Communities and Local Government

Regulatory Impact Assessment Energy Performance of Buildings Directive Articles 7-10

The Energy Performance of Buildings
(Certificates and Inspections) (England and Wales)
Regulations 2007

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March 2007
Department for Communities and Local Government

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Summary

Article 7(1) of the Energy Performance of Buildings Directive requires an Energy Performance Certificate (EPC) to be made available whenever a building is constructed, sold or rented out and **Article 7(2)** requires that the EPC should be accompanied by a list of cost-effective measures to improve energy efficiency. The EPC is expected to influence the market and encourage additional investment. The following Options were analysed:

Option 1 – 'Do nothing' – not taken forward as infraction proceedings would result

Option 2 – Non-statutory voluntary approach – this does not meet the Directive's requirements

Option 3 – Strict interpretation of the Directive

Option 4 – Wider interpretation of the Directive

In the private marketed sales dwellings sector, Option 4 is based on the production of a new EPC each time the property is marketed whereas Option 3 requires a new EPC only when the old one expires after 10 years (the longest validity period permitted by the Directive). For Article 7(1) and 7(2) in all other sectors a 10 year validity period has been selected. In Option 4 the list of cost-effective measures is widened to include advice on how to operate the building in an energy efficient manner and the use of renewable energy technologies.

The basis for the EPC whenever a building is constructed, sold or rented out is to calculate an **Asset Rating** using approved software which indicates the energy performance of the building when occupied in a standardised way. The Asset Rating will be related to the energy performance that would be needed to comply with the current Building Regulations.

The introduction of EPCs is expected to lead to additional demand for energy saving measures in the dwellings sector. There is already a mechanism for promoting energy efficiency through the Energy Efficiency Commitment (EEC) scheme and the RIA discusses how these two policy frameworks will work together. It is expected that EPCs will increase the demand for energy efficiency improvements which will provide the confidence to set challenging mandatory energy targets in future supplier obligations. In the RIA we have included a modest increase in these targets reflecting some of the potential areas for investment which are not being strongly supported by the current round of EEC. It is also recognised that the use of EPCs will mean that the promotional effort needed to support the EEC to achieve the targets will be less and there will be a resultant cost saving which provides a significant economic benefit.

The indicative costs of producing EPCs have been assessed following trials of the process to collect data and produce the certificates. Effort has been devoted to reducing the costs as far as possible by reducing the amount of data collection needed. This is particularly important for the social housing sector where decisions on energy efficiency investments are less likely to be influenced by EPCs. In this sector there is also the potential to reduce costs by using common values for identical properties e.g. in a block of flats.

The benefits for dwellings have been based on the reduction in EEC promotional costs and the maintenance of challenging EEC targets. In addition, Option 4 is assumed to result in an additional benefit from a reduction in electricity use of 3% for two years from the time the EPC is issued as a result of the behavioural energy advice provided with the EPC. To avoid double counting benefits from advice on heating systems are included under Article 8. For buildings other than dwellings the benefits arise from additional energy investments and a reduction in energy use from behavioural change for Option 4.

For dwellings, there is a net cost, the costs of producing the EPCs are higher than the benefits to the economy from the energy savings. Option 4 has a lower net cost than Option 3 and in addition the carbon savings are greater from Option 4.

For buildings other than dwellings there is also a net cost but this is smaller than for the dwellings. Option 4 has a lower net cost compared to Option 3 and again the carbon savings are greater from Option 4. This is because there would be a requirement with Option 4 to provide additional advice on operation of the energy systems and equipment.

Article 7(3) requires the display of an EPC in public buildings over 1,000m^2. The approach proposed is to use an **Operational Rating** based on actual meter readings for fuel and electricity. Option 3 requires a Display Energy Certificate to be produced every 10 years whereas for Option 4 the Display Energy Certificate is to be produced each year but the list of cost-effective measures would be produced every 7 years. The display of the EPC and the resulting potential public pressure together with the discipline of assessing energy use for comparison with similar buildings will sustain better energy management and lower energy costs even without the take-up of energy efficiency investments. The economic model assumes only a reduction due to low or zero cost measures and the results indicate that there is a net economic benefit rather than a cost, with Option 4 giving a much greater benefit as the Display Energy Certificate is produced every year.

Article 8 offers the options of boiler inspections or the provision of advice and the latter is proposed. The costs and financial benefits associated with this Article are much smaller and a net benefit is forecast for Option 4. The carbon savings are however significant.

Article 9 is concerned with the inspection of air-conditioning equipment and again the costs are low and a small net benefit is predicted.

There are no significant adverse impacts identified with respect to small firms, rural communities, race equality, health or competition.

The main risk identified is the potential lack of energy assessors to carry out the inspections and produce energy certificates. Article 10 requires that the energy experts are qualified and/or accredited and that they act in an independent manner. The Option 4 approach is to require the experts to be accredited by an independent body which in turn will call for suitable qualifications to be held or equivalent competence to be demonstrated. This should enable a wide variety of individuals and organisations to enter the market. The Department has been working to manage these risks by promoting the uptake of assessors and maintaining close liaison with training organisations.

The overall costs and benefits are summarised in the table below.

It can be seen that the proposals for implementing Articles 7 to 10 as set out in Option 4 offer better value than strict interpretation of the Directive. By 2020 this is expected to save 1.91 million tonnes of carbon per annum at a cost of £28 per tonne of carbon which compares very favourably with the central case social cost of carbon of £94 per tonne over the period to 2020. It can also be observed that when Option 4 is compared with Option 3 (strict interpretation of the Directive) 0.68 million tonnes of the carbon saved per annum is expected to be saved at no or negative cost (i.e. a cost saving).

Summary of costs and benefits for Articles 7-10

	Units	**Option 3**	**Option 4**	**Difference**
Average annual net cost for implementation of Articles 7(1) and 7(2) dwellings	£m p.a.	120.5	80.8	-39.7
Average annual net cost for implementation of Articles 7(1) and 7(2) buildings other than dwellings	£m p.a.	56.2	51.4	-4.8
Average annual net cost for implementation of Article 7(3)	£m p.a.	-3.4	-38.5	-35.2
Average annual net cost for implementation of Article 8	£m p.a.	8.0	-3.4	-11.4
Average annual net cost for implementation of Article 9	£m p.a.	-4.9	-4.9	0.0
Average annual net cost for Article 7-10	**£m p.a.**	176.4	85.3	-91
Carbon saved in 2020	m tonnes C p.a.	1.229	1.913	0.68
Cost per tonne of carbon saved	**£/tonne C**	79.98	28.36	positive

Note 1: The costs given are relative to Option 1 do-nothing and taken as zero cost, although Option 1 would result in the costs of infraction

Note 2: Net costs are expressed as a positive number and net benefits as a negative number

Purpose and Intended Effect of Measure

Objective

1 The objective of the implementation of Articles 7 to 10 of the Directive is to improve the energy efficiency of buildings and thus reduce carbon emissions and lessen the impact of climate change. The period during which this Impact Assessment is assumed to apply is from 2007 to 2020, although reductions in carbon emissions achieved through a higher uptake of energy efficiency improvements are estimated for the expected lifetime of these measures.

