Total Monetised Costs of GHG Reporting*

- Total Annual GHG Reporting Costs: Low Costs: £0.6m; Upper Costs: £107.5m
- PV Total Costs: PV Low Costs: £5.1m; PV Upper Costs: £925m**

#### *Benefits of Mandatory GHG Reporting for UK Main Listed Companies*

- Benefits from Reduced Carbon Dioxide Emissions
  - Estimated employment not covered by CRC, ETS and CCAs: 17,581, 0.13% of non-reporting employment (~13.4m)
  - Estimated turnover not covered by CRC, ETS and CCAs: £9.9bn, 0.60% of non-reporting turnover (~1,589bn)
  - Mid-point: 0.36%
  - Using the estimates above it is estimated that option 2 will capture 0.36% of the unconstrained emissions in the private sector. This is equivalent to 0.061MtCO<sub>2</sub>. Upper and High benefit estimates assume an emissions reduction of 2%, equivalent to 0.001MtCO<sub>2</sub>.

#### Option 2: Electricity and Gas Related Carbon Dioxide Emissions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	1229	1229
Value of emission reductions (£m) 2011	0	0.02	0.03
Value of electricity energy savings (£m) 2011	0	0	0.15
Value of gas energy savings (£m) 2011	0	0	0.05
Total savings (£m) 2011	0	0.02	0.23

- This provides Upper benefits of £0.23m and High benefits of £0.02m.
- Net Benefits of Electricity and Gas Related Carbon Dioxide Emissions
  - Costs and benefits are only reported for electricity and gas related carbon dioxide emissions therefore these are compared below.
  - As the table below shows, it is estimated that there are net costs for reporting of electricity and gas related emissions, for all cost and benefit scenarios.

#### Option 2: Net Benefits (£m) of Reporting Electricity and Gas related Carbon Dioxide Emissions

		Cost Estimate	
		Low	Upper
Benefit Estimate	Upper	-4.8	-19.6

	High	-5.1	-19.8
	Low	-5.1	-19.8

*\*Values in Red indicate negative values, costs are greater than benefits*

- *Reduction in Wider GHG Emissions*

- As discussed, the reduction in carbon dioxide emissions results in a reduction in wider GHG emissions. Wider GHG emissions account for an additional 8% of CO<sub>2</sub>e, above total carbon dioxide emissions.

Option 2: Electricity and Gas Related wider GHG Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> e)	0	108	108
Value of emission reductions (£m) 2011	0	0.01	0.01
Total savings (£m) 2011	0	0.01	0.01

- *Benefits from Reduction in Freight Transport Emissions*

- As discussed it is assumed that firms will not report transport related emissions in the baseline.
- Option 2: Estimated employment: 6.75m, 30% of total employment (~22.8m).
- Option 2: Estimated turnover: £1,041bn, 32% of total turnover (~£3,240bn)
- Mid-point: 31% of emissions.
- Using the estimates above it is estimated that option 2 will capture 31% of the road freight transport emissions in the private sector. This is equivalent to 9.3 MtCO<sub>2</sub>. Upper and High estimates assume an emissions reduction of 4% for these firms, equivalent to 0.37MtCO<sub>2</sub>.
- Benefits from Reduction in Freight Transport Emissions

Option 2: Fuel related Emission Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	373114	373114
Value of emission reductions (£m) 2011	0	19	19
Value of diesel fuel savings (£m) 2011	0	0	60
Total Transport Benefits (£m) 2011	0	19	80

- This provides Upper benefits of £80m and High benefits of £19m.
- This highlights the magnitude of transport benefits in estimating total benefits in this analysis.

### Total Benefits

Summing these values gives total benefits for Option 2

Option 2: Total Annual Benefits

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	374451	374451
Value of emission reductions (£m) 2011	0	19	19
Value of energy and fuel savings (£m) 2011	0	0	61
Total savings (£m) 2011	0	19	80

**PV Benefits: PV Low Benefits: £0m; PV High Benefits: £179m; PV Upper Benefits: £701m**

### Option 3 Large Companies

Employment and turnover are used as a proxy for emissions in the analysis below. The 4,050 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 1500 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:

Table 6: 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	7,700

#### Key Assumptions for Option 3

- Central estimate of large companies is from BIS/ONS statistics
- The estimate of large companies engaged in some form of monitoring/reporting includes the expected voluntary take-up

#### Costs of Mandatory Reporting Electricity and Gas Carbon Dioxide Emissions

The cost estimates are provided below, for one-off and measuring and reporting costs. The lower and upper bound annual costs are estimated by summing the respective costs for both new reporters and existing reporters.

Option 3: Mandate under the Companies Act for all large companies

		Costs	Number of Companies	One-off costs	Measuring Emissions	Reporting emissions	Annual Costs
New Reporters	Large	Upper	16,300	£1,956,000	£489,000,000	£16,300,000	£505,300,000
		Lower	16,300	£1,956,000	£91,280,000	£1,630,000	£92,910,000
Adjustors	Large	Upper	7,700	£0	£0	£7,700,000	£7,700,000
		Lower	7,700	£0	£0	£770,000	£770,000

- Electricity and Gas Related Annual Reporting Costs: Low: £93.7m; Upper: £513m

#### Illustrative Costs of Mandatory Reporting Transport Related Emissions

- The process for estimating these costs are laid out in Annex G. These are estimated from the costs to large companies of reporting electricity and gas carbon dioxide emissions. Then, fitted to each option based upon the relative amount of freight transport related wider GHG emissions.
- Transport Related Annual Reporting Costs: Low Costs: £0m; Upper Costs: £187m

#### Total Monetised Costs of GHG Reporting

- Total Annual GHG Reporting Costs: Low Costs: £93.7m; Upper Costs: £700m
- **PV Total Costs: PV Low Costs: £808m; PV Upper Costs: £6,025m**

#### Benefits of Mandatory GHG Reporting for Large Companies

- Benefits from reduced electricity and gas related carbon dioxide emissions
  - Estimated employment of large companies not covered in existing reporting requirement (CRC, ETS and CCA): 2.13m, 15% of non-reporting employment (~13.4m)
  - Estimated turnover not covered by £412bn, 25% of non-reporting turnover (~1,589bn)
  - Mid-Point: 20%
  - It is estimated that option 3 will capture 20% of the unconstrained emissions in the private sector. This is equivalent to 3.4 MtCO<sub>2</sub>. Upper and High benefit estimates assume an emissions reduction of 2% for these firms, equivalent to 0.068MtCO<sub>2</sub>.

#### Option 3: Electricity and Gas Related Carbon Dioxide Emissions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	68406	68406
Value of emission reductions (£m) 2011	0	1.19	1.82
Value of electricity energy savings (£m) 2011	0	0	8.27
Value of gas energy savings (£m) 2011	0	0	2.73
Total savings (£m) 2011	0	1.19	12.82

- This provides Upper benefits of £13m and High benefits of £1.2m.
- Net Benefits of Electricity and Gas Related Carbon Dioxide Emissions
  - Costs and benefits for electricity and gas related carbon dioxide emissions are compared below.
  - As the table below shows, it is estimated that there are net costs for reporting of electricity and gas related emissions, for all cost and benefit scenarios.

#### Option 3: Net Benefits (£m) of Reporting Electricity and Gas related Carbon Dioxide Emissions

		Cost Estimate	
		Low	Upper
Benefit Estimate	Upper	- 795.50	- 4,404.88
	High	- 807.14	- 4,416.51
	Low	- 808.32	- 4,417.70

*\*Values in Red indicate negative values, costs are greater than benefits*

- Reduction in Wider GHG Emissions

- As discussed, the reduction in carbon dioxide emissions results in a reduction in wider GHG emissions. Wider GHG emissions account for an additional 8% of CO<sub>2</sub>e, above total carbon dioxide emissions.

Option 3: Electricity and Gas Related wider GHG Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> e)	0	5992	5992
Value of emission reductions (£m) 2011	0	0.3	0.3
Total savings (£m) 2011	0	0.3	0.3

- Benefits from Reduction in Freight Transport Emissions

- As discussed, it is assumed that firms will not report transport related emissions in the baseline.
  - Option 3: Estimated employment: 11.12m, 48% of total employment (~22.8m)
  - Option 3: Estimated turnover: £1,991bn, 62% of total turnover (~£3,240bn)
  - Mid-point: 55%.
  - Using the estimates, above it is estimated that option 3 will capture 55% of the road freight transport emissions in the private sector. This is equivalent to 16.5 MtCO<sub>2</sub>. Upper and High benefit estimates assume an emissions reduction of 4%, equivalent to 0.66MtCO<sub>2</sub>.

