EXPLANATORY MEMORANDUM TO

THE FLUORINATED GREENHOUSE GASES REGULATIONS 2008

2008 No. 41

1. This Explanatory Memorandum has been prepared by the Department for Environment, Food and Rural Affairs and is laid before Parliament by Command of Her Majesty.

2. Description

2.1 These Regulations prescribe offences and penalties applicable to infringements of EC Regulation No 842/2006 on certain fluorinated greenhouse gases (F gases), together with proposed powers for authorised persons to enforce these Regulations. The principal objective of the EC Regulation is to contain, prevent and thereby reduce emissions of F gases covered by the Kyoto Protocol.

2.2 The GB Fluorinated Greenhouse Gases Regulations set out offences for each of the key obligations in the EC Regulation and include offences and penalties in relation to commercial and domestic equipment arising from the following provisions of the EC Regulation:

- Leakages
- Leakage checking/leak detection systems
- Record keeping
- Instruction manuals
- Recovery
- Provision of information
- Placing on the market prohibitions

2.3 The proposed Regulations also provide enforcement powers for enforcement bodies and apply the proposed Regulations to offshore oil and gas installations that use F gases in equipment.

3. Matters of special interest to the Joint Committee on Statutory Instruments

3.1 None

4. Legislative Background

4.1 The EC legislation is in the form of a Regulation. The Regulation has direct effect once it applies in the UK with no further transposition being necessary. However national secondary legislation is needed under article 13 of the 2006 Regulation for Member States to create sanctions and penalties for

infringements of the relevant obligations in the Regulation. Article 13 of the 2006 Regulation and related provisions took effect in the EU from 4 July 2007.

4.2 The Fluorinated Greenhouse Gases Regulations 2008 put in place the legislative framework necessary for the reduction of emissions of fluorinated greenhouse gases (F Gases) and prescribe offences and penalties applicable to infringements of EC Regulation No 842/2006 on certain fluorinated greenhouse gases in accordance with the requirements of Article 13 of the 2006 Regulation, together with proposed powers for authorised persons to enforce these Regulations. Powers of authorised persons are set out in regulation 22.

4.3 The proposals for the Council Regulation were the subject of EM 12179/03**,** which was considered by the by the House of Commons European Scrutiny Committee on 15 September 2004 and by the House of Lords Select Committee on European Communities on 21 May 2004. Both Committees considered the EM to have no political or legal importance and cleared it.

5. Extent

5.1 This instrument applies to Great Britain, including "offshore installations" as defined in Regulation 2, except in relation to importation, where the Regulations will also apply in Northern Ireland..

6. European Convention on Human Rights

6.1 As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

7. Policy background

7.1 The principal objective of the Council regulation is to contain, prevent and thereby reduce emissions of F gases covered by the Kyoto Protocol. The main focus is on containment and recovery of F gases, together with harmonised restrictions on the marketing and use of F gases in applications where containment of F gases is difficult to achieve or the use of F gases is considered inappropriate and suitable alternatives exist.

7.2 The containment and recovery articles in the Regulation affect commercial refrigeration, air-conditioning and heat pump sectors and in the fire protection sector; and for the personnel involved in the installation, servicing and recovery of F gases from these systems as well as from equipment containing fluorinated greenhouse gas based solvents, high voltage switchgear and fire extinguishers.

7.3 In line with the requirements of the Council Regulation, the UK has developed the Fluorinated Greenhouse Gases Regulations which set out offences for each of the key obligations in the EC Regulation. Operators of

relevant systems have a range of obligations including prompt leakage repair, leakage checking and record keeping and ensuring appropriately qualified personnel are used. The UK Regulations provide enforcement powers to ensure compliance with these obligations.

7.4 Nineteen responses were received to a joint Defra/Scottish Executive/National Assembly for Wales consultation document outlining the proposed Regulations. The consultation ran from 18 May 2007 to 14 August 2007. Consultees were asked a number of specific questions about the proposals. Generally the replies addressed the questions in the consultation paper which were of relevance to them. However, some responses also made more general comments in reference to specific regulations. Some respondents suggested minor drafting changes to ensure consistency of terminology and with the F gas Regulation text.

7.5 None of the respondents to the consultation document objected specifically to the substantive proposal to make a statutory instrument prescribing offences and penalties to the F gas Regulation and there was overall support for the proposed Regulations. In addition to this, there were no respondents who disagreed with the premise of having GB wide Regulations

7.6 A summary of responses received, and the Government's response to them, has been published on the Defra website at

http://www.defra.gov.uk/environment/climatechange/uk/fgas/index.htm

8. Impact

A Regulatory Impact Assessment is attached to this memorandum

9. Contact

Stephen Reeves at the Department for Environment, Food and Rural Affairs Tel: 020 7238 3138 or e-mail: stephen.reeves@defra.gsi.gov.uk can answer any queries regarding the instrument.

Annex A

Final Regulatory Impact Assessment of Regulation (EC) No. 842/2006 of the European Parliament and of the Council Of 17 May 2006 on certain fluorinated greenhouse gases

1. EU regulation 842/2006 on certain fluorinated greenhouse gases

1.1 This updated final Regulatory Impact Assessment deals with EC Regulation No 842/2006 of the European Parliament and of the Council on certain fluorinated greenhouse gases with regard to reducing the emissions of such gases in the Community. It includes further information about costs of enforcement and sanctions in section 7.

1.2 During negotiations, the Commission's original proposal was split into two separate pieces of legislation. Provisions dealing with mobile air-conditioners (MACs) in cars were included in a Directive with all other provisions remaining in a Regulation. The Directive has an Article 95 (internal market) legal base that modifies European Whole Vehicle Type Approval legislation. Department for Transport are responsible for ensuring transposition and implementation of the Directive and updated RIA material.

1.3 The Regulation entered into force on the 4th July 2006, with many of the key obligations applying from the 4th July 2007, one year after entry into force.

1.4 As this is an EC Regulation it is directly applicable in the UK but article 13 requires Member States to lay down sanctions and penalties applicable to infringements of the EC Regulation. In the UK this is being done through two sets of Regulations. One will apply in Great Britain and one in Northern Ireland. The GB offences and penalties Regulation set out offences for each of the key obligations in the EC Regulation. They also provide powers for enforcing bodies as well as including provisions for the Regulations to apply to offshore oil and gas installations.

2. Purpose and intended effect of the EC legislation

Objective

2.1. The Regulation puts in place the legislative framework necessary for the reduction of emissions of fluorinated greenhouse gases (F Gases). The Commission proposed Community action in order to address the problems that would be caused if gas emissions were allowed to rise

unchecked. The Commission brought forward their proposal as part of the European Climate Change Programme.