Background

2 The Government has recognised the threat posed by Climate Change and has developed the Climate Change Programme[1] of which the implementation of the Energy Performance of Buildings Directive (EPBD) is a significant element. Articles 3 to 6 of the Directive have been implemented through the Building Regulations which has: developed a national methodology for calculating energy performance, used this to set energy standards for new buildings and in relation to certain work on existing buildings and encouraged the introduction of low and zero carbon technologies.

3 Article 7(1) requires the provision of energy performance certificates (EPCs) when buildings are constructed sold or rented out and Article 7(3) requires the display of certificates for certain categories of public buildings. Article 7(2) requires the provision of reference values (legal values or benchmarks) and recommendations on cost-effective measures to improve energy performance. These requirements have the potential through influencing the property market to stimulate improvements in energy efficiency, particularly in existing buildings. Articles 8 and 9 cover the provision of advice and inspections of boilers and air-conditioning systems. Article 10 is concerned with the setting up of a qualifications and/or accreditation system for energy experts who will carry out the work in Articles 7 and 9 in an independent manner.

Rationale for Government Intervention

4 The main rationale for Government intervention is the obligation to implement the Directive and that the energy market is failing to deliver cost-effective energy efficiency improvements to buildings at a fast enough rate to reduce the risk of climate change. The reasons for the lack of investment are well understood and include: lack of information on the opportunities, the short payback periods required if there is no perceived increase in asset value, and landlord/tenant issues concerning who invests and who benefits.

[1] The UK Climate Change Programme – Defra 2006

Consultation

5 A public consultation on the implementation of the Directive was held in 2004. Since then a number of meetings have been held with key stakeholders from the property industry sectors that will be most affected. Whilst there was general agreement of the benefits of energy certificates there were concerns expressed by representatives of the social housing sector that the costs of producing the EPCs would be high and take money away from investment programmes. In the commercial sector there were also concerns regarding costs but also the need for a transparent and robust methodology for producing EPCs given that property values could be affected. In developing the details of the policies these concerns have been taken into account.

6 Consultation with Other Government Departments has also been carried out, specifically with Defra but also with representatives of those Departments responsible for large portfolios of buildings. Although there was widespread acceptance of the benefits there was also a desire to build on the systems and processes already in place within Government to manage energy.

Options for Implementation

7 In developing the RIA the following Options have been considered:

Option 1 – 'Do nothing'

Option 2 – Non-statutory voluntary approach

Option 3 – Strict interpretation of the Directive

Option 4 – Wider interpretation of the Directive

8 **Option 1** would result in infraction proceedings being brought against the United Kingdom which would result in a judgment against the UK in the European Court of Justice, potential liability to unlimited fines and no benefits. In addition, there would be a lost opportunity to make carbon savings and a loss of credibility for the Government in its leadership on Climate Change policy both domestically and with respect to foreign policy. It should be noted that there are many other current policies and mechanisms in place to address climate change issues and so Option 1 is only a 'do nothing' approach in the context of this Directive. The most significant current policy mechanism for existing buildings (dwellings only) is the Energy Efficiency Commitment (EEC) and the way in which the implementation of the Directive supports the EEC programme is discussed in more detail within the RIA.

9 **Option 2** would also result in infraction proceedings as the Directive is required to be implemented by legally binding measures.

10 **Option 3** takes a strict interpretation of the Directive.

11 **Option 4** takes a wider interpretation of the Directive for practical implementation and added value.

12 The overall policy approach has been to adopt Option 4 with limited and justifiable enhancements of the Directive. The policy approach included in Option 4 has been developed with the aim of maximising the potential for reducing carbon emissions whilst minimising costs.

Sectors and groups affected

13 Over time, most people and businesses will be affected by the requirement for energy certificates either as property owners when they come to sell or rent their property or as occupiers when they decide to rent a building. The public sector will be required to display energy performance certificates and the construction industry will need to produce them for each new building. The energy efficiency industry will benefit from an increased demand for their goods and services.

Structure of the RIA

14 The RIA considers first the requirement of Article 10 as the energy experts are required for all aspects of Articles 7 and 9. The RIA then continues to discuss Articles 7(1) and 7(2) for each building sector. Both Options 3 and 4 are analysed in this RIA with the policy differences stated for each element of the Directive under each building sector. This is followed by sections on Articles 7(3), 8 and 9. Finally the RIA considers the Small Firms Impact, Competition Assessment, Other Impacts, Enforcement and Monitoring.

Article 10 – Independent Experts

15 Article 10 requires that energy certificates and inspections are produced by qualified and/or accredited experts. The full text is as follows:

> *(10) Member states shall ensure that the certification of buildings, the drafting of the accompanying recommendations and the inspection of boilers and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts, whether operating as sole traders or employed by public or private enterprise bodies.*

16 The Directive permits two methods to be introduced to control the quality of the experts – a level of qualifications or a system of accreditation. Either of these options would be valid for an **Option 3** approach. The **Option 4** approach is to require the experts to be accredited by an independent body which in turn will call for suitable qualifications to be held or equivalent competence to be demonstrated. In addition, Option 4 requires domestic energy assessors to be subjected to basic Criminal Record checks so as to protect the public. Although Option 4 will lead to higher costs these are relatively small compared to the costs of actually performing the duties and there are benefits from a greater level of credibility in the outputs from the experts and greater consumer trust.

17 Work is in hand (to be published in 2007) to develop National Occupational Standards to support qualifications for experts providing energy certificates and undertaking plant inspections. Accreditation schemes will be established for those activities, for the purposes of quality control and consumer protection. The schemes will also address record keeping, insurance, definition of working processes, complaints procedures and ongoing continuous professional development.

18 Active quality control will help to secure implementation of the Directive in a way which supports the wider policy agenda for reducing emissions. The greater consumer confidence in the independence of assessors, which such arrangements will provide, is expected to lead to greater uptake of recommended energy efficiency improvements.

19 Some larger employers in the rented dwellings sectors and non-domestic market including Local Authorities and Registered Social Landlords will wish to use energy assessors and plant inspectors who are direct employees and the arrangements will accommodate this, subject to appropriate quality safeguards. This will reduce the costs of implementation for these sectors.

20 Similarly, for new construction, members of a design team will be able to produce the necessary certificates as they will be considered to be acting independently from the building owner/developer. This will also reduce costs for this sector.

21 For Article 7(3) the EPC for display and accompanying recommendations can also be produced by in-house staff provided they are accredited, leading to lower costs.

Articles 7(1) and 7(2) – Energy Performance Certificates on construction, sale or rent

(1) Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years.

Certification for apartments or units designed for separate use in blocks may be based:

– on a common certification of the whole building for blocks with a common heating system, or

– on the assessment of another representative apartment in the same block.

Member States may exclude the categories referred to in Article 4(3) from the application of this paragraph.

(2) The energy performance certificate for buildings shall include reference values such as current legal standards and benchmarks in order to make it possible for consumers to compare and assess the energy performance of the building.

The certificate shall be accompanied by recommendations for the cost-effective improvement of the energy performance. The objective of the certificates shall be limited to the provision of information and any effects of these certificates in terms of legal proceedings or otherwise shall be decided in accordance with national rules.