Option 3: Fuel related Emission Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	661977	661977
Value of emission reductions (£m) 2011	0	34	34
Value of diesel fuel savings (£m) 2011	0	0	107
Total Transport Benefits (£m) 2011	0	34	141

- This provides Upper benefits of £107m and High benefits of £26m.
- Transport benefits are the only monetised benefits for this option

### Total Benefits

Summing these values gives total benefits for Option 3

Option 3: Total Annual Benefits

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	736375	736375
Value of emission reductions (£m) 2011	0	36	37
Value of energy and fuel savings (£m) 2011	0	0	118
Total savings (£m) 2011	0	36	154

**PV Benefits: Low Benefits: £0m; High Benefits: £332m; PV Upper Benefits: £1,357m**

### Option 4 – Mandatory Reporting Using Energy Consumption Criteria

According to registration data for the CRC there are approximately 4500 organisations who consume more than 6000MWh of electricity. Of these 90% (4050) are private companies. All of these companies

would be reporting their emissions associated with non-transport energy use through either the CCA or the CRC.

Table 6: Impact of Option 4: Electricity consumption greater than 30,000MWh

Total number of companies consuming more than 6,000MWh	4050
Proportion already reporting CO <sub>2</sub> under the CRC or CCAs	100%

Newly reported emissions are limited to emissions associated with freight transport, emissions of the five non CO<sub>2</sub> Kyoto gases and emissions associated with the companies' international activities.

#### *Costs of Mandatory Reporting Electricity and Gas Carbon Dioxide Emissions*

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.

Option 4: Mandate under the Companies Act for all large companies

		Costs	Number of Companies	One-off costs	Measuring Emissions	Reporting emissions	Annual Costs
Adjustors	Large	Upper	4,050	£0	£0	£4,050,000	£4,050,000
		Lower	4,050	£0	£0	£405,000	£405,000

- Electricity and Gas Related Annual Reporting Costs: Low: £0.4m; Upper: £4.1m

#### *Illustrative Costs of Mandatory Reporting Transport Related Emissions*

- The process for estimating these costs are laid out in Annex G. These are estimated from the costs to large companies of reporting electricity and gas carbon dioxide emissions. Then, fitted to each option based upon the relative amount of freight transport related wider GHG emissions.
- Transport Related Annual Reporting Costs: Low Costs: £0m; Upper Costs: £139m

#### *Total Monetised Costs of GHG Reporting*

- Total Annual GHG Reporting Costs: Low Costs: £0.4m; Upper Costs: £143m
- **PV Total Costs: PV Low Costs: £3.5m; PV Upper Costs: £1,233m**

#### *Benefits Mandatory GHG Reporting*

- Benefits of Mandatory Emissions Reporting for Electricity and Gas related Carbon Dioxide Emissions
  - Under option 4 all firms already report their emissions under CRC therefore there are no newly reporting companies.
    - Estimated employment not covered by CRC, ETS and CCAs: 0
    - Estimated turnover not covered by CRC, ETS and CCAs: £0bn



- Net Benefits of Electricity and Gas related Carbon Dioxide Emissions
  - There are no benefits related to electricity and gas related emissions as firms are assumed to report all emission within the baseline.
- Reduction in Wider GHG Emissions
  - As there are not expected to be reductions in electricity or gas related carbon dioxide emissions, there will also not be reductions in wider GHG reductions.
- Net Benefits of Reporting Electricity and Gas Related Emissions

Option 4: Net Benefits (£m) of Reporting Electricity and Gas related Carbon Dioxide Emissions

		Cost Estimate	
		Low	Upper
Benefit Estimate	Upper	-£3.49	-£34.86
	High	-£3.49	-£34.86
	Low	-£3.49	-£34.86

- Benefits from Reduction in Freight Transport Emissions
  - As discussed, it is assumed that firms will not report transport related emissions in the baseline.
    - Option 4: Estimated employment: 8.52m, 37% of total employment (~22.8m)
    - Option 4: Estimated turnover: £1,486bn, 46% of total turnover (~£3,240bn)
    - Mid-point: 42%.
  - Using the estimates, above it is estimated that option 4 will capture 42% of the road freight transport emissions in the private sector. This is equivalent to 12.5 MtCO<sub>2</sub>. As discussed, Upper and High benefit estimates assume an emissions reduction of 4% for these firms, equivalent to 0.50MtCO<sub>2</sub>.

Option 4: Fuel related Emission Reductions

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	500840	500840
Value of emission reductions (£m) 2011	0	0	81
Value of diesel fuel savings (£m) 2011	0	26	26
Total Transport Benefits (£m) 2011	0	26	107

- This provides Upper benefits of £107m and High benefits of £26m.
- Transport benefits are the only monetised benefits for this option

### Total Benefits

As road freight transport benefits represent all benefits these are equal to the total.

Option 4: Total Annual Benefits

	Lower	High	Upper
Range of Potential Emission Reductions (tCO <sub>2</sub> )	0	500,840	500,840
Value of emission reductions (£m) 2011	0	0	81
Value of energy and fuel savings (£m) 2011	0	26	26
Total savings (£m) 2011	0	26	107

**PV Benefits: Low Benefits: £0m; High Benefits: £241m; Upper Benefits: £959m**

## **10. Summary of Benefits**

### *Key Assumptions*

- Upper benefits assumes firms are inefficient and realise private benefits from reporting.
- These estimates do not assume any costs to business resulting from investing in more energy efficient infrastructure, additional effort expended identifying savings opportunities, or the opportunity cost of missed activities. Any of these activities would be expected to reduce net benefits to business.
- It is assumed that firms reporting UK emissions under existing reporting requirements will not generate additional behaviour change from reporting wider GHG emissions.
- For new reporters it is assumed that emissions reductions of between 0 and 2% can be achieved through measuring and managing emissions.
- The range of the potential emissions reduction achievable by companies calculated within this impact assessment are considered reasonable given the lack of empirical evidence available on behaviour change
- CO<sub>2</sub> savings have been valued in line with DECC GHG appraisal guidance.
- It has been assumed that two thirds of emissions are related to electricity use and that one-third derives from the use of gas (assumption used within CRC analysis).
- Potential energy savings (electricity and gas) are derived from potential emissions reduction figures using DECC guidance on the valuation of energy use and greenhouse gas emissions for appraisal and evaluation.
- Electricity and gas savings are monetised at the central value using the commercial variable element
- All monetised savings (GHG emissions, electricity and gas) have been discounted in line with HM Treasury's Green Book Guidance
- The intangible benefits to firms from increased reporting from increased investment, or sales to consumers are not quantified.

### *Non-Monetised Benefits*

- Increased quality and consistency of UK company emissions data
- Value of reduction in wider GHG emissions (from measuring and reporting on all 6 Kyoto GHGs) – only estimated CO<sub>2</sub> reductions are monetised
- Wider reduction in global GHGs (not just UK) where companies are multinational
- Benefits to reporting organisations minus any displacement effects elsewhere in UK economy. Includes increased reputation and branding benefits for the organisation and reduced exposure to climate change risks.

- Better corporate governance through provision of climate relevant information
- More useful information for shareholders/investors to enable them to judge risks and opportunities relevant to their investment

## 11. One In One Out

At this stage no option has been identified as *preferred*. The consultation process is being used to gather further evidence to support the identification of a preferred option. As options include non-regulatory approaches, as well as options covering a wide array of cost implications, at this stage OUTS have not been identified. These will be identified when a *preferred* option is selected.

The range of Estimate Annual Costs for each option is provided below to inform decision makers on the OUTS required for each option.

Table 7: Equivalent Annual Cost for Option

			Option 1	Option 2	Option 3	Option 4
Equivalent Annual Costs (£m)	Monetised Costs	Upper Bound	0.1	111.3	724.4	148.3
		Lower Bound	0.0	0.6	97.2	0.4

## 12. Switching point analysis

This switching point analysis is undertaken where both cost and benefit data on impacts is available, only for electricity and gas related emission reductions.

It displays the percentage reduction in emissions required, from firms that are not reporting under existing reporting requirements (e.g. ETS/CRC), to make the policy cost effective. They show that using the information available on costs and benefits, the increase in emissions reductions for newly reporting firms would have to be large to justify the costs of the proposal.

For Option 1, as firms voluntarily report it is assumed they only do so when there are private benefits, therefore, even for very small emission reductions this is beneficial. For option 2 emission reductions have to be greater than total electricity and gas related emissions using the High benefits and the upper bound costs, which is not possible; emission reductions have to be significant for the other scenarios. For option 3 using High benefits emission reductions have to be greater than firms total electricity and gas related emissions, using either cost estimate, and have to be very large even where emissions are small. For option 4, all firms currently report under CRC and so there are no benefits from electricity and gas related emission reductions, and therefore benefits cannot exceed costs.