2.2. The Regulation addresses emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). These are potent greenhouse gases covered by the Kyoto Protocol.

2.3. The intent of the Regulation is to reduce projected emissions of F gases within the European Union by approximately 23 million tonnes of carbon dioxide equivalent by 2010. The EU's Kyoto target is equivalent to a reduction in its annual greenhouse gas emissions of approximately 336 million tonnes of carbon dioxide equivalent by 2008-12.

2.4. The legislation is designed to achieve the proposed reduction in emissions of F gases through measures on containment and recovery, application-specific placing on the market bans and controls on some uses of F gases.

Background

2.5. The Kyoto Protocol commits the European Union to reduce emissions of greenhouse gases to 8% below base year levels by 2008-12.[1] The legally binding burden-sharing agreement set emissions targets for each of the then 15 Member States. The ten new Member States that joined the EU in 2004 have all ratified the Kyoto Protocol and have their own individual targets of reductions between 6 and 8%. Under the burden-sharing agreement, the UK is committed to reducing emissions of greenhouse gases by 12.5% below base year levels by 2008-12. This is considered to be an overall reduction of approximately 93 million tonnes of carbon dioxide equivalent. Action to reduce emissions of F gases should be considered as part of the wider efforts being taken in the UK and the EU to combat climate change.

2.6. The Government[2] set out its plans to achieve this objective in the UK climate change programme (CCP) first published in November 2000.[3] and subsequently updated. The CCP included projections for F gas emissions until 2020, updated from projections produced for the Department of the Environment, Transport and the Regions (DETR) and the Department of Trade and Industry (DTI) in 1999.

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[1]Base year for carbon dioxide, methane and nitrous oxide emissions is 1990. For fluorinated gases, Parties to the Kyoto Protocol can choose between 1990 and 1995. The UK, like most other EU Member States, decided to use 1995. This decision was taken on the basis of informed responses to the consultation on the UK Climate Change Programme that recommended the 1995 data as more reliable.

[2] 'Government' refers to the UK Government, and the Devolved Administrations for Scotland, Wales and Northern Ireland.

[3]See http://www.defra.gov.uk/environment/climatechange/cm4913/4913html/index.htm

2.7. Fluorinated greenhouse gases are man-made gases that are used in a wide variety of applications. HFCs in particular, were developed to replace ozone-depleting gases such as Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs). The worldwide production and supply of CFCs and HCFCs is to be banned by the Montreal Protocol on substances that deplete the ozone layer.

2.8. There has been uncertainty regarding the use of HFCs since the adoption of the Kyoto Protocol. The Government recognises that the successful phasing-out of ozone-depleting substances under the Montreal Protocol is being achieved with a range of technologies, accepting that HFCs are necessary to replace ozone-depleting substances in some applications. Consequently, the key elements of the Government's position on HFCs are as follows:

- HFCs should only be used where other safe, technically feasible, cost-effective and more environmentally acceptable alternatives do not exist;
- HFCs are not sustainable in the long term – the Government considers that continued technological developments will mean that HFCs may eventually be able to be replaced in the applications where they are used;
- HFC emission reduction strategies should not undermine commitments to phase-out ozone-depleting substances under the Montreal protocol;
- HFC emissions will not be allowed to rise unchecked.

2.9. The EC Regulation aims to ensure that a consistent set of containment provisions are applied to the key sectors where both F gases and ozone-depleting substances are used. Many of the industry sectors affected by the Regulation are also subject to EC Regulation 2037/2000, which introduced containment provisions for ozone-depleting substances.

The Issue

2.10. The key issue is whether the Regulation secures the necessary environmental benefits of reduced F gas emissions without placing a disproportionate or unsustainable burden on industries, the taxpayer or other stakeholders.

2.11. The Government recognises that threats posed by climate change are real and present, noting that failure to support credible action on F gases would be inconsistent with the Government's position on climate change.

Risk Assessment

2.12. The main risk if the Regulation is not implemented is that emissions of fluorinated greenhouse gases may rise unchecked, with the associated impact on climate change. Furthermore, this would endanger the UK's ability to meet its commitments under the Kyoto Protocol. There would also be a further risk of the UK being referred to the European Court of Justice by the European Commission for under implementation of the Regulation, and in the longer term, this could result in an unfavourable ruling and significant daily fines. It is Government policy to avoid referral wherever possible.

2.13. The main risk if the Regulation is implemented is that it would place significant, inequitable or unsustainable burdens on some industry sectors.

Main Provisions

2.14. The Regulation contains several articles with specific effects on the use of F gases. The main ones are summarised below:

- Containment – preventing leakage and repairing leaks
- Recovery – reclamation of F gases from products and equipment
- Training and certification – for containment and recovery provisions
- Reporting – to monitor production and imports/exports of F gases
- Labelling – on certain products and equipment containing F gases
- Control of use – F gases are banned from certain applications
- Placing on the market – ban on placing on the market of certain products and equipment containing F gases

3. Characterisation of business as usual / current scenario

3.1. This updated final RIA considers the implementation of the Regulation with the counterfactual option of doing nothing, or business as usual (BAU). Options considered in previous versions of this RIA have been removed following political agreement to the text of the Regulation at the October 2004 Environment Council.

3.2. BAU describes a scenario in which the Regulation on fluorinated gases is not introduced, while current policies and measures continue to operate. Given that EC regulations are directly applicable in the UK and must be implemented, this comparison serves to illustrate the economic costs and environmental benefits incurred if the Regulation is implemented.

3.3. Within the industry sectors affected by the Regulation (which are set out in more detail in sections 6 and 7 below) there are a variety of measures currently in place that will lead to a reduction in F gas emissions from the UK. These measures are included within the BAU section, as they will

remain in place if the Regulation is not implemented. Examples of sector specific measures include the following:

3.4. **Stationary refrigeration:** Within this sector, there are two measures that reduce the potential emissions of fluorinated gases:

- The Air Conditioning and Refrigeration Industry Board (ACRIB) run a voluntary scheme to certify the competency of refrigerant handlers;

- The treatment requirements of the Waste Electrical and Electronic Equipment (WEEE) Directive specify the recovery of F gases from both the refrigeration circuit and the foam in separately collected waste electrical appliances and treatment in accordance with EC Regulation 2037/2000 on ozone-depleting substances. Since over 75% of direct F gas emissions occur during the disposal of an appliance, the WEEE Directive is likely to have a significant impact.

3.5. **Mobile air conditioning:** Removal of all HFCs from vehicle air conditioning systems will be mandatory under the End of Life Vehicles (ELV) Directive from Spring 2004. It is also standard practice, although not mandatory, for all responsible service companies to use refrigerant recovery equipment.