General Approach

22 Article 7(1) requires an EPC to be made available whenever a building is constructed, sold or rented out. To produce the grading the 'Asset Rating' approach will be taken which is based on calculations using data from a site survey to establish the energy performance, rather than the use of metered energy consumption data which is more influenced by the occupants' behaviour and the way in which the building is used e.g. hours of occupancy, equipment installed etc.

23 The EPC will be produced using a standardised energy performance computer model based on the national calculation methodology. The energy model will produce a grading on an A-G scale with the scale related to the current minimum energy performance standards required by the 2006 Building Regulations. The grading will be based on the CO_2 emissions per m^2 of floor area; however for dwellings an indication of running costs will also be given. The design proposed for the EPC thus addresses the Climate Change issue directly.

24 Article 7(2) requires the EPC to be accompanied by a list of cost-effective ways in which the energy performance of the building could be improved although there will be no obligation to take up these recommendations.

25 The exemptions allowed in Article 4(3)[2] have all been taken up apart from residential buildings intended to be used less than four months of the year, dwellings under 50m^2 and historic buildings. There is no reason to exclude historic buildings from the requirements for provision of information on energy performance although it is recognised that there will be additional constraints in making energy efficiency improvements.

26 The impact of these requirements will differ between the various sectors in the property market which are therefore discussed in turn below. Under each section there is a description of the Option 3 approach and also the enhancements proposed under Option 4.

27 Costs and benefits have been assessed on an economic basis first. The environmental benefit has been estimated in terms of reductions in total carbon emissions and compared with the social cost of carbon used to evaluate this benefit. Social benefits are discussed for the dwellings sector under the heading of distributional impacts.

Dwellings

Private marketed sales

28 This is the largest group of dwellings and the costs and benefits associated with the introduction of EPCs are therefore the most significant in the RIA. The benefits of the EPC arise as a result of addressing two key barriers to the uptake of energy efficiency improvements: lack of targeted advice and financial constraints (the manner in which a return on investment is made).

Lack of advice

29 Whilst general energy advice is available to householders through the Energy Saving Trust and through energy suppliers the advice in an EPC will be qualitatively different. It will be produced by an accredited, independent energy assessor and provided at a time when it is most likely that energy saving measures will be installed (most investment in upgrading properties occurs soon after a sale). Some measures such as loft, floor or internal wall insulation are most easily undertaken when other works are being carried out and/or on a change of ownership. The advice provided will also be specific to the building and provide estimates of the running cost savings that could be obtained, together with advice on the availability of grants.

[2] Article 4(3) exemptions are places of worship; temporary buildings with planned use of less than 2 years, industrial sites, workshops and non-residential agricultural buildings with low energy demand; stand-alone buildings less than 50m^2 which are not dwellings.

Financial constraints

30 The motivation for energy efficiency improvements has been limited in the past to recovery of a capital expenditure by lower energy costs. For most people the expected time of living in a property is not known but can be relatively short. There is therefore a reluctance to invest in measures with a payback period longer than a few years. The introduction of an EPC however allows the value of energy efficiency to be recognised in the market place and thus allows a higher property price to be achieved, so that the occupier need not rely solely on the benefit from reduced running costs for the period of occupation. A second factor is that the advice is given at the critical time when a purchaser is budgeting for home improvements anyway, and can consider and more easily obtain an additional loan facility for energy improvements if necessary.

Option 3

31 In Option 3 the EPC has a validity of 10 years the maximum permitted by the Directive; an EPC produced for an earlier sale could be reused within a 10 year period (as assumed for the non-dwelling sector and the rented dwellings sector). The list of recommended measures is limited to those related to the building and which are cost-effective. Advice on how to operate equipment and appliances and manage energy use in the home is not included.

32 The Government's National Calculation Methodology for dwellings – the Standard Assessment Procedure (SAP) software has been adapted for use in existing buildings to reduce the amount of data collection required from surveys without significant loss of accuracy. It is assumed that this software, known as Reduced Data SAP (RDSAP), will be used as the basis for the certificate and the list of recommended measures.

Costs

33 The cost for producing an individual EPC comprises two main elements: site survey (including travel time) and data entry into the SAP software to produce the EPC. Following trials of the process (see Annex A), the combined cost of these two activities is estimated at £97 per dwelling (excluding VAT). This is a relatively small cost compared to the costs of moving house. In a national context however the absolute cost is significant. The total cost for England and Wales is calculated from the number of EPCs that would be required, assuming the certificate has a 10 year validity, over the period from June 2007 to 2020. In the early years the number of EPCs will equal the number of market listings as the policy is to make the EPC available at the start of marketing (approximately 1.9m listings p.a.). However, over time, some of the dwellings placed on the market will already have EPCs from construction or from previous sales or rentals which will still be valid, and hence the number of EPCs required to be produced each year will reduce over time. The calculation has adopted a probability distribution for the time period before resale, derived from the Survey of English Housing[3] and HM Land Registry resale data.

[3] Survey of English Housing – http://www.communities.gov.uk/index.asp?id=1154759

Benefits

34 The principal benefit from producing an EPC is to provide greater incentives for householders to invest in energy efficiency measures. There is a cost benefit from new energy efficiency measures provided these are cost-effective[4]. However, it is important to assess how the introduction of EPCs will impact on other policies in this area, the most important of which for individual householders is the EEC. This is a programme which requires all large energy suppliers to meet a target of energy efficiency improvements over a given period and provide 50% of the benefits to priority groups. In practice, suppliers provide grants to householders to encourage uptake of energy efficiency investments. The cost of EEC support is recovered through higher energy prices. The next round is EEC3 and will run from 2008 to 2011 and in advance of statutory consultation, a paper showing illustrative ways in which the requirement could be achieved was issued by Defra in Sep 2006[5]. Further supplier obligations after 2011 are anticipated during the lifetime of this RIA.

35 The introduction of EPCs is expected to increase demand for energy efficiency investments and thus increase demand for EEC support. This will lead to three impacts:

- a reduction in the cost of promoting EEC support to the general public as the EPCs will be directing people to the EEC obligated suppliers
- a reduction in the suppliers' costs of meeting the EEC energy reduction targets as increases in demand will ensure that the most cost-effective measures are prioritised requiring least grant and enable the level of grant to be reduced
- challenging energy saving targets can be maintained in future supplier obligations

36 The first of these cost reductions is a net economic benefit and can be included in the analysis. Suppliers' costs will reduce and these reductions are likely to be passed on to consumers in lower energy bills, as energy supply is a competitive market.

37 However, the second impact will mean a reduction in support and a corresponding increase in the investment needed by the building owner with no net economic benefit.