Table 8: % Reduction in Electricity and Gas related emissions required for benefits to exceed costs

		Cost Estimate							
		Option 1		Option 2		Option 3		Option 4	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Benefit Estimate	Upper Benefits	0%	0%	5%	19%	14%	77%	N/A	N/A
	High Benefits	0%	0%	52%	201%	147%	806%	N/A	N/A
	Low Benefits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: it is not possible for firms to realise emission reductions of greater than 100%

## 13. Small Firms Impact Test

We have carried out a small firms impact test. Options 0 and 1 will not impact small firms except in an voluntary way. Option 2 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.

We will consult on the impact of Option 2 on small firms in our consultation.

### 14. Competition Assessment

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.

### 13. 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 fuel use. It has not been possible to quantify the impact on air quality.

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

--

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

No

--

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

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

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

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 balanced	Moderately negative	Strongly negative
	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<sub>2</sub> (it was only possible to monetise CO<sub>2</sub> reductions). Given the fact that these are expected to be positive, we conclude that the sustainable development impacts are expected to be positive overall.

## Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

### Annex 1: Post Implementation Review (PIR) Plan

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

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), it could be to review existing policy or there could be a political commitment to review];</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured]</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review]</p>
<p><b>Reasons for not planning a PIR:</b> We have not currently made plans to carry out a PIR because the decision has not been taken to introduce regulation. This consultation has no preferred option and so without an indication of a preferred option we have not been able to define how to review its impacts. If a regulatory approach is taken, a further consultation will be held and IA prepared and we will include plans for a PIR at that stage.</p>

Add annexes here.



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

### (i) 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, for financial years beginning on, or after 1 October 2007, 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*

#### (ii) EU Emissions Trading System (EU ETS)

This is a cap and trade system which covers CO<sub>2</sub> 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 231.9MtCO<sub>2</sub>, around 48% of total UK CO<sub>2</sub> emissions in 2009. It is assumed that there will be no additional benefits in terms of increased CO<sub>2</sub> 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-CO<sub>2</sub> greenhouse gases and wider emission sources such as freight emissions.

#### (iii) CRC Energy Efficiency Scheme (CRC)

The CRC Energy Efficiency Scheme is a mandatory cap and trade scheme that captures CO<sub>2</sub> emissions from large non energy-intensive organisations in the UK. It is estimated that it covers 54MtCO<sub>2</sub> (around 10% of total UK CO<sub>2</sub> emissions), with around 90% coming from the private sector. The estimated number of organisations that will qualify for full participation is 3-4,000 (DECC, 2010). However, it is estimated that approximately 15,000 companies will have to make some form of information disclosure under the CRC. It is assumed under the baseline that up to 4,500 companies currently monitor and report emissions for the purposes of the CRC. It is assumed that there will be no additional impact in terms of increased CO<sub>2</sub> 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-CO<sub>2</sub> greenhouse gases and wider emission sources such as freight emissions.

#### (iv) Climate Change Agreements (CCAs)

Currently 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 CO<sub>2</sub> emissions, but there is no requirement for this information to be disclosed publicly. Approximately, 500 companies 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 CO<sub>2</sub> 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-CO<sub>2</sub> greenhouse gases and wider emission sources such as freight emissions.

## Annex B: Evidence on costs

Provided below is a summary of the evidence on the costs of reporting which has been used to form the cost estimates within this impact assessment. Note that the evidence is drawn from a range of sources and is therefore limited in terms of mapping precisely to this policy. Nevertheless the reports below enabled a judgement to be formed on an illustrative range of costs.

- *PwC/CDP report: Review of the Contribution of Reporting to GHG Emissions Reduction and Associated Costs and Benefits (2010)*

PwC carried out a business survey<sup>53</sup> which asked detailed questions about the costs of measuring emissions and the costs of reporting. Responses to the survey were primarily from large companies (52% of companies were large quoted companies). The survey indicated that over 50% of respondents have annual measurement costs of less than £50,000 and a further quarter have costs between £50,000 and £100,000. The remainder of companies were spread across the higher range of costs, with highest total cost of measurement stated was £450,000. Company size was not always related to cost of measurement with some SMEs giving costs in the higher range. Specific costs associated with external GHG emissions reporting were generally slightly lower than measurement costs. Around 40% of companies quoted costs of less than £25,000 for reporting, with a further 25% stating costs between £25,000 and £50,000. Just fewer than 20% stated costs from £50,000 to £100,000 and the maximum cost stated was £400,000.

The survey results suggest considerable variation in costs across companies. Reasons suggested for this include: differing time spent on measurement and data collection (which is dependent on the number of facilities/operations); employee type engaged in the measurement and reporting of GHG emissions (e.g. engineering professionals, corporate managers, operations managers); coverage of emissions (all GHG or CO<sub>2</sub> only, scope of reporting – 1,2 or 3); company size (larger, higher profile companies may have different pay scales compared to smaller, less established companies) the level of verification and assurance; the level of engagement by senior management; and, the level of integration into day-to-day operations. In particular, interviews with companies also suggested that the approach to measurement and reporting could range from simple data collation to the use of real-time integrated software systems. Interestingly, most companies who participated in the survey had not seen a reduction in costs, and some of the reasons for this were explored by PwC in the telephone interviews with companies. However most companies do not view the costs of reporting as financially material<sup>54</sup> (PwC key conclusions).

- *Final Impact Assessment on the Order to implement the CRC Energy Efficiency Scheme (January 2010)*

The CRC Energy efficiency scheme impact assessment identified administrative costs related to many activities associated with measurement and reporting of GHG emissions. These include: understanding scheme rules; collection and analysis of data; developing a compliance (reporting) strategy; and, submitting and verifying data. These activities, and others specific to an emissions trading scheme, are estimated to range from £7,000 to £28,500 per annum<sup>55</sup>. These are based on a daily cost of £500/person-day input.

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<sup>53</sup> The survey was open to all companies in the UK via a weblink and outreach was estimated at about 6000 UK companies. The weblink was sent directly to companies and indirectly via sector associations; it was also advertised on websites such as Defra, Environment Agency and PwC. See Chapter 6 of the PwC report for further details.

<sup>54</sup> PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits"

<sup>55</sup> PwC/CDP (2010), page 30.

- *ERM report for EC Company GHG Emissions Reporting – a Study on Methods and Initiatives (July 2010)*

Environmental Resources Management (ERM) UK Ltd has carried out a study on behalf of the European Commission which reviewed and compared the major GHG reporting methods and initiatives. This review showed a very wide range of private sector costs quoted for GHG reporting ranging from €1,000 per annum (for a small company in the UK CRC) to €800,000 per annum (FTSE500 company highest cost quoted in CDP responses). There is evidence that the costs of GHG reporting are not linearly related to the size of the company or the magnitude of GHG emissions, although larger and more complex organisations will typically have higher reporting costs than small companies with few emission sources.

- *Institute of Environmental Management and Assessment (IEMA) Special Report – GHG Management and Reporting (August 2010)*

Evidence from IEMA from a survey of their members showed that 77% of respondents felt that they could not be confident enough to estimate reporting costs with a reasonable level of accuracy (i.e. to within £5,000). However, of those that did respond, the majority (over 70%) have costs for GHG reporting of below £10,000 per annum. The IEMA sample is small but their confidence in the figures is high. In relation to GHG management costs (not just reporting), over 50% indicate costs above £40,000.

- *US Environmental Protection Agency*

The mandatory reporting rule in the US is expected to capture 85-90% of total US GHG emissions from some 10000 facilities; small businesses are likely to fall below the threshold and so be excluded from the rule. Evidence from the U.S Environmental Protection Agency<sup>56</sup> suggested total annualised costs incurred by companies would average \$13,200 each for the first year (approximately £8,600) and \$8,900 each for subsequent years (approximately £5,600)

- *Final Impact Assessment of guidance on measurement and reporting on greenhouse gas emissions (September 2009)*

This impact assessment considered both the costs and benefits of reporting in accordance with the guidance. The table below summarises the costs of implementation of the guidance on a company basis.