3.6. **Fire protection systems:** Recovery of fluorinated gases from fire protection systems is undertaken on a voluntary basis for HFCs. Various British and ISO standards influence the inspection regimes used by operators of HFC fire protection systems. PFCs have not been used in new UK fire protection systems since 1999. The HFC fluids used in fire protection systems are expensive (approximately £6,000 for a 200kg cylinder) so there is a financial incentive to recover fluids when a system is decommissioned.

3.7. **High voltage switchgear:** Companies in this sector have already adopted voluntary measures to minimise emissions of SF_6.

3.8. **Metered dose inhalers:** Leaks are not tolerated in a factory producing MDIs as they could present a major health risk for factory operatives. Stringent leak testing is carried out and staff training is comprehensive.

3.9. **Rigid insulating foam:** Recovery of F gases from the foam in domestic refrigerators and freezers and treatment in accordance with EC Regulation 2037/2000 on ozone depleting substances is specified in annex II of the WEEE Directive.

3.10. **Solvent cleaning:** Recovery of HFCs from equipment containing solvents is already standard practice on a voluntary basis. The fluorinated gas used in this industry is very expensive, so there is a financial incentive to avoid emissions and recover fluids wherever possible.

3.11. **Semiconductors and other electronics:** The industry is already taking steps to reduce emissions of fluorinated gases under the World Semiconductor Council (WSC) agreement.

3.12. **Aluminium smelting**: Current projections assume a significant reduction in PFC emissions by 2010, due to voluntary initiatives to reduce emissions.

3.13. **Producers and suppliers of fluorinated gases**: Most F gases are currently supplied in refillable containers. It is already standard practice to recover all unused fluorinated gas from refillable containers. Practical measures to prevent emissions during manufacturing are being taken under the chemical industry's responsible care programme. Furthermore, a major UK F gas producer has installed a thermal oxidiser (HFC 23 Incinerator), which reduces its emissions to five percent of previous levels. Staff training in the sector is currently of a high standard.

3.14. Overall, emission trends between the thirteen sectors considered in this final Regulatory Impact Assessment vary significantly from 2004 to 2025. In five of the sectors (fire protection systems, general aerosols, one component foam, rigid insulating foam and solvent cleaning), emissions are estimated to increase under the business as usual case. In four of the sectors (magnesium casting, high voltage switchgear, aluminium smelting and producers/suppliers of fluorinated gas), emissions are estimated to fall. In three of the sectors (stationary refrigeration & air conditioning, mobile air conditioning and metered dose inhalers), emissions are projected to increase and then fall again and in one sector (semiconductors and other electronics), emissions are set to fall and then increase.

4. Benefits[4]

4.1. The Government currently suggests an illustrative year 2000 figure for the global damage cost of carbon emissions of £70t/C, within a range of £35t/C to £140t/C.[5] However, the Government recommends these social cost of carbon (SCC) estimates rise by £1/tC per year to reflect the rising cost over additional emissions over time, and that they take inflation into account.[6]

4.2. Quantification of the benefits of climate change policy is ongoing and these illustrative figures are currently under review. However, they have been used to illustrate in monetary terms, the magnitude of the benefits from the Regulation.

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[4] For a description of how the benefit figures have been derived, please see the technical annex I.

[5] GES paper 140 "Estimating the Social Cost of Carbon Emissions", Clarkson & Deyes, 2002.

[6] Hence the figures of £41/tC, £78/tC and £153/tC are used in this report to reflect the 2003 cost and benefit figures in 2003 prices. More detail of the SCC estimation can be found in the Technical Annex I.

4.3. Global Warming Potentials (GWPs) are used as an indication of the relative damage caused by different greenhouse gases relative to carbon dioxide. The time-horizon used for calculating GWPs in this Regulatory Impact Assessment is 100 years.

Business sectors affected

4.4. The Regulation affects a wide range of business sectors, which are set out in more detail in Sections 6 and 7 below. The proposal not only affects businesses that are involved in the manufacturing or importing and exporting of fluorinated gases, but it also affects businesses that use fluorinated gases as part of their operations or production processes and those that emit them as a by-product. It will also affect businesses using components which contain fluorinated gases, those in the servicing sector that are involved in the handling of fluorinated gases and businesses that own or sell products containing fluorinated gases.

4.5 There are a significant number of offshore oil and gas installations that will be affected by the 2006 Regulation. The Department for Business Enterprise and Regulatory Reform (BERR), formerly the Department of Trade and Industry (DTI), is the competent authority for offshore oil and gas matters and would remain responsible for administering / enforcing the relevant provisions on offshore installations that fall within its remit. Although certain aspects of pollution from oil and gas installations have been devolved to Scotland up to the first three nautical miles of the territorial sea, it has been agreed with the Scottish Executive that in this case BERR will have responsibility for these also.

Estimated benefits from Regulation

Sector	**Emission reduction '000 tonnes CO_2, 2005-2025**	**Range of annualised benefits[7] £'000**	***Comments***
Stationary Refrigeration and Air conditioning (SRAC)	37,959 – 44,372	20,479 – 89,055	Training, recovery and containment provisions apply.
Fire Protection Systems (FPS)	2,562 – 4,271	1,313 – 8,233	Training, recovery and containment provisions apply.
Magnesium Casting (Mg)	0	0	Prohibition only.
High Voltage Switchgear (GIS)	100	54 - 202	Recovery and training provisions may apply.
F-gas propellant	14,575	7,446 –	Prohibition

[7] Low range based on £41t/C value, high range based on £153t/c value.

aerosols: Novelty aerosols		28,022	
F-gas propellant aerosols: Technical aerosols	87	–45 - 168	Recovery and training provisions may apply.
Metered Dose Inhaler (MDI)	27	15 - 55	Recovery and training provisions may apply.
One Component Foam (OCF)	2,550	1,357 – 5,108	Prohibition only.
Rigid Insulating Foam	100	51 - 192	Training and recovery provisions may apply.
Solvent Cleaning	0	0	It is believed there is no further potential to reduce emissions beyond BAU.
Semiconductors and Other Electronics	0	0	It is believed there is no further potential to reduce emissions beyond BAU.
Aluminium Smelting	0	0	It is believed there is no further potential to reduce emissions beyond BAU.
The F-gas and HCFC Industry	200	107 - 403	Reporting and the ban on non-refillables apply.

Benefits of specific articles/provisions (included in figures above) – where these can be separated from other provisions:

- **Reporting provisions:** no direct environmental benefit.
- **Prohibition of the use of non-refillable containers:** £2,727,000 (annualised benefit) from recovery of gas remaining in reused containers after each use, rather than this gas being released from each disposable container.
- **Labelling:** no direct environmental benefit but will aid service engineers and help avoid improper servicing, which may result in a venting of gases. In practice most equipment is already labelled.