38 The third impact is dependent on the EEC negotiations on targets. At present, the majority of the energy efficiency improvements are obtained through cavity wall insulation and loft insulation. Other measures such as solid wall insulation are not currently supported through EEC as they are much less cost-effective. There are two possible ways in which the overall energy efficiency uptake could increase as a result of EPCs:

4 Cost-effectiveness is defined for this sector as achieving a positive net present value over the life of the investment at a real discount rate of 3.5% and assuming current energy prices

5 EEC3 – The first draft Illustrative Mix of Measures for the Energy Efficiency Commitment 2008-11, Defra, September 2006

- The requirements for EPCs provide the confidence that challenging energy saving targets can be sustained in future supplier obligations. The aim is to provide maximum carbon savings targets consistent with supply and demand side constraints at acceptable cost. To do this government needs support of additional policies including EPCs to ensure higher demand from households. This impact is most likely to be seen in the later phases of the programme. Some insulation measures, e.g. top-up loft insulation, internal solid wall insulation and underfloor insulation, are unlikely to be undertaken by most householders unless there is access to a clear loft, the lifting of floorboards for other reasons, or if rooms to be insulated are unoccupied. Because such occasions will occur when moving house and coincide with the issue of an EPC, the chances of such measures being installed as a result are likely to be higher.

- If the demand for improvements is high enough such that EEC support is limited only to the priority groups then there could be an increase in the number of installations beyond the EEC mandatory targets. Even though there would then be no support available outside the priority groups the impact of the EPCs could be enough to stimulate additional installations.

38 It can be seen that there are considerable uncertainties in assessing the impact of the EPC on the EEC programme. After discussion with analysts within Defra, a central estimate is proposed assuming two impacts as follows:

- Promotional costs currently running at £120m p.a. (EEC2) are estimated to be reduced by a third, saving £40m p.a. This saving is assumed to be constant over the period 2008-2020, even though future savings are likely to be higher as it becomes increasingly difficult to attract people to the programme and as the scale of the EEC activity is increased.

- There is an increase in uptake of energy efficiency improvements as a result of the EPC, including those investments in areas which are not currently supported significantly by the EEC programme, either through challenging targets or even without support. The impact is assessed as about 16% of the current EEC target savings. Some of this saving is expected to arise from new technologies in the later years of the EEC programme.

40 **It is important that these benefits are not 'double-counted' with the benefits claimed in reporting on both the EPBD and the EEC policies.**

41 The existing buildings review undertaken by The Department[6] used information from a Building Research Establishment report[7] which provided costs and savings for a wide range of improvement measures. This formed the basis for the model. The measures are listed in Table 1 showing the expected support of each from EEC3 (illustrative mix) and the assumed increased uptake of measures with EPCs. The total potential number of dwellings in Table 1 is the number estimated for 2020 assuming no new policies.

6 Energy efficiency of dwellings initial analysis, Communities and Local Government, November 2006

7 'Reducing carbon emissions from the UK housing stock', BRE/Defra, 2005

42 Some of the figures in Table 1 are zero as these measures are assumed to achieve full market penetration through the existing EEC programme and no additionality can then be claimed by the introduction of EPCs.

Table 1 – Energy efficiency measures and assumptions of uptake

Energy efficiency measure	**Percentage of total EEC carbon saving from this measure[8]**	**Number of installations for EEC3[6]**	**Total potential – – no. of dwellings[5]**	**Percentage additional uptake from EPCs**
	%			%
Loft insulation to 300mm	29.7 (all)	2,550,000 (all)		
Currently with none			1,039,280	0
Currently with 50mm or less			531,520	0
Currently with 75mm			100,320	0
Currently with 100mm			8,677,680	15
Currently with 150mm			1,632,400	0
Currently with 200mm			815,760	0
Cavity wall insulation	49.2 (all)	3,250,000		
Pre-76 cavity insulation			2,533,520	12
Post-76 cavity insulation			2,247,520	12
Solid wall insulation	1.5	40,000	6,363,280	12
Draughtproofing	0.3	150,000	2,621,520	0
Hot water cylinder insulation to >75mm	0.4 (all)	300,000 (all)		
Currently with no insulation			895,840	0
Currently with 25mm			310,640	6
Currently with 50mm			1,133,440	6
Improved heating controls	1.0	400,000	426,800	4
Energy efficient lighting	4.6	10,000,000 (approx)	13,861,760	0
Floor insulation (raised timber floors)	n/a	n/a	9,610,480	13

Option 4

43 In Option 4 it is proposed that a new EPC will be required whenever the property is first marketed for sale so that it is as up to date as possible. This has a number of advantages:

- the latest information on energy saving technologies can be provided, including micro-generation options as these become more available and cost-effective

8 EEC3 – The first draft Illustrative Mix of measures for the Energy Efficiency Commitment 2008-11, Defra, September 2006

- the estimates of energy cost savings will be based on current prices
- the information on availability of grants will be up to date
- any changes to the building since the last EPC was issued will be taken into account
- lenders could use new EPCs as a basis for green mortgages
- overall the new EPC will have a greater level of credibility in the market

As a result, the benefits obtained from the EPC are considered to be higher than for Option 3.

44 The recommended measures will include advice on operating the building in an energy efficient manner and on other energy options such as renewable energy.

45 The software used to produce the EPC will be the RDSAP software as for Option 3.

Costs

46 Trials of the RDSAP software have been used to estimate the cost which is expected to average £97 per dwelling (excluding VAT). This is a relatively small cost compared to the costs of moving house. In a national context however the absolute cost is significant. A new EPC will be produced whenever a property is marketed and there are currently some 1.9m dwellings marketed each year. This leads to a higher cost than for Option 3 as approximately the same number of EPCs will be needed each year with no reduction in costs when properties are resold.

47 The behavioural advice and information on renewable energy options will be produced automatically by the RDSAP software so there is no additional cost for including this requirement.

Benefits

48 The benefits arising from the impact on the EEC programme discussed in Option 3 will be similar but enhanced as the EPC will have greater impact in the market due to its more recent production date. Over the period 2007 to 2020 Option 3 is estimated to result in 12% of EPCs being issued which are older than 5 years and 19% of EPCs issued would be older than 3 years. From this information, the level of additional activity for the newer EPCs in Option 4 is estimated to be about 10%, equivalent for example for a 50% reduction in activity on EPCs older than 3 years and an 80% reduction on EPCs older than 5 years.

49 Savings in EEC promotional costs are also assumed to be 10% higher for Option 4 as a result of the greater credibility of the new EPC.

50 The inclusion of behavioural advice under Option 4 will result in energy efficiency gains at least for the first few years after receiving a certificate. Although the behavioural advice will be provided for both heating and electricity use, to avoid double counting within this RIA, the benefits of reduced electricity use only are considered for Article 7(1) with the benefits from advice provided on heating systems being included in the benefits from Article 8.

51 The benefits from behavioural advice have been based on a report for the Energy Savings Trust[9] which reviews results from a survey of 1,900 households. The average annual electricity saving obtained across all 1,900 households for cooking, appliances and lighting use was 154kWh per dwelling, as a result of the provision of written reports. As advice will also be received from other sources we have taken two-thirds of this figure or 103kWh per dwelling equivalent to about 3% of average electricity use. It has also been assumed that this benefit lasts for two years after the issue of the EPC, although there is some evidence to show that once behavioural change has been made it tends to persist for longer.

52 The greater credibility in the market of a new EPC is assumed to lead to a 5% improvement in savings from behavioural advice.

Comparison of Options 3 and 4 – i.e. between 10 year validity and new EPCs on each sale

53 This section provides the results of a calculation to compare the costs and benefits of an EPC which can be reused provided it is less than 10 years old (Option 3) and a new EPC being issued for each marketing of a dwelling.