Table 7: Defra/DECC GHG Reporting Impact Assessment costs

Average costs per company	Annual costs (£)	
	2009/10	2010/11
Adjusting companies - large	1,050	4,740
Adjusting companies - small	357	946
Newly reporting companies – large	6,300	6,300
Newly reporting companies - small	1,250	1,250

<sup>56</sup> [http://www.epa.gov/climatechange/emissions/downloads09/GHG\\_RIA.pdf](http://www.epa.gov/climatechange/emissions/downloads09/GHG_RIA.pdf)

Annex C: Evidence on benefits

Limited evidence is available on the relationship between reporting emissions and subsequent behaviour change, provided below is a summary of the evidence on the benefits of reporting which has been used to form benefit estimates used within this impact assessment. Because of the limited evidence, benefits are provided in a range of between 0-2% for electricity and gas related emissions and 4% for transport related emissions. This appears reasonable given other ranges on policies targeted on emissions reductions. It is not clear where in the range of reductions from 0 to 2% these reductions could lie.

- *PwC/CDP report: Review of the contribution of Reporting to GHG Emissions Reduction and Associated Costs and Benefits*

The PwC research noted that quantification of the benefits was challenging as many are long-term or qualitative. Evidence suggests that companies often do not directly benefit from publishing GHG information externally. The benefits that are gained by companies are primarily driven by the act of measurement of energy use and/or GHG emissions. This measurement can help identify opportunities for emission reduction and the setting of KPIs and targets. Therefore, directly attributing emissions reductions to external reporting is difficult, even if there is clearly a need to measure in order to report externally. Moreover, investor interest in the information is a key driver for reporting.

There was also consensus that reporting in isolation does not reduce actual emissions. It has to be followed by behavioural and operational changes within business. Companies found that external reporting helped enable reductions of GHG emissions and development of climate change strategies.

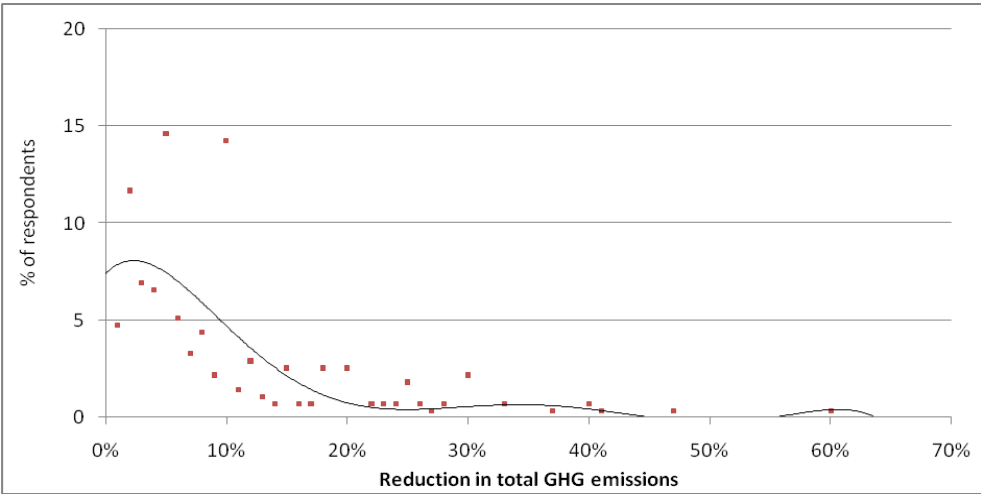
Most benefits identified through their literature review are intangible and difficult to quantify. The vast majority of respondents who report GHG emissions were able to identify GHG reporting as an important or very important contributor to many of the climate change outcomes. Companies in PwC’s survey were asked to quantify monetary benefits associated with costs savings from energy, carbon and resource efficiency that were attributable to GHG reporting. Around half of the companies were unable to answer the question – reinforcing the message that the monetary benefits of reporting are difficult to quantify. Results were primarily from large companies, with 14% of respondents quantifying energy cost savings of over £200,000, suggesting that benefits could be substantial for some companies. However it is worth noting that over half of the companies that PwC conducted telephone interviews with believed that reporting was a net benefit to the business.

- *Institute of Environmental Management and Assessment (IEMA) Special Report – GHG Management and Reporting (August 2010)*

Figure 3 below, from the IEMA Special Report, shows the distribution of responses to achieved and publicly reported total percentage reductions in GHG emissions in the period 2008-2010. It presents the percentage respondents for each reported level of achieved GHG reduction by organisations. As an example, 3% of respondents indicated an organisational total GHG reduction of 12% over the period. Survey results indicated a clear relationship exists between the ability to state an achieved reported reduction and the scale/size of the organisation.

Figure 3: IEMA – achieved and reported GHG reduction 2008-2010

Mean	9.3%
Median	7%
Response Rate	33.2%



Source: Institute of Environmental Management and Assessment (IEMA) Special Report – GHG Management and Reporting (August 2010), p.13

The mean value for the percentage reduction in emissions was calculated at 9.3%, for those that reduced emissions. The Committee on Climate Change has recently investigated the effects of recession and indicated that UK GHG emissions fell by 1.9% in 2008 and 8.6% in 2009 – this would imply that none of the 9.3% could be attributed to reporting. However, during this period companies that reported an average 9.3% emissions fall had a greater reduction in emissions intensity over 10.2%. In the previous 2 year period emission reductions also fell by less than emission intensity, by 8.9% compared to 10.7%. This provides some illustrative evidence that reporters reduce emission intensity, and that reporting may work to reduce emissions over and above the baseline, although there are a number of other drivers that will also act to reduce emissions. Further, there is a risk that reporting firms may respond less to mandatory reporting than firms that currently report, although it is also possible that these firms choose not to report to protect their reputation because they have higher emissions.

- *Other reports*

The CBI’s 2009 report: “All together now: a common business approach for greenhouse gas reporting” cited a range of benefits such as allowing companies to realise potentially significant efficiency improvements and cost savings; providing information to policymakers to provide for more effective policy making in this area; and stimulating behavioural change to move towards a low carbon economy.

The recent study by ERM<sup>57</sup> on behalf of the European Commission noted that the majority of companies had given little thought to identifying and quantifying the benefits of GHG reporting: typically focussing on reputational and investor benefits only. Despite this all the companies in the ERM survey were able to detail non-financial benefits. The report also states that several of the benefits arise from addressing the risks related to non-disclosure. These include reduced profit exposure, enhanced market value, increased brand value, improved reputation, reduced insurance premiums and improved credit ratings. But benefits were also found to vary according to the size of the company, sector and reporting scheme with benefits for SMEs being of a lower order.

<sup>57</sup> ERM (2010) Company GHG emission reporting – a study on methods and initiatives

## Annex D: *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 benefits<sup>58</sup>. 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 recent 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 CO<sub>2</sub> 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 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, 2,000 of which would simply be adjusting to this method of reporting rather than completely 'new reporters'; and 6,000

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<sup>58</sup> PwC/CDP (2010) "Review of the contribution of reporting to GHG emission reductions and associated costs and benefits".

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.

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 E: Illustrative evidence on Potential Costs and Benefits of International Emissions Reporting for FTSE 350 Firms

The PwC/CDP report provided inadequate data to robustly estimate the costs and benefits associated with this option. Costs for firms have been reported as partial and were not provided in a consistent manner, these should not be considered as adequate for the purposes of CBA. Therefore they are provided for five estimates: the lower and upper bound of costs, the median and the upper and lower quartile of cost estimates.

The PwC/CDP report provides one-off and annual cost estimates related to measuring and reporting emissions. This data is provided below.

Table E1: Illustrative Costs Per Firm of Measuring Emissions

		Lower Bound	Lower Quartile	Median	Upper Quartile	Upper Bound
Set Up	Lower	0	25	50	100	250
	Upper	25	50	75	125	275
Annual	Lower	0	25	50	75	250
	Upper	25	50	75	100	275

Table E2: Illustrative Costs Per Firm of Reporting Emissions

		Lower Bound	Lower Quartile	Median	Upper Quartile	Upper Bound
Set Up	Lower	0	0	25	50	250
	Upper	25	25	50	75	275
Annual	Lower	0	0	25	50	250
	Upper	25	25	50	75	275

Total costs are estimated by using the mid-point for each band then summing the annual and set up costs and multiplying each estimate by 350 for the total firms in the FTSE 350. Annual costs are then discounted and summed over 10 years and added to one-off costs to estimate total costs.

**Key Cost Assumptions**

This analysis is based on the cost and benefits in making all firms report. In reality clearly a significant number of firms already report voluntarily with CDP or other schemes, they will not incur as significant costs or benefits from reporting.

Costs of undertaking emission reductions in terms of training costs, investments costs or opportunity costs have not been monetised, therefore these costs are underestimates.

Cost data was not consistent across firms therefore it may be that some cost elements are missing or double counted.