4.6 The potential benefits arising from the enforcement of the 2006 Regulation on the offshore oil and gas sector have been considered in more detail, and appropriate information has been provided in the industry's response to the public consultation. The associated benefits of compliance with the relevant provisions of proposed Regulations are not expected to be significant as they should not represent major changes to current operational procedures.

5. Costs of the regulation[8]

Sector	**Range of annualised costs £'000**	***Comments***
Stationary Refrigeration and Air conditioning (SRAC)	22,800 – 39,187	Training, recovery and containment provisions apply.
Fire Protection Systems (FPS)	785	Training, recovery and containment provisions apply.
Magnesium Casting (Mg)	0	Prohibition only.
High Voltage Switchgear (GIS)	68	Recovery only
F gas propellant aerosols: Novelty aerosols	134	Prohibition
F gas propellant aerosols: Technical aerosols	102	Recovery and training provisions may apply.
Metered Dose Inhaler (MDI)	67	Recovery and training provisions may apply.
One Component Foam (OCF)	0	Prohibition only.
Rigid Insulating Foam	76	Training and recovery provisions may apply.
Solvent Cleaning	0	It is believed there is no further potential to reduce emissions beyond BAU.
Semiconductors and Other Electronics	0	It is believed there is no further potential to reduce emissions beyond BAU.
Aluminium Smelting	0	It is believed there is no further potential to reduce emissions beyond BAU.
The fluorinated gas and HCFC Industry	53	Reporting and the ban on non-refillables apply.

Costs of specific provisions (included in figures above) – where these can be separated from other provisions:

[8] For a description as to how the cost figures have been derived, please see the technical annex II. The above figures include estimated costs of record keeping where appropriate.

- **Reporting:** £53,000 (annualised cost).
- **Prohibition of the use of non-refillable containers:** £0

11. **Labelling:** No estimation was undertaken, and costs are not expected to be significant, as manufacturers already label equipment and are expected to be tasked with F-gas labelling requirements.

The costs included in this section relate to the estimated compliance costs of the sectors directly affected by the proposal. It is possible that some of these costs may be passed on to consumers. BERR has considered with the Oil & Gas UK (formerly the United Kingdom Offshore Operators Association (UKOOA)), the potential compliance costs and associated benefits of relevant provisions. From an offshore oil / gas perspective, the potential costs and associated benefits of compliance with the relevant provisions of proposed Regulations are not expected to be significant as they should not represent major changes to current operational procedures.

Small firms impact test

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5.1. The proposed Regulations do not add to the obligations contained in the 2006 Regulation and therefore in themselves to not create additional cost and benefits in relation to impacts on sectors identified in this final RIA.

5.2. The proposal affects businesses in a variety of industry sectors, many of which contain small businesses.

5.3. In general, with the exception of the ban of the use of SF_6 in magnesium die-casting and the frequency of inspections in the refrigerant industry (less frequent for users of smaller amounts of F gases), the proposal treats small businesses in the same way as other businesses in the same sector. The Commission believes that the measures in the proposal will not have a disproportionate affect on SMEs.

5.4. The following paragraphs consider the impacts on small firms in sectors which have been identified as containing a significant number of small businesses:

5.5. **Stationary refrigeration and air conditioning:** Most of the several thousand independent operatives carrying out site installation work and plant maintenance would be likely to fall under the definition of small businesses. In addition, some of the manufacturers and importers may also be small businesses. The training and certification requirements will apply to all operatives working on installation and maintenance, however the industry is largely already operating a certification scheme on a voluntary basis. In addition, mandatory certification already applies to those working with hydrochlorofluorocarbon (ozone-depleting) refrigerants, which are still widely used in commercial equipment. For those not holding such a qualification, a transitional provision applies until 9 April 2007. In practice, the qualifications necessary to work with hydrochlorofluorocarbons also provide the necessary skills to work with hydrofluorocarbons.

5.6. The measure relating to leakage inspections does not apply to systems containing less than 3kg of F gases. For systems with more than 3kg, the frequency of the inspections is related to the weight of the refrigerant. Assuming that small businesses are likely to have smaller refrigerant systems than larger businesses, the burden associated with inspections should be proportionate to the output of the business concerned.

5.7. **Fire protection systems:** There are a number of small companies carrying out servicing and installation work on these systems. Training

for containment and recovery will apply to these businesses, although the costs relating to training are not anticipated to be disproportionate to output.

5.8. **Magnesium casting:** The prohibition relating to the use of SF_6 in die-casting operations sets a maximum usage of 850kg per annum. Therefore firms using less than 850kg per annum will not be affected by the prohibition. The Commission's view has been that this derogation is necessary for small companies as switching to alternative gases would not be cost-effective. In the UK, the only firm that used more than 850kg of SF_6 has ceased its magnesium die-casting operations, therefore there are no firms that use more than 850Kg of SF_6 in magnesium die-casting in the UK.

5.9. **General comments:** The Federation of Small Businesses commented that one area of concern is the need to be certified or accredited by an external body and that any mandatory accreditation is often disproportionately expensive for small businesses.

5.10. A member of the Small Business Council commented that the 2006 Regulation should have little effect on small businesses. The main burden small businesses will have to face is under the article concerning containment in the stationary refrigeration industry. However, annual inspections (as opposed to larger businesses that may have more frequent inspections as well as possibly having to fit leakage detection equipment) should not be too much of a burden.

5.11. Three businesses, which operate within the sectors that will be affected by the 2006 Regulation, were also contacted. All three did not consider that there would be any significant impact on their firm as a result of the Regulation. Subsequently, extensive and continuing discussions have taken place with businesses and trade bodies covering all the key sectors affected by the F gas regulation.

5.12. The main area of potential concern for small businesses is likely to be any additional costs of training relating to containment and recovery. The Commission have to propose and establish minimum qualification requirements by 4 July 2007 and then Member States have to establish or adapt their own training and certification requirements by 4 July 2008. This will be the subject of a separate consultation later in mid-2008. Such a scheme has the potential to impose disproportionate costs on small businesses, but the levels of costs anticipated to be imposed on small businesses within the other sectors are not considered to be significant.

5.13. In conclusion, trade associations and small firms in the sectors likely to be affected by the proposals have been contacted as part of stage one of the Small Firms Impact Test. Respondents have, however, been unable to identify any specific disproportionate impact on small firms as a result of the 2006 Regulation. The Small Business Service (SBS) has

been consulted on a number of occasions during stage one. The SBS has agreed that there is no requirement to carry out further small firms impact test analysis. However, should any as yet unidentified impacts or unintended consequences of the proposals on small firms be identified during the consultation period, further work to assess this impact will be carried out, and the position will be reviewed and the Small Business Service informed.