54 The calculations only relate to private marketed sales dwellings where this difference applies.

Costs

55 The costs of obtaining an EPC are determined by the number of EPCs issued which is higher for the 'new EPCs' case. The costs are:

New EPCs: £1,893m,
10 year validity: £1,533m,
Additional cost for new EPCs: £360m (for the period 2007 to 2020).

56 These costs are based on an average cost of £97 per EPC. As a sensitivity, a reduction of 10% and 20% on this figure has been considered. Lower costs are expected to result from market competition, EPCs being carried out as part of other survey work by estate agents or as part of a voluntary Home Condition Report.

Benefits

57 Additional benefits will be obtained in both financial and carbon savings as discussed above. For this part of the analysis the benefits from behavioural change are included in Option 3 even though this is not a strict requirement of the Directive. However, if a 10 year validity period was adopted it is self-evident that behavioural advice would be included as it provides benefits without additional cost. Similarly the costs for the register are included for Option 3.

58 The base case results of the analysis are given in Table 2 below.

9 Savings from behavioural changes following energy advice, Report on a Survey, New Perspectives, for the Energy Advice Providers Group, EST, April 2004

Table 2 – Comparison of 10 year validity and new EPCs – Dwellings – Private Marketed Sales

		10 year validity	**New EPC**
Financial			
Present Cost for dwellings EPC	£m	1,533	1,893
Benefits:			
Lower EEC promotional costs	£m	288	317
Behavioural advice	£m	382	401
Measures	£m	559	615
Total net cost	£m	304	560
Carbon			
Behavioural advice	m tonnes C	0.58	0.61
Measures	m tonnes C	22.38	24.61
Total	m tonnes C	22.96	25.22
Cost per tonne of C		**13.2**	**22.2**

59 Table 2 shows that the new EPC on each sale results in an additional cost and additional carbon savings. In order to help determine which policy should be pursued the marginal cost of additional carbon saved has been calculated by comparing the difference in costs and benefits between the two policies. This is presented in Table 3.

Table 3 – Marginal cost and benefit for the new EPC case

Additional cost of EPCs	£m	360
Difference in benefit from measures	£m	56
Difference in benefit from behavioural advice	£m	19
Difference in EEC costs	£m	29
Net additional cost of new EPCs	£m	256
Difference in carbon benefit from measures	m tonnes C	2.238
Difference in carbon benefit from behavioural advice	m tonnes C	0.031
Total additional carbon benefit from new EPCs	m tonnes C	2.268
Additional cost per tonne C saved		**112.9**

60 The additional cost per tonne of carbon saved is above the social cost of carbon of £94/tonne C but not significantly higher. Further investigation was carried out to explore some upside sensitivities. Table 4 provides the results of the sensitivity analysis for the marginal cost calculation, varying the parameters of take-up of energy efficiency measures through higher EEC targets and the cost of producing the EPC. These figures can also be compared with a social cost of carbon of £94 per tonne C.

Table 4 – Marginal cost per tonne of Carbon saved for a new EPC compared to 10 year validity

	EEC targets +16% (Base Case)	**EEC targets +20.5%**	**EEC targets +25%**
Cost of EPC £97 (Base Case)	113	84	65
10% reduction in EPC cost	97	71	54
20% reduction in EPC cost	81	59	44

61 The conclusion of this analysis is that on plausible assumptions, the cost of requiring a new EPC for each marketing activity can be justified by the potential additional carbon savings. It can be seen that the results are sensitive to the assumptions made.

Social Housing

62 This sector covers housing owned by Local Authorities and Registered Social Landlords. Discussions with stakeholders indicated that the provision of an EPC would have relatively small impact on energy efficiency as expenditure on energy improvements is controlled by rental income and, for local authorities, the resources available to support capital investment, rather than being driven by the market. Social housing supply is less than demand and the information on an EPC is unlikely to result in a differential take-up or levels of rent (unless the changes are of such significance that they impact on the value of the homes which would allow changes to be made under the rent restructuring rules). There was concern that money spent on producing the EPCs would be taken away from budgets used for the actual energy efficiency improvements. However it was recognised that energy rating of property in a consistent manner would assist in setting priorities and measuring outputs from investments. The introduction of requirements for EPCs in this sector has therefore focused on finding opportunities to reduce the costs as far as possible.

Options 3 and 4

63 The only difference between these Options for this sector is that behavioural advice is included in Option 4. EPCs will be valid for up to 10 years, although there would be an incentive for landlords to obtain a new EPC if energy efficiency improvements were made to the property.

Costs

64 Costs have been reduced by allowing the use of common values when assessing dwellings of identical layout and servicing e.g. in a block of flats, and to allow the use of other information held by the landlord e.g. previous surveys, details of boilers installed etc so as to limit the amount of time needed to survey the property. As a result, the productivity of an assessor in this sector is expected to be significantly

higher. The interpretation of Article 10 will be such as to allow in-house staff to produce EPCs provided they are accredited by an independent body and have suitable qualifications or equivalent. This should also reduce costs as a lower hourly rate can be assumed. In addition, the EPC would have a validity of 10 years, the maximum allowed by the Directive. The cost of each EPC is estimated to range from £39 per dwelling for local authorities and larger Housing Associations to £90 per dwelling for smaller Housing Associations. The local authority cost is lower as there is likely to be a greater number of flats where a 'common values' approach could be used. These costs should be viewed in the context of a 10 year life for the certificate.

Benefits

65 The benefits assumed have been limited to those associated with behavioural advice as it is unlikely that additional investment would be triggered by the use of EPCs in this sector. Investment in energy efficiency improvement is already being taken forward through a range of programmes supported by Government and through the EEC. The benefit from behavioural advice is only available for Option 4. It is assumed that each dwelling will have an EPC issued on average every seven years as a result of a change of tenancy so that the benefit in behavioural advice is seen in approximately 4 years out of the 13 years to 2020.

Private Rented

66 It is expected that the provision of EPCs in this sector will act to remove a major barrier to investment which is that an investment by a landlord would lead to lower energy running costs but these will benefit the tenant not the landlord. The landlord would like to be able to recover at least some of the investment through higher rents but is currently unable to easily demonstrate that running costs will be lower. The EPC will enable the running costs of a property to be taken into account by a prospective tenant who may then be more willing to pay a higher rent for a more efficient property. Similarly, properties with poor energy efficiency and high running costs will become less attractive and the potential rental value would fall. A further key influence is how long properties are empty between lets and it would be expected that higher rated property with lower energy costs would be re-let more quickly. These factors will encourage landlords to invest to obtain maximum rental income.

67 The Landlord's Energy Saving Allowance will provide additional support to this sector with the scheme having been extended recently to 2015 and including solid wall insulation, hot water systems and draughtproofing.

68 The provision of advice on which measures are cost-effective is also important in this sector as such technical advice may not be obtained easily by landlords with only a few properties.

Options 3 and 4

69 The only difference between these Options for this sector is that behavioural advice is included only in Option 4. EPCs will be valid for up to 10 years.

Costs

70 In this sector the cost of producing an EPC will be similar to that of the private marketed sales as there is less likelihood of the use of common values or existing data. Also the use of in-house staff is unlikely except for the largest landlords.