Table E3: Illustrative FTSE 350 PV Costs  
(£m) 2010 Prices

PV Costs (£m)	Lower Bound	84
	Lower Quartile	168
	Median	336
	Upper Quartile	513
	Upper Bound	1,765

Benefits are estimated from CDP report on scope 1 and scope 2 emissions<sup>59</sup>. These are provided for industries. The data provides the total scope 1 and scope 2 emissions for each industry the number of firms in that industry and the number that report and the numb. These are provided for industries. The data provides the total scope 1 and scope 2 emissions for each industry the number of firms in that industry and the number that report and the percentage of those that report scope 1 or scope 2 emissions. It is assumed that scope 1 emissions include transport. The data is reproduced below.

Table E4: CDP Data on Reporting Companies

	Reporting in CDP	Industry Total	Scope 1 (tCO <sub>2</sub> )	% disclosed	Scope 2 (tCO <sub>2</sub> )	% disclosed
Consumer Discretionary	47	66	26,858,795	94	8,746,601	94
Consumer Staples	22	22	12,490,911	90	127,946,081	95
Energy	12	18	141665080	92	20705180	83
Financials	69	109	467576	84	3963476	91
Health Care	7	10	1542405	100	1530691	100
Industrials	44	62	25674304	89	5319586	89
Information Technology	13	26	61945	92	234535	92
Materials	15	23	71469704	100	68290255	100
Telecommunications	5	5	472830	100	3145245	100
Utilities	9	10	128198075	100	3259362	78

These are then updated to generate an estimated of total emissions.

To generate some indicative benefits figures these emission savings are then run through the model used in the main analysis on benefits. This uses UK traded and non-traded prices and ratios of electricity to gas ratios and the value of GHG savings also use UK values. Electricity prices and values will be smaller internationally. These represent an initial assessment of potential benefits.

Estimated Total Emissions Related to FTSE 350 firms: 891MtCO<sub>2</sub>

### **Monetised Benefits**

As in the main analysis benefits are provided for an Upper and High scenario. Please read section 7 for details.

#### Upper Benefits

Value of GHG Savings: £5bn

Value of Gas Savings: £6bn

Value of Electricity Savings: £19bn

Total Benefits: £31bn

#### High Benefits:

Value of GHG Savings: £3bn

Total Benefits: £3bn

#### International Benefits Key assumptions

The analysis assumes a 2% reduction, as in the main analysis.

There has been no assessment of emissions covered by other reporting schemes, this means that benefits will be overestimated.

The UK values of carbon are used. UK values of electricity, gas and diesel prices are used. The UK ratio of gas and electricity emissions are used.

## Annex F: Discussion of Internal versus External Emissions Reductions Benefits

The benefits identified below include both those that will be received directly by firms through cost savings and “externalities” that will benefit wider society. The former are in energy or fuel savings to companies and the latter from damaging GHG emissions. High benefits assume that firms gain the full value of energy and fuel savings.

### **Upper Benefits**

For firms to obtain energy saving benefits from reporting it requires the assumption that firms are not currently acting efficiently, that they do not currently minimise their costs. Evidence suggests that to some extent this is true as many firms do not take up no/low cost energy savings<sup>60</sup>. Therefore there may be some private savings to firms. However, there are costs associated with energy savings such as investment costs, training costs, and opportunity costs from diverting resources to deal with energy. Therefore, assuming full energy savings will overestimate benefits. This analysis includes energy and fuel savings as the most optimistic benefits assumption it is likely that these private benefits would be significantly lower than this.

### **High Benefits**

The High benefits scenario assumes that firms do not realise energy savings as these are equalled by the other costs identified above. This assumes that firms are acting efficiently. Therefore the only benefits are those associated with reduced damage from non-traded GHG emissions. Electricity emissions are traded, and firms pay to emit these emissions, therefore these are not included in High benefit estimates.

The diagram below represents costs and benefits to firms and wider society from emissions reductions from mandatory GHG reporting. The marginal private benefits (PB) are the value of energy savings to firms for each tonne of CO<sub>2</sub>e saved. Marginal social benefit (MSB) line includes both the private benefits to firms and other benefits from reduced damage to society from emissions. The Marginal Emission Reduction Cost represents the cost of reducing emissions, this increases as cheaper methods of reducing emissions are exhausted. The width of the bars represents the 2% CO<sub>2</sub> emission reductions from each starting point.

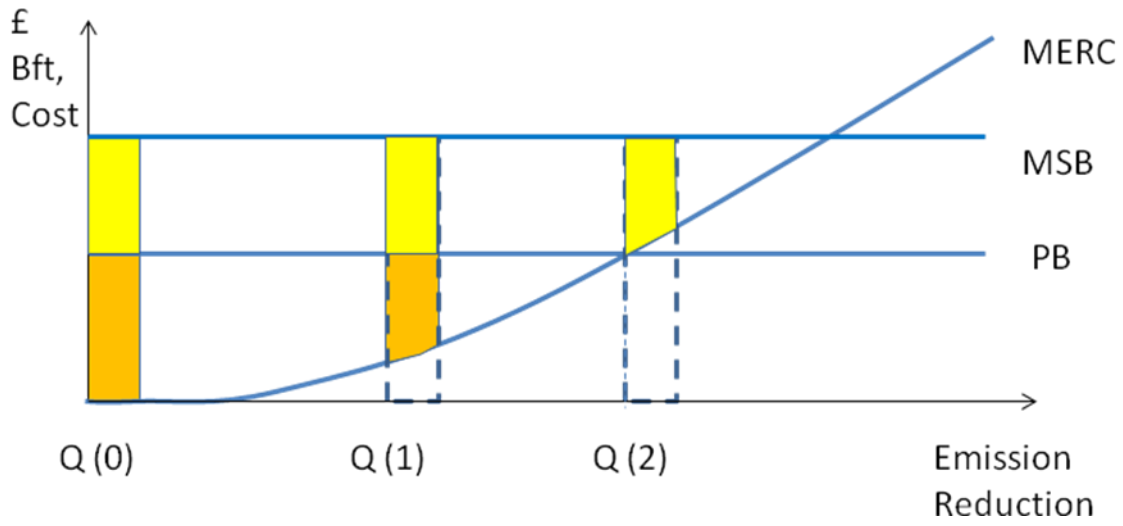
The private benefits are represented by the orange quadrangles the yellow quadrangles represent the benefits to wider society.

Q(0) is where firms are perfectly inefficient and therefore energy savings are made at zero cost, firms take the full benefit of energy savings and the wider benefits to society. Q(3) is where firms are perfectly efficient so the costs of additional emission reductions are equal to the energy cost savings, therefore additional emission savings come at private cost and there will be benefits to society from reduced emissions. At point 2 there will be some private cost savings, but less than the full energy value and benefits to wider society.

Figure 2: Estimating the size of private benefits to firms and wider benefits to society

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<sup>60</sup> 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>



This analysis has modelled firms assuming that they are either at Q(0) or Q(2) in reality evidence suggests that firms would be somewhere between the two. Assuming firms are reasonably competitive it may be that they are closer to Q(2).

*Annex G: Provisional Estimates of Transport Costs*

This Annex provides some illustrative cost estimates. The transport cost estimates assume that the average cost of reporting transport related emissions (ie the cost per tonne of emissions reported) are the same as for reporting electricity and gas related emissions for large companies. This should generate some useful order of magnitude cost estimates for transport, however it may be possible this could underestimate or overestimate transport costs. The costs of collating transport emissions may be greater where there are greater numbers of small depots, which need to collate data on transport emissions. Furthermore, electricity and gas related emissions may benefit from metering which may improve the quality of emissions estimates, this could mean greater effort expended on verifying direct freight transport related emissions. This will be examined in more detail during and after consultation to improve analysis.

Total freight transport related GHG emissions are estimated at 52MtCO<sub>2</sub>e. Total electricity and gas related carbon dioxide emission are estimated at 213MtCO<sub>2</sub>. Freight transport related emissions are therefore approximately a quarter of the size of total electricity and gas related carbon dioxide emissions, which proxies for reporting costs are taken from.

The total annual costs of reporting electricity and gas related emissions for all large companies are estimated, assuming 24,000 large companies report and using the Upper and Low cost estimates for new reporters. The annual cost is £747m for Upper and £140m for Low. Then the present values over 10 years are calculated using a discount rate of 3.5%. The present value cost estimate is £6,428m using Upper costs and £1,204m using Low costs<sup>61</sup>.

These are then divided by one quarter, as transport related GHG emissions are approximately one quarter of electricity and gas related carbon dioxide emissions. This represents the costs to these companies of measuring their freight transport related emissions. For option 3 Upper costs are therefore estimated at £1,607m and Low costs at £301m.