6. Competition assessment

6.1. This section considers the relevant markets, upon which the 2006 Regulation would impact, with such relevant markets being identified by the application of the hypothetical monopolist test. Under this test both demand side substitutability[9] and supply side substitutability[10] are considered for both the product and geographic elements of the potential market.

6.2. Thirteen sectors have been identified as being affected by the Regulation. Section five identifies the potential costs involved with this Regulation for each sector, including, where appropriate, the costs of particular sections of the Regulation. Competition effects have been analysed for each sector separately as follows.

6.3. **Stationary refrigeration and air conditioning:** The businesses mainly affected are the installation and servicing elements of the industry. These are distinct areas of business with no clear substitutability from the customer's point of view, and very limited potential for supply side substitutability given the different work undertaken. Therefore, the above areas are likely to represent three individual relevant product markets. Considering the above firms' activities on a UK-wide basis, such potential markets would not appear to be concentrated.

6.4. The recovery of fluorinated gases in this industry is already standard practice, and consequently, the recovery provisions are not expected to have any significant effect on competition in the markets considered above.

6.5. **Fire protection systems:** The affected sector includes manufacturers of fire protection systems containing perfluorocarbons and servicing companies for fire protection equipment containing all types of F-gases. Given the clear differences between manufacturing and servicing operations in terms of both demand and supply side substitutability,

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[9] Demand side substitution occurs when customers would be willing to switch from one product (or geographic area) to another if the price of the first product (or product within an area) rose by a small but significant amount; usually 5 to 10%.

[10] Supply side substitution occurs when firms would be willing to quickly switch to producing one product (producing in one area) from producing another (in another area) in response to a small but significant price increase in the first product.

these areas are likely to represent distinct product markets. There are around ten companies that manufacture these systems in use in the UK, so a potential UK-wide market would be slightly concentrated. The servicing market has a larger number of smaller companies involved, so is unlikely to be significantly concentrated. Training provisions relating to containment and recovery apply largely to servicing companies. Any effect on competition within this sector is unlikely to be significant.

6.6. **Magnesium casting:** The companies in this sector are involved in producing metal castings using either sand or die-casting methods. There are significant differences between sand and die casting in terms of the production method, equipment needed and the characteristics of the final products produced.

6.7. The Regulation affects magnesium die-casting companies that use more than 850Kg of SF_6 in a year. There are currently no UK companies that use more than this amount of SF_6, therefore there is no effect on competition within this sector, and no conclusion need be reached on the relevant economic market.

6.8. **High voltage switchgear (GIS):** The companies operating in this sector are UK power transmission and distribution companies and large industrial users. As such, they are more than capable of absorbing the potential additional costs of recovery and training provisions. Therefore no significant competition effects are envisaged in this sector and no conclusion need be reached on the definition of the relevant market in this area.

6.9. **F gas propellant aerosols:** The affected sector includes manufacturers of aerosols that use F gases as propellants. These are aerosols designed specifically for use in flammable areas (technical aerosols) and novelty aerosols that are designed for frivolous uses, where the user may be unaware of the possible danger of potential flammable substances being nearby. There is likely to be a reasonable level of supply side substitution between producers of both these types of aerosol, given the similarity between aerosols in terms of their design. Furthermore, there may be some further substitutability between aerosol producers using flammable propellants and those manufacturing aerosols using F gas propellants. However, from the consumer point of view, given the different products that aerosols are used in, there would be very little substitutability between different aerosols, as these would be designed for specific applications. Therefore, it is possible that the relevant markets for novelty and technical aerosols could be different, given their different uses.

6.10. The Regulation bans the use of F gases as propellants in novelty aerosols, and given the associated risks of using flammable propellants, these products are assumed to cease to exist. There is one main producer of novelty aerosols in the UK, with one further producer of a small number of novelty aerosols. The effect of this ban on competition

is likely to be insubstantial. If the UK producers of novelty aerosols exit the market, the effect on competition between the remaining aerosol producers would be unchanged. If novelty aerosol producers were able to switch to production to other aerosols, either technical F gas ones or other non-F gas ones, this would be likely to increase the degree of competition within this sector. Therefore, given the possible effects on competition within the remaining area of production in this sector, no conclusion need be reached on the exact definition of the relevant economic market.

6.11. **Metered Dose Inhalers (MDI):** MDIs are small aerosols with specific medical applications. In the UK there are four plants producing MDIs directly for consumer medical uses, and a further six plants that produce MDIs for medical research, testing and product approval purposes. Given the likely similarities in equipment and knowledge to produce MDIs for both of the above applications, there is likely to be a reasonable degree of supply side substitutability in this area. However, given the different function of different MDIs there would be likely to be minimal demand side substitutability between these products. If the relevant market were considered to be that of medical MDIs and research MDIs separately, with the relevant geographic market being UK wide, such markets would be significantly concentrated.

6.12. The only impact on this sector would come from the potential need for recovery and training. The scope of the recovery obligation has yet to be determined, so the impact on this sector requires further consideration.

6.13. **One component foam (OCF):** No OCF is manufactured in the UK; consequently the proposal will have no impact on this sector.

6.14. **Rigid insulating foam:** There are approximately ten sites in the UK that produce rigid foam, and this sector is likely to be slightly concentrated. The scope of the recovery obligation in relation to foams has yet to be determined and so the consequential implications for training not yet clear.

6.15. **Solvent cleaning:** There are a number of specialist engineering and electronic companies that carry out precision cleaning of metals, and optical and electronic components. This is a relatively fragmented sector with several small companies in niche product areas. No impact on competition is envisaged in this sector.

6.16. **Semi-conductors and electronics:** Due to current voluntary initiatives in this sector, significant emission reductions have already occurred; therefore costs of the containment, training and recovery should be near zero. Therefore, no impact on competition is envisaged in this sector.

6.17. **Aluminium smelting:** This industry is currently highly concentrated. The major investments undertaken in this industry have reduced significantly this sector's emissions, and this proposal is not expected to have any

additional effect; consequently, no impact on competition is envisaged in this sector.

6.18. **Producers and suppliers of fluorinated gases:** This sector includes fluorinated gas manufacturers, packaging plants, recovery and recycling plants and destruction plants. These areas are substantially different, and as such there would be likely to be no demand side substitutability, and limited supply side substitutability, between such areas. Therefore, they may represent separate relevant product markets, although no conclusion is reached on this issue. Such potential markets are likely to be highly concentrated on a UK-wide basis.