Benefits

71 The benefits could be significant as this is a sector where lack of investment and lower energy efficiency standards are typical. It is also the sector where fuel poverty is of most concern. With Option 4, benefits from behavioural advice are also obtained and as the EPC (although valid for up to 10 years) is issued more frequently, given the shorter average letting period, this benefit is proportionately higher than for the other sectors. It has been assumed that tenants will see a certificate every two years on average in this sector, with the benefit from behavioural advice lasting for two years, so that the benefit is continuously achieved.

72 The lodgement of EPCs in a register will be a particular advantage for this sector in gaining a better understanding of the quality of stock and the potential fuel poverty risk (see paras 154 to 157).

Dwellings – new construction

73 The provision of an EPC for new dwellings will enable the market to compare new dwellings with older, less efficient ones on the same basis but it is unlikely to influence the design of the new dwellings. The Code for Sustainable Homes is expected to become the major driver for improvements in energy efficiency standards above that of the Building Regulations and the EPC grades may be aligned with the Code Energy Ratings to assist in defining the various levels.

Options 3 and 4

74 In Option 3 the certificate would be valid for up to 10 years and in Option 4 a new EPC would be required when sold subsequently, however for new construction the costs of the initial EPC will be the same. In addition, behavioural advice is included only in Option 4.

Costs

75 In this sector the cost of producing the EPC is relatively small as calculations using the SAP model will be needed anyway to demonstrate compliance with Part L of the Building Regulations.

Benefits

76 It is expected that cost-effective opportunities to reduce energy consumption will already be included in the design as this was the intention when setting higher energy efficiency standards in Part L of the Building Regulations. For Option 4 additional benefits are obtained from the behavioural advice.

Other Dwellings

77 A small number of additional types of property transactions have not been discussed above. These include: private non-marketed sales, right to buy sales and large-scale voluntary stock transfer. The nature of the transactions mean that the benefits arising from issuing the EPCs will be very limited. These types of transaction are discussed in more detail in Annex A.

Risks and unforeseen impacts

78 The availability of inspectors to carry out the necessary surveys and produce the EPCs from June 2007 for over 2 million properties a year has been recognised as a significant risk and for this reason full implementation has been delayed from January 2006 as permitted by the Directive. If there is a shortage of inspectors this may drive up costs in the short-term and lead to a lower level of compliance in some sectors. For example, there will be pressure to let properties in the private rented sector rather than remaining empty whilst waiting for an EPC to be produced.

79 To manage this risk, work has been undertaken by the Department to quantify the number of inspectors required and to phase in the EPBD requirements accordingly. Energy assessor training organisations estimate that they will train some 3000 assessors by June 2007 in addition to 720 Home Inspectors who have already been trained. This compares with the Department's estimated requirement of 1600 to 4300 inspectors/assessors.

Distributional Impacts

80 The main beneficiaries of the Directive will be those private householders who take advantage of the recommendations and implement them. They will benefit from energy cost savings and will be able to obtain grant funding through EEC for most measures. When selling their property in the future, the third party endorsement of the energy efficiency standard means the dwelling may benefit from a more rapid sale and/or attract a higher price in the market.

81 Tenants in the rented sector will benefit by having more information on the expected energy costs of the property they are about to occupy and hence will be able to make an informed choice that suits their budget. They will also have advice on how to operate the building energy systems more efficiently and hence could obtain financial benefits.

82 Landlords will benefit by having a third party assessment of the energy efficiency standard of their property. They will also have information on how to improve their property cost-effectively and if they choose to act on this they could potentially obtain higher rents and have lower void rates.

83 Domestic energy assessors will see an increase in work opportunities in carrying out surveys, with additional jobs being created.

84 Manufacturers and installers of energy efficient products are likely to see an increase in their markets.

Compliance levels

85 A system of enforcement and sanctions will be put in place (see paras 193 – 200) As a result, the expected compliance levels assumed in the dwellings model are as follows:

Private marketed sales 99%
Social housing 95%
Private rented 90%
New construction 99%

Results of Cost-Benefit Analysis

86 The results of the cost-benefit analysis and the comparison of Options 3 and 4, using the modelling assumptions in Table 1 on uptake of measures, are given in Table 5. More details on the model and assumptions are given in Annex A.

Comparison with the social cost of carbon

87 The introduction of the EPC requirement results in a cost per tonne of carbon saved which can be compared to the social cost of carbon as advised in Government guidance[10]. This guidance provides a central case cost of carbon of £94 per tonne for the period to 2020, and a high case of £172 per tonne (2005 prices).

Table 5 – Costs and Benefits for Article 7.1 and 7.2 – EPCs for Dwellings

	Units	**Option 3**	**Option 4**
NPV of costs of EPC	£m	2,538	2,941
NPV benefit lower EEC costs	£m	412	453
NPV benefit behavioural advice	£m	-	822
NPV benefit from energy measures	£m	559	615
Net cost of EPCs (Present Value basis)	£m	1,567	1,051
Estimate of carbon saved	m tonnes C	22.38	25.91
Cost per tonne of carbon saved	£/tonne	70	41
Carbon saved in 2020	m tonnes C p.a.	0.706	0.877

88 It can be seen from Table 5 that for both options there is a net cost for implementation. Option 4 has a lower net cost and greater carbon savings. As a result, the cost per tonne of carbon saved is substantially lower than Option 3. The cost per tonne of carbon saved for both Options is lower than the central case social cost of carbon of £94/tonne.

[10] Estimating the social cost of carbon, Government Economic Service Paper No. 140

Scenario Analysis

89 As a scenario analysis (sensitivity) some of the variables have been adjusted to determine the impact on the Option 4 results. The variables included in this analysis are:

The percentage reduction in EEC promotional costs
The electricity price assumed
The impact of behavioural advice
The take-up of energy efficiency measures

90 A high case and low case for each of the above have been assessed for comparison with the central case. For the take-up of energy efficiency measures, the high case now assumes a significant additional take-up of cavity fill and loft insulation as a result of EPCs. However, while EPCs are needed to stimulate higher demand from households, there may be limiting factor for market penetration of these measures determined by the capacity of the industry.

91 A summary of the assumptions is given in Table 6 and the results for each case in Table 7.

Table 6 – Assumptions for Scenario Analysis based on Option 4

Variable	**Low case**	**Central case**	**High case**
The reduction in EEC promotional costs	15%	33%	45%
The energy prices assumed	-20%	9.47p/kWh[11] elec	+20%
The take-up of behavioural advice	20% less for 2 years	103kWh for 2 years after EPC issued	20% more for 2 years
The take-up of energy efficiency measures (which also impacts on EEC promotional costs)	Take-up reduced by 25%	As Table 1 with 10% addition as new EPCs	Take-up increased by 25%

[11] Table 2.2.3 UK Energy Statistics, December 2006, DTI

Table 7 – Costs and Benefits for Article 7.1 and 7.2 – EPCs for Dwellings – Option 4 – Scenario Analysis

	Units	**Low Case**	**Central Case**	**High Case**
NPV of costs of EPC	£m	2,941	2,941	2,941
NPV benefit lower EEC costs	£m	153	453	765
NPV benefit behavioural advice	£m	526	822	1,184
NPV benefit from energy measures	£m	462	615	769
Net cost of EPCs	£m	1,800	1,051	223
Estimate of carbon saved	m tonnes C	19.5	25.91	32.33
Cost per tonne of carbon saved	£/tonne	92.3	41	6.9
Carbon saved in 2020	m tonnes C p.a.	0.66	0.877	1.09

92 The results show that for the high case assumptions the net cost of EPCs falls to about a fifth of the central case and the cost per tonne of carbon is very low. In contrast the low case results in an increase in the net cost by almost a factor of two and a cost of carbon that is twice as high. Even in this low case however the cost of carbon is slightly less than the central social cost of carbon of £94/tonne.