For the remaining options the costs are estimated using the ratio of transport related emissions, compared to Option 3. These estimates are not based on any costs evidence directly obtained from the transport sector, which increases uncertainty, however it is a neutral assumption for generating cost estimates at this stage. For freight transport related Upper costs, for each option, the Upper Option 3 freight transport related costs are multiplied by the road freight transport related emissions of that option and divided by Option 3 road freight transport related emissions. Please note that in Option 1 estimated Upper costs of reporting transport related emissions are greater than Upper benefits; however, companies choosing to report voluntarily will only be those which will benefit from reporting, ie have the highest net benefits. This analysis uses the Low costs estimate for electricity and gas related costs as the basis for transport related reporting costs. This is reflected in the table below and in the analysis in the summary sheets and summary section of costs and benefits.

Intuitively this means that these crude reporting freight transport cost estimates will be proportional to the benefits estimates.

Table G1: Proxy used to Estimate Road Freight Transport Costs for Options

	Option 1	Option 2	Option 3	Option 4
MtCO <sub>2</sub>	0.1	9.3	16.5	12.3

Table G2: Estimated Transport Costs for Options

Option 1	Option 2	Option 3	Option 4
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<sup>61</sup> Note: this will be larger than the costs under mandating all large company reporting, in Option 3, as it is the total cost of all companies reporting, versus the cost to new reporters only.

Transport Costs (£m)	Electricity and Gas Related	Upper	1.1	906	1,607	1,198
		Low	0	0	0	0

Table G3: Present Value Summary of Costs and Benefits for Options including Crude Transport Estimate

			Option 1	Option 2	Option 3	Option 4
Net Benefits (£m)	All Monetised Costs and Benefits, including Illustrative Transport Costs	Maximum Benefits - Minimum Costs	3	696	549	955
		Minimum Benefits - Maximum Costs	0	-926	-6025	-1233

The final table provides a summary of costs and benefits, including the crude transport cost estimates. As expected these show a reduction in net benefits for each option. Using these crude estimates net benefits using a maxi min criteria deliver overall net costs for all options.

## Annex H: Estimating Gas, Electricity and Fuel Related Emissions Coverage for Firms Not Reporting Under Existing Reporting Requirements.

It has not been possible to identify the exact emissions of firms currently reporting under existing reporting requirements. Therefore this analysis uses two commonly reported aspects of firms employment and turnover as a proxy for emissions. Company data is available on employment estimates for SME firms<sup>62</sup> and data on employment and turnover of firms of UK Main Quoted Companies has been obtained from BIS by performing a matching analysis on company names against entries in company house to obtain employment and turnover information.

Please note that fuel related emissions and electricity and gas emissions use the same proxy. This assumes that larger companies use more electricity and gas and have greater freight needs. However, this analysis assumes they are perfectly correlated. This is likely to overestimate the freight emissions related to Option 4 as these companies are assumed to have very significant electricity usage, and it would not be expected that the freight use would be so strongly correlated.

To estimate the benefits related to reduced carbon dioxide emissions for mandatory options 2 and 3 it has been important to identify the emissions currently reported under ETS, CRC and CCAs. As these emissions are already reported it is assumed that the mandatory reporting will not generate further emission reductions for these firms. To estimate the benefits of this policy it has therefore been necessary to estimate the number of newly reporting firms and the proportion of the emissions not covered by existing reporting firms that these represent. DECC estimate there are 17MtCO<sub>2</sub> not covered by existing reporting requirements.

### Option 0

This represents the baseline. As discussed in the IA it is estimated there are 4,050 companies reporting under CRC, 5000 companies reporting under CCAs, and 1500 companies voluntarily reporting.

## **Baseline Reporting under CRC**

### Estimated Employment and Turnover of CRC Companies

CRC captures the largest energy using firms. Therefore this analysis assumes that CRC firms also represent the largest firms using employment and turnover. SME data provides estimates of companies by employment size and also reports these firms contribution to turnover.

Estimated Employment of CRC firms: 8,523, 37% of total employment (~22.8m)

Estimated Turnover of CRC firms: 1,486bn, 46% of total turnover (£3,240bn)

### Estimate of the size of Smallest CRC Company

SME data reports there are 2870 firms with greater than 500 employees. This leaves 1,180 smaller firms remaining. There are a further 2,945 firms with between 250 and 499 employees. Therefore approximately 40.1% of the largest remaining firms are within the CRC. This allows a crude estimate of the smallest CRC firm to be estimated at approximately 400 employees, using linear interpolation.

### Estimate Employment and Turnover of CCA and Voluntary Reporting Companies

It has been assumed that companies reporting under CCAs will be large. As this policy is not aimed at directly at the largest emitters, these firms are assumed to have average employment and turnover of the remaining large firms. There are a total of 3,650 companies either reporting voluntarily or under CCAs. This is approximately 18% of the 19,950 large companies not reporting under CRC.

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<sup>62</sup> BIS document insert here

## **Estimating Employment and Turnover for Option 1**

### Estimating Fuel Related Emissions Coverage

It is assumed that 200 large and 3000 small companies report under this option. This is for transport related emissions only, as the cost benefits analysis suggests it is not privately cost beneficial for these firms to report their electricity and gas related emissions.

The average employment and turnover of large and small companies not reporting in the baseline is estimated. These are then multiplied by the number of companies assumed to report in this option as detailed above.

Total Employment of Large Companies: 21,000, 0.09% of total employment.

Total Employment of Small Companies: 20,000, 0.09% of total employment.

Total Employment of additional voluntary reporting companies: 42,000, 0.18% of total employment

Total Turnover of Large Companies: £4.1bn, 0.13% of total turnover.

Total Turnover of Small Companies: £3.2bn, 0.10% of total turnover.

Total Turnover of additional voluntary reporting companies: £7.3bn, 0.23% of total employment

Mid-point: 0.20%

Using the estimates above it is estimated that option 1 will capture 0.2% of the road freight transport emissions in the private sector. This is equivalent to 0.061MtCO<sub>2</sub>.

## **Estimating Employment and Turnover for Option 2**

### Estimating Fuel Related Emissions Coverage

There are 1,101UK Main listed companies. BIS have provided data employment and turnover for 984 of these firms. Of these 540 and 625 companies provided information on employment and turnover respectively in the last 4 years. This analysis used the last available year's employment or turnover figures.

Total Employment of UK Main Listed Companies: 6.75m, 30% of total employment.

Total Turnover of UK Main Listed Companies: 1,043bn, 32% of total turnover.

Mid-point: 31%

Using the estimates above it is estimated that option 2 will capture 31% of the road freight transport emissions in the private sector. This is equivalent to 9.3 MtCO<sub>2</sub>.

The estimated turnover and employment figures represent a considerable proportion of total employment and turnover and of large company employment and turnover within the UK. This provides a useful sense that these companies identified represent a reasonable estimate of the employment and turnover of listed companies.

### Estimating Electricity and Gas Related Emissions Coverage



To estimate electricity and gas related carbon dioxide emissions for new reporters the emissions covered by CRC and CCAs, and voluntary reporting need to be excluded. Therefore firms with greater than 400 employees were assumed to report under CRC, please see option 0 for how this was estimated.

Estimated employment of firms not reporting under CRC: 19,295,

Estimated turnover of firms not reporting under CRC: 11bn

Finally, as approximately 18% of large companies not reporting under CRC are assumed to report under CCAs or voluntarily it is assumed that a further 18% of emissions related to large companies need to be excluded.

Estimated Employment of firms not reporting under CRC, CCAs or Voluntary Reporting: 17,581, 0.13% of employment not covered by existing requirements.

Estimated Turnover of firms not reporting under CRC, CCAs or Voluntary Reporting: 9.9bn, 0.60% of employment not covered by existing reporting requirements.

Mid-point: 0.36%

### **Estimating Employment and Turnover for Option 3**

#### Estimating Fuel Related Emissions Coverage

Using SME data, the employment and turnover of the 24,000 largest companies was estimated. SME tables list companies by employment bands and report turnover for the listed firms.

Estimated employment of large companies: 11,129m, 49% of total employment (~22.8m)

Estimate turnover of large companies: £1,991bn, 62% of total turnover (~£3,240bn)

Mid-point: 55%

Using the estimates above it is estimated that option 2 will capture 55% of the road freight transport emissions in the private sector. This is equivalent to 16.5 MtCO<sub>2</sub>.

#### Estimating Electricity and Gas Related Emissions Coverage

To estimate electricity and gas related carbon dioxide emissions for new reporters the emissions covered by CRC and CCAs, and voluntary reporting need to be excluded, using the figures reported earlier in this annex.