6.19. The on-going costs of this are likely to be more significant than the set-up costs, therefore ensuring that the impact on firms in this sector is likely to be reasonably proportionate to output over time.

6.20. The prohibition on the use of non-refillable containers would be unlikely to have a significant impact, as most fluorinated gases are supplied in refillable containers, as these are more cost-effective than using non-refillable containers. Therefore, while the proposal may be seen as restrictive, in practice it is unlikely to have a significant impact. Overall, the impact on competition within this sector is unlikely to be significant.

7. Enforcement and sanctions

7.1. The EC legislation is in the form of a Regulation. The Regulation has direct effect once it applies in the UK with no further transposition being necessary. However national secondary legislation is needed under article 13 of the 2006 Regulation for Member States to create sanctions and penalties for infringements of the relevant obligations in the Regulation.

7.2. The proposed Regulations provide power for enforcing authorities to appoint authorised persons to act for the purposes of the Regulations. The Secretary of State will be the enforcing authority as regards offshore installations and will also have power to appoint authorised persons.

7.3. In England and Wales, Defra has worked closely with the Environment Agency and LACORS (Local Authorities Co-ordinators of Regulatory Services) to prepare for the implementation of the proposed Regulations. A joint risk based enforcement model has been proposed by the Environment Agency and LACORS. As part of preparatory work for this enforcement work, LACORS has carried out initial intelligence work on behalf of Defra in order to apply a risk-based approach to enforcement.

7.4. The proposed Regulations do not add to the obligations contained in the 2006 Regulation and therefore in themselves to not create additional cost and benefits in relation to impacts on sectors identified in this final RIA. It will only be a person/company that is subject of enforcement action that may be required to take steps to remedy a contravention of

the 2006 Regulation and in doing so may incur costs. If an enforcing authority is obliged to take steps to remove a danger, it can do so at the expense of the person/company involved. Where a person/company infringes the requirements of the Regulation and in doing so commits an offence and is found guilty, then additional costs may be imposed in the form of a fine. The proposed qualification requirements are intended to mirror current requirements rather than create new ones. (can we take out this last sentence?)

8. Monitoring and review

8.1. It will be necessary to monitor the effectiveness of the measures in the 2006 Regulation to ensure that the policy objectives are being met. This will be done as follows:

- Through an analysis of UK inventories of greenhouse gas emissions. As a party to the United Nations Framework Convention on Climate Change (UNFCCC), the UK is required to develop, publish and update regularly a national inventory of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies.

- The UK is also required to submit an annual greenhouse gas inventory to the EU Monitoring Mechanism, which separately sends a report for the European Community as a whole to the UNFCCC. UK inventory estimates are reviewed annually and updated to reflect improvements in methodology or availability of new information. Any changes are backdated each year to 1990 to ensure a consistent time series.

- The annual UK inventory is compiled by the National Environmental Technology Centre (Netcen) on behalf of Defra and the devolved administrations. Inventory estimates for the six types of gases (CO_2, CH_4, N_2O, HFCs, PFCs and SF_6) are calculated on a top-down approach, using activity data and emissions factors, and adhering to IPCC Reporting Guidelines and Good Practice Guidance. Removals by sinks are calculated by the Centre for Ecology and Hydrology (CEH) and are published separately, within the inventory. These reports also address plans to adapt to the impacts of climate change in the UK and outline action to prepare for deeper cuts in emissions in the longer term. The Government is currently engaged in a review of the Climate Change Programme.

- Reporting of offshore oil and gas emissions is carried out via the Environmental Emissions Monitoring System (a computerised database for managing environmental data relating to the emissions / discharges from offshore installations). BERR will therefore establish with Oil and Gas UK and operators the extent to which releases of F-gases from appliances on platforms can be quantified to help meet reporting requirements.

8.2. The Regulation sets out the following reporting requirements:

- Article 6 requires data to be reported by organisations that produce, import or export more than one tonne of fluorinated gases per annum, on the volumes of each gas produced, imported and exported, or destroyed, recycled, and reclaimed annually. This will assist in assessing the effectiveness of the measures in reducing fluorinated gas emissions.

8.3. In addition, the Regulation provides two instruments for review of the legislation in Article 9:

- The Commission will review the legislation with regard to the potential for containment of fluorinated gases in air conditioning systems (other than those fitted to motor vehicles referred to in the Directive) and refrigeration systems contained in other modes of transport by 31 December 2007 at the latest.

- By 4 July 2011, the Commission must report with the aim of:

  - Assessing the impact of relevant provisions on emissions and projected emissions of fluorinated gases, and examine the cost effectiveness of these provisions;
  - Assessing whether additional F gases should be covered by the Regulation;
  - Evaluating training and certification programmes established by Member States;
  - Evaluating the effectiveness of containment measures and assess whether maximum leakage rates for installation can be established;
  - Reviewing the need for further controls on use of sulphur hexafluoride;
  - Assessing whether further products should be subject to the placing on the market prohibition;
  - Assessing whether provisions concerning global warming potential of F gases should be amended taking account of technological and scientific developments.

9. Consultation

9.1 During the drafting of the proposed offences and penalties Regulations, Defra has consulted informally on a wide scale. An implementation group consisting of the devolved administrations and potential enforcement bodies Local Authorities Co-ordinators of Regulatory Services (LACORS) and the Environment Agency (EA) was also set up last year to assist in the development of these proposed Regulations and

to agree a suitable enforcement regime. Defra has also worked closely with BERR as well as other Government Departments such as HM Revenue and Customs.

9.2 Defra has also continued to hold regular meetings with stakeholders to update them on implementation of the 2006 Regulation.

9.3 A smaller stakeholder communications group consisting of key trade groups was also set up and they have proved invaluable in providing advice and guidance on how to effectively implement the 2006 Regulation and communicating information to stakeholders.

9.4 In respect to the offshore oil and gas industry, BERR has been liaising with Oil & Gas UK on the specific Articles in the EC Regulation that would be most prevalent from an offshore oil and gas perspective. BERR will continue to work closely with the offshore oil and gas industry after the proposed Regulations enter into force, to ensure that operators are in a position to fully comply with the appropriate enforcement provisions.