93 The benefits from the EPBD will be enhanced by a public communications activity and this has been assumed to be in place for both Options 3 and 4. A budget cost estimate has been included in the financial models.

94 The allocation of costs and benefits between the various sectors is given in Table 8 for Option 4 (dwellings). The annual benefit is shown as all allocated to citizens although some of this benefit could be shared with landlords in the rented sector. The annual cost given under New Policy is mainly the enforcement cost. The one-off cost under New Policy is the communications cost.

Table 8 showing costs and benefits by sector for dwellings – Option 4

Policy Option No 4				
Net Present Value of option			£m	(1,051)
Benefits	**Citizens**	**Public Sector**	**Private & Voluntary**	**Total**
Current (No Action)	0.0	0.0	0.0	0.0
One-off Benefits	0.0	0.0	0.0	0.0
Annual Benefits	170.9	0.0	0.0	170.9
Non-monetary benefits	Carbon savings			
Annual Costs				
Current (No Action)	0.0	0.0	0.0	0.0
New Administrative	0.0	0.0	0.0	0.0
New Policy	0.0	12.4	0.0	12.4
New Annual Costs	194.2	13.0	72.6	279.9
Non-monetary costs				
Annual Regulatory Benefit (in brackets if negative)			£m p.a.	(121.3)
One-off Costs				
New Administrative	0.0	1.5	0.0	1.5
New Policy	0.0	9.0	0.0	9.0
New Transitional Costs	0.0	0.0	0.0	0.0

Buildings other than dwellings

Existing Buildings

95 For existing buildings an EPC will be produced following a site survey and the use of Simplified Building Energy Model (SBEM) software to produce an energy rating. Trials have been carried out to establish indicative costs for this work on a range of building types. The list of cost-effective measures to accompany the certificate will be produced from a generic list, customised by the energy assessor for the building concerned with the software used to limit the time this would take. Typical costs range from £260 for a small retail unit through £480 for a small commercial building to £1,790 for a large commercial building.

96 The benefits from provision of an EPC in this sector arise from three issues: the landlord tenant relationship which acts as barrier, the pressure to maintain value in the property market and the importance of Corporate Social Responsibility (CSR).

97 The landlord tenant barrier exists because often an investment in energy efficiency by the landlord will result in energy savings to the tenant. EPCs would allow a market for more energy efficient buildings to be created where the landlord would see a return on investment through higher rents because of the differentiator created by the EPC. In some cases the landlord may be offering a fully-serviced building where the landlord is directly responsible for the energy supply. In this case the EPC and the recommended measures will be of direct value to the landlord.

98 When EPCs become established it is likely that buildings with better ratings will attract higher rents and hence the property value will increase. This will result in pressure on landlords to improve energy efficiency to maintain the value of their property investment.

99 The third benefit arises simply because both landlords and their tenants will wish to be associated with buildings of a good energy rating. It could quickly become established that another indicator for good CSR is the quality of buildings occupied and the EPC would produce an immediate indication of this. The pressure to source better rated buildings would encourage greater investment by building owners to improve the existing building stock. This impact would be seen mainly at the top-end of the market.

100 As a result of EPCs it is considered likely that additional investments will result and improved energy management as a result of the advice provided. Research for the Existing Buildings Review lists a large number of measures that could be implemented across this sector with an indication of the potential carbon saving and net present cost saving. It should be noted that this is not the technical potential but the cost-effective potential. This is shown in Table 9 together with an estimate of the expected take-up as a result of the introduction of EPCs.

Differences between Options 3 and 4

101 The main difference between Options 3 and 4 is the inclusion of advice on efficient operation of the building in Option 4 but not in Option 3. It is proposed that this advice is largely generated automatically by software which will tailor the advice to the building systems installed. As a result there would be negligible cost for providing this advice but some additional take-up and consequent benefits.

Table 9 – Energy efficiency measures for buildings that are not dwellings

Energy efficiency measure	**Cost-effective potential**	**Additional percentage uptake from EPCs Option 3**	**Additional percentage uptake from EPCs Option 4**
	m tonnes C	%	%
Investments in energy efficiency	28.4	10	10
Energy management	2.5	0	5
Equipment management	3.5	0	5
CHP/heat pumps investment	9.2	10	10

New buildings

102 For new buildings, the EPC will be produced by the design team using the SBEM software model which will be required in any case to demonstrate compliance with Part L of the Building Regulations. The costs will therefore be very small as the production of the EPC will be automated. The list of cost-effective measures will also be limited and generated automatically. The EPC will also include advice on operation of the building and this will reinforce the message received through the building log book. The direct benefits from the EPC in this sector are therefore small, however, the EPC will enable prospective purchasers to decide which building to occupy and using the same EPC for new build and existing will create a uniform market. It is also possible that the EPC for new buildings will lead to greater recognition in the market of those buildings that exceed the Building Regulations requirements, thereby encouraging additional carbon savings. Overall though, both costs and benefits of the EPC in this sector are assumed to be small.

Risks and unforeseen impacts

103 There is a risk that there will be insufficient energy experts available to carry out the necessary surveys. This will be critical in the early years as an EPC will be needed when renting out any property, and to avoid any risk of loss of rental income landlords may wish to rate all of their portfolio within the first few years.

104 There is a risk that in some sectors, such as small and medium enterprises who own small commercial buildings, compliance levels will be low and the impact of EPCs will be reduced.

105 To manage these risks, work has been undertaken by the Department to quantify the number of inspectors required and to phase in the EPBD requirements accordingly and the introduction of EPCs is to be supported by a significant communications exercise to help obtain the maximum benefit from the new regulations.

Distributional Impacts

106 Tenants of buildings will benefit by having more information on the likely energy use and environmental impact of the building they may wish to occupy. They will also have advice on how to operate the building energy systems more efficiently and hence obtain financial benefits.

107 Landlords will benefit by having information on how to improve their property and hence potentially obtain higher rents.

108 Energy experts will see an increase in work opportunities in carrying out surveys, with additional jobs being created.

Compliance levels

109 As a result of the enforcement and sanctions scheme proposed, the expected compliance levels for this sector are:

Existing small buildings 90%
Existing large buildings 95%
New buildings 99%

Results of Cost-Benefit Analysis – Buildings other than dwellings

110 The results of the cost-benefit analysis using the modelling assumptions in Table 9 on uptake of measures are given in Table 10. More details on the model and the assumptions are given in Annex B.