Estimated Employment of firms not reporting under CRC, CCAs or Voluntary Reporting: 17,581, 0.13% of employment not covered by existing requirements.

Estimated Turnover of firms not reporting under CRC, CCAs or Voluntary Reporting: 9.9bn, 0.60% of employment not covered by existing reporting requirements.

Mid-point: 0.36%

Estimated employment of large companies not covered by existing reporting requirements (CRC, CCAs and voluntary reporting): 2.13m, 15% of employment not covered by existing reporting requirements (~13.8m).

Estimated turnover excluding existing reporting requirements (CRC, CCAs and voluntary reporting): £412bn m, 25% of turnover not covered by existing reporting requirements (~£1.66bn).

Mid-point: 20%

It is estimated that option 3 will capture 20% of the unconstrained emissions in the private sector. This is equivalent to 3.4 MtCO<sub>2</sub>.

## **Estimating Employment and Turnover for Option 4**

### Estimating Fuel Related Emissions Coverage

The employment and turnover of CRC companies are reported above.

The mid-point of the two proxies is 42%.

It is estimated that option 4 will capture 52% of the emissions of road freight transport sector. This is equivalent to 3.4 MtCO<sub>2</sub>.

Estimated employment of large companies: 11,129m, 49% of total employment (~22.8m)

Estimate turnover of large companies: £1,991bn, 62% of total turnover (~£3,240bn)

Mid-point: 55%

Using the estimates above it is estimated that option 2 will capture 55% of the road freight transport emissions in the private sector. This is equivalent to 12.5 MtCO<sub>2</sub>.

## *Annex I: Assessment of Administrative Costs*

The key variables in the analysis of administrative costs undertaken by NERA/Enviros are:

*Number of sites per organisation.* In the model we consider the effect on businesses with 1, 2, 3, 4, 5, 6-10, 11-50, and 50 or more sites.

*Annual electricity consumption per site.* Sites vary significantly in their electricity use. NERA/Enviros consider four annual consumption bands: up to 200 MWh, 200-500 MWh, 500-1,000 MWh, and over 1,000 MWh. Because the gains from energy savings for very large energy consuming sites are substantial, close scrutiny of the administration costs of these large sites was not a priority in the NERA/Enviros study.

*Management cost day rate.* NERA/Enviros assumed a fully absorbed cost of £500 / day. This represents the approximate value of management time and associated overheads, including rent, insurance and central support services. The value of management time needs to reflect the full cost of employment and running the business, not just the variable employment costs. Another point of reference is the market rate for a technical consultancy that would be suitable to do this work—since one option for any covered firm would be simply to contract out all scheme-related activity. This daily rate would also be on the order of £500 / day or more. Again, these rates reflect the fully absorbed costs of the consultants' time.

*Management days spent on different administrative activities.* Each of these entails a certain amount of effort that will depend on the particular policy implementation as well as the size of the organisation (including the number of covered sites and the total energy bill).

A detailed description of each of these activities is provided below.

### ***Understanding the scheme rules***

Irrespective of the eventual design of the scheme companies will need to take time to understand what is required of them. At a very simple level this will include:

- receiving emails and reading associated documentation, including the legal details that back up these schemes;
- checking websites for updates;
- checking details with relevant officials or points of contact;
- understanding definitions;
- understanding the structure of their organisation
- consequences of being included.

For very large organisations, these rules will also need to be understood by more than one person. Often the energy manager or environmental compliance manager will need to explain the scheme to directors of engineering, purchasing and finance. This will require internal discussions and presentations. In very large organisations (for example, major retailers and supermarkets), the time taken up with internal communication can form a significant proportion of the overall overhead of these schemes.

For the fixed price sale we have assumed between one and two person-days for these tasks for organisations with few sites, rising to three to four days for more complex site structures. This relatively small time requirement reflects the simplicity of the fixed-price format, which means that participants do not need to be as concerned about bidding rules and strategies. It also assumes that rules do not change throughout the scheme's duration.

The increase in the number of days is because in spite of the intended simplicity of the scheme the rules will have to be clearly and legally defined. For example, with organisations with several sites we can foresee a few days time spent determining whether sites should be included or excluded from the scheme. This activity will also need to be reviewed on a yearly basis as site's energy consumption (and

metering arrangements) may change. Large organisations also may require more than one person to understand different aspects of the scheme.

In the case of a fixed quantity auction we increase our estimate of the number of days required for understanding the scheme to two to three days for a single site and three to five days for a large multi-site company. The increased time requirements over a fixed price scheme, reflects the generally higher risks of participating in a fixed quantity scheme.

### ***Collection and analysis of data***

Most half hourly metered sites will have relatively good data on electricity use. The amount of time required to compile data is likely to depend in part on the required level of accuracy under the scheme. For organisations with established energy management systems or simple energy use profiles, it should be possible to retrieve half hourly metered electricity consumption data relatively quickly. We assume that this data can be collected to a confidence level of around 98 percent. The residual inaccuracy remains for two main reasons:

- incorrectly allocated meters (i.e. meter assigned to the wrong site address);
- meters incorrectly assigned to bill owner (most likely for large multi-site owners).

These types of inaccuracy are however quite rare, but can be significant where businesses have changed ownership of sites. If these inaccuracies can be tolerated then data collection for half hourly electricity meters can be undertaken relatively quickly.

In addition to the above sources of inaccuracy, meters also occasionally fail and cannot provide the necessary data. Although a multi-site organisation will be more likely to be affected by a meter failure at any one time (because such organisations have more meters that can fail), the contribution that such failure makes to overall levels of uncertainty is lower at multi-site organisations because it will only affect a small fraction of total consumption. In cases where meters fail, missing data are filled in by the data aggregators using approved algorithms, which may be based, for example, on average consumption rates from previous days. For single site companies, the error from estimating this consumption will form a higher proportion of the uncertainty in the total annual consumption.

In some cases, it may be necessary to devote time to reconciling internal data systems. For example, billed data sometimes do not correspond to internal consumption data. When determining actual consumption for ETS purposes this can create confusion and time can be spent reconciling these differences.

The same quality data typically are not available for gas consumption. Energy use associated with gas consumption is generally not recorded as accurately and may require additional auditing. Most gas meters in the UK are read monthly “by hand”, although automated reading is more common in other countries. The quality of data available for other fuels is considerably lower than that for gas, and data validation may be required for sites that consume oil or other fuels.

The time required to resolve these data issues will vary considerably by organisation. Some organisations (particularly those for whom energy expenditures are substantial) may have detailed databases already in use that can report their total energy consumption and expenditure and that can analyse the performance of individual sites and, possibly, processes. We have allowed for this in our table by assuming for multi site companies that less time is spent gathering data where sites have high energy consumption, and more time is spent for those with low energy consumption.

For small sites we have assumed an average of one to two days to collect electricity and gas consumption data and check that it is of a suitable quality and at the high end 15 days for organisations with a large number of low-consuming sites (up to 500 sites). This estimate reflects the project team’s experience in collating data of sufficient quality to be used in a trading scheme across large, multi-site companies. The difference in number of days between small and large sites narrows as the number of sites per organisation increases because sites conform more to a standard retail premises. The number of days required for average-sized organisations may be closer to ten for those that already have in place good energy-tracking systems.

We do not make a distinction between the time required for data collection under fixed price and fixed quantity schemes.

## ***Developing a compliance strategy***

The distinction between a compliance strategy under an ETS and simply deciding on whether to invest in energy saving measures is that with the ETS organisations need to decide whether it makes sense for them to undertake investments themselves, and if so, at what level. A comprehensive compliance strategy would outline not only those measures designed to meet a pre-defined “target”, but also would try to make the most cost-effective use of the market-based instrument by buying or selling allowances. This requires additional analysis. At a minimum, it requires the organisation to take stock of the abatement opportunities that it may have available, and the approximate costs that such opportunities may entail.

We assume that compliance strategies are only relevant for the fixed quantity type scheme, where participants in the aggregate would be more likely to face emissions caps that are less than they need. Under a fixed price scheme, participants would be somewhat more likely to acquire sufficient allowances to cover their expected need. Where this is the case participants would be more likely to follow business as usual and a compliance strategy in the context of CRC becomes less meaningful.

Under the fixed quantity type scheme we have estimated a time requirement of one day for a single site and five days for a large multi-site organisation to put in place a compliance strategy. This time estimate includes the need to consider the “make-buy” decision in the context of CRC but *excludes* the time and costs associated with the identification and evaluation of the energy saving measures themselves. For the purposes of this analysis we assume that these costs have already been taken into account in the models that assess the costs of the measures and are not related to the presence of the scheme. In practice the time spent developing a compliance strategy will be spent consulting with in-house engineers, plant managers and/or external consultants to identify potential energy-saving measures, quantify energy reduction potential, assess payback periods, and develop implementation plans.