10.Summary

Option	Annualised Costs (£'000)	Annualised Equivalent benefits (£'000) SCC = £41 tC	Annualised Equivalent benefits (£'000) SCC = £78 tC	Annualised Equivalent benefits (£'000) SCC = £153 tC
SRAC	22,800 – 39,187	20,479 – 23,665	39,341 – 45,462	77,066 – 89,055
FPS	785	1,313 – 2,188	2,522 – 4,203	4,940 – 8,233
Magnesium	N/A	N/A	N/A	N/A
GIS	68	54	103	202
F gas propellant aerosols: Novelty aerosols	134	7,446	14,305	28,022
F-gas propellant aerosols: Technical aerosols	102	45	86	168
MDI	67	15	28	55
OCF	N/A	1,357	2,608	5,108
Rigid Insulating Foam	76	51	98	192
Solvent	N/A	N/A	N/A	N/A
Electronics	N/A	N/A	N/A	N/A
Aluminium smelting	N/A	N/A	N/A	N/A
F Gas	53	107	206	403
Total	**24,085 – 40,472**	**30,867 – 34,928**	**59,297 – 67,099**	**116,156 – 131,438**

10.1. When the benefits of carbon abatement are valued at the lower SCC bound of £41 per tonne of carbon (tC)[11], the highest cost estimate of the Regulation exceeds the corresponding benefits, however the lowest cost estimate is exceeded by the benefits. At £78 /tC, the benefits of the Regulation as proposed outweigh the costs (both high and low estimates). At £153 /tC the benefits significantly outweigh the costs at both the low and high cost estimates.

10.2. The upper/lower values of the costs and benefits in this section are not directly comparable because they may be based on different scenarios. For example one cannot compare the upper range of the cost with the upper range of the benefit. This problem arises from the fact that the scenario with the highest cost does not necessarily also have the highest benefits.

11. Ministerial Declaration:

I have read the Regulatory Impact Assessment and I am satisfied that the balance between cost and benefit is the right one in the circumstances.

Signed by the responsible Minister

.....Phil Woolas.....

Date

.....10th January 2008.....

12. Contact point:

Andy Smith
Defra, Climate, Energy and Ozone, Science and Analysis
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London, SW1P 3JR

[11] The social cost of carbon (SCC) figures were originally estimated at £35/tC, £70/tC and £140/tC in 2000 but should rise by £1/tC per year and take inflation into account, hence the figures of £41/tC, £78/tC and £153/tC are used in this report to reflect the 2003 figures in 2003 prices. More detail of the SCC estimation can be found in the Technical Annex I.

Technical annex I – benefit calculations

Methodology

Step 1: Valuation

CO2 savings in each year have been converted to tonnes of carbon equivalents (tC) and then valued using an illustrative figure for the social costs of carbon. As recommended in the 2000 Government Economic Service paper[12], the valuations have been undertaken at both the low and high levels currently recommended as well as the midpoint central value. These were originally estimated at £70/tC (within the range £35 - £140), rising by £1/tC per year to reflect the increasing marginal damage of emitting carbon over time, and is adjusted to take inflation into account[13]. This results in revised lower, central and upper bounds of £41/tC, £78/tC and £153/tC respectively.

Step 2: Net Present Value (NPV) of benefits

The range of monetised benefits has then been discounted back to 2005 using the Government discount rate of 3.5%.

Step 3: Annualisation

The aggregate NPV of benefits in 2005 has then been annualised over the stream of years under consideration, in this case 2005 – 2025; this is an illustrative figure that indicates how the benefits would appear on a constant annual basis from 2005 - 2025.

Tables with Calculations

Stationary Refrigeration and Air conditioning (SRAC)

Alternative scenarios	**Emission reductions '000 tonnes CO_2 2005-2025**	**Average annual benefits Carbon equivalent (Tonnes)**	**Annualised benefits £'000**		
			Based on £41	**Based on £78**	**Based on £153**
SRAC/A	37,959	517,623	20,479	39,341	77,066
SRAC/B	44,372	605,073	23,665	45,462	89,055

[12] See http://www.hm-treasury.gov.uk/documents/taxation_work_and_welfare/taxation_and_the_environment/tax_env_GESWP140.cfm

[13] This is assumed to be 2.25% per annum, with all calculations performed using the 2003 social cost of carbon estimate, adjusted for three years' inflation to reflect 2003 prices.

SRAC/C	44,372	605,073	23,665	45,462	89,055
SRAC/D	44,372	605,073	23,665	45,462	89,055

Applicable sections / Alternative scenarios:

SRAC/A: BAU with no offset for EC Regulation 2037 / 2000 (for ozone depleting substances).

SRAC/B: Higher BAU, assuming fewer actions taken without Regulation. No offset for EC Regulation 2037 / 2000.

SRAC/C: As SRAC/B, but with an offset for EC Regulation 2037 / 2000.

SRAC/D: As SRAC/B, but with higher annual costs of inspections.

Fire Protection Systems (FPS)

Alternative scenarios	**Emission reductions '000 tonnes CO_2 2005-2025**	**Average annual benefits Carbon equivalent (Tonnes)**	**Annualised benefits £'000**		
			Based on £41	Based on £78	Based on £153
FPS/A	4,271	58,240	2,188	4,203	8,233
FPS/B	2,562	34,936	1,313	2,522	4,940

Applicable sections / Alternative scenarios:

FPS/A: Emission reduction from BAU from 5% to 2.5%

FPS/B: Emission reduction from a lower BAU from 4% to 2.5%

Magnesium Casting (Mg)

It is believed there is no further potential to reduce emissions beyond BAU.

High Voltage Switchgear (GIS)

Alternative scenarios	***Emission***	**Average annual**	**Annualised benefits £'000**

	reductions ***'000 tonnes CO_2*** **2005-2025**	**benefits Carbon equivalent (Tonnes)**	Based on £41	Based on £78	Based on £153
GIS/A	100	1,364	54	103	202

F-gas propellant aerosols: Technical and Novelty Aerosols

Alternative scenarios	***Emission reductions*** ***'000 tonnes CO_2*** **2005-2025**	**Average annual benefits Carbon equivalent (Tonnes)**	**Annualised benefits £'000**		
			Based on £41	Based on £78	Based on £153
Aer/A	14,575	198,750	7,446	14,305	28,022
Aer/B	87	1,186	45	86	168

Applicable sections / Alternative scenarios:

Aer/A: Prohibition on use of HFCs for novelty aerosols

Aer/B: Aerosol recovery

Metered Dose Inhalers (MDI)

Alternative scenarios	***Emission reductions*** ***'000 tonnes CO_2*** **2005-2025**	**Average annual benefits Carbon equivalent (Tonnes)**	**Annualised benefits £'000**		
			Based on £41	Based on £78	Based on £153
MDI/A	27	368	15	28	55

MDI/A: Recovery and training

One Component Foam (OCF)

Alternative scenarios	***Emission reductions*** ***'000 tonnes CO_2*** **2005-2025**	**Average annual benefits Carbon equivalent (Tonnes)**	**Annualised benefits £'000**		
			Based on £41	Based on £78	Based on £153
OCF/A	2,550	34,772	1,357	2,608	5,108

OCF/A: Prohibition

Rigid Insulating Foam

Alternative scenarios	*Emission reductions* *'000 tonnes CO_2* 2005-2025	Average annual benefits Carbon equivalent (Tonnes)	Annualised benefits £'000		
			Based on £41	Based on £78	Based on £153
Foam/A	100	1,364	51	98	192

FOAM/A: Recovery and training

Solvent Cleaning
It is believed there is no further potential to reduce emissions beyond BAU.

Semiconductors and Other Electronics
It is believed there is no further potential to reduce emissions beyond BAU.

Aluminium Smelting
It is believed there is no further potential to reduce emissions beyond BAU.

The F-gas and HCFC Industry

Alternative scenarios	***Emission***	**Average annual benefits**	**Annualised benefits £k**

	reductions ***'000 tonnes CO_2*** **2005-2025**	**Carbon equivalent (Tonnes)**	Based on £41	Based on £78	Based on £153
FGas/A	0	0	0	0	0
FGas/B	200	2,727	107	206	403

Applicable sections / Alternative scenarios:

F Gas/A: Reporting provisions

F Gas/B: Prohibition on use of non-refillable containers

Technical annex II – cost calculations

Methodology and Key Concepts

Cost Annualisation
In addition, annualised costs are also presented. The aggregate NPV of costs in 2005 has been annualised over the stream of years under consideration, in this case 2005 – 2025; this is an illustrative figure that indicates how the costs would appear on a constant annual basis from 2005 - 2025.

Cost Effectiveness

Cost Effectiveness is a relative concept indicating which measures may be deemed as more efficient in terms of achieving substantial emission reductions at least cost. Lower figures indicate more cost effective measures.

- **Lifetime Cost Effectiveness**
  A ratio of the aggregate (discounted) costs and physical emission reductions achieved over the 20 years being considered (2005 – 2025).

- **2010 Cost Effectiveness**
  A ratio of the annualised costs over physical emission reductions achieved in 2010. This figure may be viewed in the context of the Kyoto Protocol commitments.

Tables with Calculations

Stationary Refrigeration and Air conditioning (SRAC)

Alternative scenarios	**Annualised costs (£k)**	**Lifetime cost-effectiveness £/tonne CO_2 saved**	**2010 CE £/tonne CO_2 saved**
SRAC/A	23,260	9	10.5
SRAC/B	23,260	7.7	9.5
SRAC/C	22,800	7.6	9.3
SRAC/D	39,187	13	16

Applicable sections / Alternative scenarios:

SRAC/A: BAU with no offset for EC Regulation 2037/2000 (for ozone depleting substances).

SRAC/B: Higher BAU, assuming fewer actions taken without Regulation. No offset for 2037/2000.

SRAC/C: As SRAC/B, but with an offset for 2037/2000.

SRAC/D: As SRAC/B, but with higher annual costs for inspections.

Fire Protection Systems (FPS)

Alternative scenarios	**Annualised costs (£k)**	**Lifetime cost-effectiveness £/tonne CO_2 saved**	**2010 CE £/tonne CO_2 saved**
FPS/A	785	9	10.5
FPS/B	785	7.7	9.5

Applicable sections / Alternative scenarios:

FPS/A: Emission reduction from BAU at 5% to 2.5%

FPS/B: Emission reduction from a lower BAU of 4% to 2.5%

Magnesium Casting (Mg)

It is believed there is not further potential to reduce emissions beyond BAU.

High Voltage Switchgear (GIS)

Alternative scenarios	Annualised costs (£k)	Lifetime cost-effectiveness £/tonne CO_2 saved	2010 CE £/tonne CO_2 saved
GIS/A	68	10.1	13.7

F-gas propellant aerosols: Technical and Novelty Aerosols

Alternative scenarios	Annualised costs (£k)	Lifetime cost-effectiveness £/tonne CO_2 saved	2010 CE £/tonne CO_2 saved
Aer/A	134	0.1	0.2
Aer/B	102	17.2	22.5

Applicable sections / Alternative scenarios:

Aer/A: Prohibition on HFCs for novelty aerosols

Aer/B : Aerosol recovery

Metered Dose Inhalers (MDI)

Alternative scenarios	Annualised costs (£k)	Lifetime cost-effectiveness £/tonne CO_2 saved	2010 CE £/tonne CO_2 saved
MDI/A	67	37	44.8

MDI/A: Recovery and training

One Component Foam (OCF)

Alternative scenarios	Annualised costs (£k)	Lifetime cost-effectiveness £/tonne CO_2 saved	2010 CE £/tonne CO_2 saved
OCF/A	0	N/A	N/A

OCF/A: Prohibition

Rigid Insulating Foam

Alternative scenarios	Annualised costs (£k)	Lifetime cost-effectiveness £/tonne CO_2 saved	2010 CE £/tonne CO_2 saved
Foam/A	76	11.2	16.9

FOAM/A: Recovery and training

Solvent Cleaning
It is believed there is no further potential to reduce emissions beyond BAU.

Semiconductors and Other Electronics
It is believed there is no further potential to reduce emissions beyond BAU.

Aluminium Smelting
It is believed there is no further potential to reduce emissions beyond BAU.

The F-gas and HCFC Industry

Alternative	**Annualised costs**	**Lifetime cost-**	**2010 CE**

scenarios	**(£k)**	**effectiveness £/tonne CO_2 saved**	**£/tonne CO_2 saved**
FGas/A	53	N/A	N/A
FGas/B	0	N/A	N/A

Applicable sections / Alternative scenarios:

F Gas/A: Reporting

F Gas/B: Prohibition on non-refillables

Technical annex III

Comparison of costs to business of the original proposed Regulation as at 11 August 2003 and the current Regulation

Sector	Costs – August 2003 £'000	Costs – October 2004 £'000	Cost reduction £'000
SRAC	31,841 – 43,280	22,800 – 39,187	9,041 – 4,093
FPS	1,364	785	579
Magnesium	82	N/A	82
GIS	508	68	440
Technical & Novelty Aerosols	236	236	0
MDI	71	67	4
OCF	N/A	N/A	N/A
Foam	188	76	112
Solvent	1,153	N/A	1,153
Electronics	N/A	N/A	N/A
Aluminium	N/A	N/A	N/A
F-Gas	80[14]	53	27
Total	**35,523 – 46,962**	**24,085 – 40,472**	**6,490 – 11,438**

[14] In a previous partial RIA this figure was erroneously of £4,442. The correct figure for costs for F-gases sector of original text proposal is £80, as reported in the table above.