## ***Understand and take part in the auction***

Participating in the auction requires a number of actions including:

- reading auction documents and understanding the rules of the auction;
- projecting emissions for future years—depending on the format and timing of the auction, participation may require organisations to predict what their emissions will be in future years as well as the year of the auction. (This can be time-consuming where organisations are buying / selling sites and businesses. Merger and acquisition activity is often a cause of discrepancies in yearly energy and emissions data.);
- combining projections with expectations of abatement measures to arrive at an “optimal” bidding strategy.

For a fixed price sale participation will be more straightforward than in fixed volume auctions. Assuming the organisation has developed some knowledge of the available abatement opportunities and their approximate costs, managers will be able to carry out cost-effective emissions reductions internally, and then purchase sufficient allowances at the auction price to cover their remaining emissions. With a fixed price, participation should result in a cost neutral position providing that the projection of future emissions is accurate. Fixed quantity auctions will be more complicated and will involve the development and submission of detailed bid schedule information.

Companies will also need to factor in uncertainty surrounding price in a future traded market and availability of allowances for purchases via gateway or other mechanism during the auction process.

Under the fixed price sale we have estimated that the time required to secure allowances is one day for a small company and between five and ten days for a 500-site company. These estimates assume that the auction is very simple and easy to understand. It also reflects the outcome of the fixed price sale, which may be more likely to result in companies not being concerned with the “make or buy” decision and simply buying at the auction what they expect to emit.

If a fixed quantity format is used, the number of days for understanding and participating in the auction is likely to be higher – one to three for a single site and 10 to 20 days for a large multi-site company. The reason for this higher figure is that for large companies, such as supermarket chains, the costs of making a mistake in the auction will be higher and hence the analysis will demand more scrutiny.

## ***Trading activities***

If all covered organisations and sites participated in the auction and all auction participants were able to predict their future emissions with perfect accuracy, there would be no need for further trading.

However, some participants may decide not to participate in the auction at all, and many sites will find that their initial emissions projections have not been entirely accurate. Both of these will make it necessary to engage in trading of some sort. The main activities required will be:

- understanding mid-year positions and projecting year end positions — for some organisations it may be desirable to monitor actual emissions levels more frequently;
- engaging with the market to buy or sell—this will require making decisions on when and who to trade with as well as performing the actual transaction;
- trading administration—a small amount of time will be needed to ensure that the back office administration (i.e. accounting) is done appropriately, e.g. credit checks, money transfer etc. In the early stages of a scheme these types of costs can be substantial.

NERA/Enviros have allowed for zero to 0.5 days time for this activity for single site participants under a fixed price scheme. Note these estimates reflect averages across all participants. An average of half a day assumes some sites will not engage in trading at all whereas others may undertake one trade. For multi-site participants NERA/Enviros assume four days are required to execute the trade.

Under a fixed quantity auction NERA/Enviros assume one to two days trading activity for a single site participant and seven to ten days for a large organisation. These higher estimates reflect the greater likelihood of participants needing to trade under a fixed quantity auction, because they have not bought sufficient allowances in the auction.

These day estimates include all necessary steps associated with understanding how to trade, finding a counterparty, receiving internal approvals etc. NERA/Enviros have also accounted for brokers' fees in their estimates. Brokers typically charge a commission fee related to the deal size, but for small transactions make a fixed charge. In CRC and the EU ETS commissions are around 1-2 percent of the deal value for buyers and sellers. Fixed charges are assumed to be around £200 per transaction, based on Enviros experience from managing CCAs.

## ***Submitting data to co-ordinator***

This is a relatively straightforward task but will need to be done according to the co-ordinator's specifications to ensure that data is assembled and presented in a consistent format—which may not be the format that the company itself chooses to use for its own internal reporting. Thus although much of the relevant data will have been compiled under Task 1, more effort will be required to organise the data in the format required. NERA/Enviros have allowed for one day for small companies for this task, but increase this to five to six days for multi-site companies that may need to submit data covering hundreds of sites.

NERA/Enviros do not differentiate between fixed price and fixed quantity schemes in the time required to submit data to the scheme coordinator.

Annex J – Annualised Profile of Monetised Costs and Benefits

Option 1 - Annual profile of monetised costs and benefits\* - (£m)  
constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>	Total
Transition costs (low)	0	0	0	0	0	0	0	0	0	0	0
Transition costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transition costs (high)	0	0	0	0	0	0	0	0	0	0	0
Annual recurring cost (low)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1
Annual recurring cost (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring cost (high)	0	0	0	0	0	0	0	0	0	0	0
Total annual costs (low)	0	0	0	0	0	0	0	0	0	0	1
Total annual costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual costs (high)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1
Transition benefits	0	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring benefits (high)	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	4.6
Total annual benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Total annual benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual benefits (high)	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	4.6

Option 2 - Annual profile of monetised costs and benefits\* - (£m)  
constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>	Total
Transition costs (low)	0	0	0	0	0	0	0	0	0	0	0
Transition costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transition costs (high)	0	0	0	0	0	0	0	0	0	0	0
Annual recurring cost (low)	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	5.1
Annual recurring cost (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring cost (high)	107.5	103.9	100.4	97.0	93.7	90.5	87.5	84.5	81.7	78.9	925.7
Total annual costs (low)	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	5.1
Total annual costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual costs (high)	107.6	103.9	100.4	97.0	93.7	90.5	87.5	84.5	81.7	78.9	925.7
Transition benefits	0	0	0	0	0	0	0	0	0	0	0

Annual recurring benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring benefits (high)	79.9	77.6	75.3	73.1	71.0	68.9	66.6	64.6	62.7	60.9	701
Total annual benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Total annual benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual benefits (high)	79.9	77.6	75.3	73.1	71.0	68.9	66.6	64.6	62.7	60.9	701

Option 3 - Annual profile of monetised costs and benefits\* - (£m)  
constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>	Total
Transition costs (low)	2.0	0	0	0	0	0	0	0	0	0	2.0
Transition costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transition costs (high)	2.0	0	0	0	0	0	0	0	0	0	2.0
Annual recurring cost (low)	93.7	90.5	87.5	84.5	81.6	78.9	76.2	73.6	71.1	68.7	806
Annual recurring cost (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring cost (high)	699.7	676.1	653.2	631.1	609.8	589.1	569.2	550.0	531.4	513.4	6023
Total annual costs (low)	95.6	90.5	87.5	84.5	81.6	78.9	76.2	73.6	71.1	68.7	808
Total annual costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual costs (high)	701.7	676.1	653.2	631.1	609.8	589.1	569.2	550.0	531.4	513.4	6025
Transition benefits	0	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Annual recurring benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Annual recurring benefits (high)	154.2	149.8	145.5	141.4	137.2	133.2	128.8	125.2	121.4	117.9	1355
Total annual benefits (low)	0	0	0	0	0	0	0	0	0	0	0
Total annual benefits (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total annual benefits (high)	154.2	149.8	145.5	141.4	137.2	133.2	128.8	125.2	121.4	117.9	1355

Option 4 - Annual profile of monetised costs and benefits\* - (£m)  
constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>	Total
Transition costs (low)	0.0	0	0	0	0	0	0	0	0	0	0.0
Transition costs (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transition costs (high)	0.0	0	0	0	0	0	0	0	0	0	0.0
Annual recurring cost (low)	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	3.5
Annual recurring cost (central)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



<b>Annual recurring cost (high)</b>	143.2	138.4	133.7	129.2	124.8	120.6	116.5	112.6	108.8	105.1	1233.0
<b>Total annual costs (low)</b>	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	3.5
<b>Total annual costs (central)</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Total annual costs (high)</b>	143.2	138.4	133.7	129.2	124.8	120.6	116.5	112.6	108.8	105.1	1233.0
<b>Transition benefits</b>	0	0	0	0	0	0	0	0	0	0	0
<b>Annual recurring benefits (low)</b>	0	0	0	0	0	0	0	0	0	0	0
<b>Annual recurring benefits (central)</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Annual recurring benefits (high)</b>	106.8	104.2	101.6	98.7	96.6	94.5	92.0	90.1	88.1	86.2	959
<b>Total annual benefits (low)</b>	0	0	0	0	0	0	0	0	0	0	0
<b>Total annual benefits (central)</b>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<b>Total annual benefits (high)</b>	106.8	104.2	101.6	98.7	96.6	94.5	92.0	90.1	88.1	86.2	959