Comparison with social cost of carbon

111 The introduction of the EPC requirement results in a cost per tonne of carbon saved which can be compared to the social cost of carbon as advised in Government Guidance[12]. The central case cost of carbon is £94 per tonne for the period to 2020, the high case is £172 per tonne.

112 Table 10 summarises the costs and benefits associated with this sector

Table 10 – Costs and benefits arising from Article 7(1) and 7(2) in the non-dwellings sector

	Units	**Option 3**	**Option 4**
NPV of costs of EPC	£m	1,148	1,148
NPV of energy benefits (investments)	£m	418	418
NPV of energy benefits (management)	£m	-	62
Net cost of EPCs	£m	730	668
Estimate of carbon saved	m tonnes C	3.76	4.05
Cost per tonne of carbon saved	£/tonne	194	165
Carbon saved in 2020	m tonnes C p.a.	0.32	0.36

113 It can be seen that Option 4 is preferred because of the additional benefit from the provision of behavioural advice. The net cost of producing EPCs is £668m which leads to a cost per tonne of carbon saved of £165/tonne which is higher than the central social cost of carbon but lower than the high case.

Scenario Analysis

114 There is considerable uncertainty as to how the advent of EPCs will impact the property market and the amount of additional energy efficiency improvements that might result. A scenario analysis has been developed varying the proportions of energy take-up as in Table 11 below with the results in terms of net cost of EPCs and cost per tonne of carbon given in Table 12 assuming Option 4 is taken forward.

[12] Estimating the social cost of carbon, Government Economic Service Paper No. 140

Table 11 – Scenario Analysis for take-up of measures (Option 4 assumed)

Energy efficiency measure	**Cost-effective potential**	**Low case take-up of measures as a result of EPCs**	**Central case take-up of measures as a result of EPCs**	**High case take-up of measures as a result of EPCs**
	m tonnes C	%	%	
Investments in energy efficiency	28.4	5	10	15
Energy management	2.5	0	5	10
Equipment management	3.5	0	5	10
CHP/heat pumps investment	9.2	5	10	15

Table 12 – Results of Scenario Analysis based on Option 4 – buildings other than dwellings

	Units	**Low Case**	**Central Case**	**High Case**
NPV of costs of EPC	£m	1,148	1,148	1,148
NPV of energy benefits (investments)	£m	209	418	627
NPV of energy benefits (management)	£m	-	62	125
Net cost of EPCs	£m	939	668	396
Estimate of carbon saved	m tonnes C	1.88	4.05	6.23
Cost per tonne of carbon saved	£/tonne	500	165	64
Carbon saved in 2020	m tonnes C p.a.	0.16	0.36	0.56

115 From Table 12 it can be seen that the high case results in a reduction in net cost to 59% of the central case net cost and a cost per tonne of carbon saved which is two-thirds of the central social cost of carbon comparator.

116 The way in which costs and benefits are distributed between the sectors is given in Table 13 overleaf for Option 4.

Table 13 – Distribution of costs and benefits for Articles 7(1) and 7(2) buildings other than dwellings – Option 4

Policy Option No 4				
Net Present Value of option			£m	(668)
Benefits	**Citizens**	**Public Sector**	**Private & Voluntary**	**Total**
Current (No Action)	0.0	0.0	0.0	0.0
One-off Benefits	0.0	0.0	0.0	0.0
Annual Benefits	0.0	0.0	36.9	36.9
Non-monetary benefits	Carbon savings			
Annual Costs				
Current (No Action)	0.0	0.0	0.0	0.0
New Administrative	0.0	0.0	0.0	0.0
New Policy	0.0	5.7	0.0	5.7
New Annual Costs	0.0	0.0	108	108
Non-monetary costs				
Annual Regulatory Benefit (in brackets if negative)			£m p.a.	(76.9)
One-off Costs				
New Administrative	0.0	0.5	0.0	0.5
New Policy	0.0	2.0	0.0	2.0
New Transitional Costs	0.0	0.0	0.0	0.0

Article 7(3) – Certificates for Public Display

(3) Member States shall take measures to ensure that for buildings with a total useful floor area over 1,000m² occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public.

The range of recommended and current indoor temperatures and, when appropriate, other relevant climatic factors may also be clearly displayed.

117 This is being interpreted as buildings with a total useful floor area over 1,000m² where the occupier is a public authority or an institution which provides public services to a large number of persons and is frequently visited by members of the public.

118 Government is committed to widening the display requirement to all public and private sector buildings where it can be demonstrated this is cost-effective to do so i.e. going beyond the scope of the Directive. However, a further public consultation on this issue is proposed and therefore a further RIA will be produced to consider the implications.

Options 3 and 4

119 There are two ways of assessing energy performance, one based on the Asset Rating which is calculated from a software model of the building to estimate its energy use for a standardised occupancy pattern and the second is based on the Operational (or Measured) Rating (OR) which uses actual energy use to calculate a CO_2 emission per m² of floor area which can then be compared with ratings from other similar buildings.

120 The Asset Rating approach is more valid for buildings which are constructed, sold or rented out as it is the intrinsic properties of the buildings that are important rather than the actual energy used by the current occupant (which may vary due to intensity of use, occupancy periods, equipment use etc). It is for this reason that the Asset Rating excludes energy used by computers, display lighting etc.

121 In contrast, the OR is more appropriate for producing certificates for display in public buildings for which control of actual energy use on an annual basis is more important. An OR shows in-use performance and is derived from actual energy consumption, and so enables an assessment of whether an occupier is using a building efficiently. ORs are lower cost to produce as they require only a knowledge of the annual electricity and fuel use, the floor area and the category of building. The Display Energy Certificate will include information to show how the building performance compares to the median of buildings of a similar type. It would also show the rating for the previous two (or more) years.

122 In **Option 3** the requirement would be to allow either rating option and for the Display Energy Certificate to have a validity of up to 10 years. In **Option 4** there is a specific requirement to adopt ORs for the display certificate and to produce the Display Energy Certificate with an energy rating on an annual basis to sustain good energy management.

123 In addition to the Display Energy Certificate there is a need for a list of cost-effective measures to be produced and hence a site survey will be required even though the list of measures will be taken from a generic list as for the Article 7(1) transactions. For **Option 3** this survey and recommendations would be carried out initially and then every 10 years. For **Option 4** it is considered that every 7 years would be a more suitable interval to encourage a regular review of potential investments in energy efficiency measures.

Costs

124 The numbers of public sector buildings are known and so the total cost for each Option has been estimated accordingly.

Benefits

125 The benefits are expected to come from two areas: firstly, improved energy management, i.e. not involving significant investment, as a result of the discipline of obtaining annual energy data and calculating a rating as well as the added pressure from the requirement to display a Display Energy Certificate to the public and, secondly, an increase in uptake of energy efficiency measures recommended with the certificate. Whilst the public sector scope for investment is constrained by budgets, the availability of a Display Energy Certificate with specific advice may assist in prioritising budgets and hence obtaining funding for energy improvements that would not otherwise have gone ahead.

125 The benefits from Option 4 are much higher than for Option 3 as the certificate is produced annually and the improvements from better energy management are therefore more likely to be maintained.

127 The assumptions on energy savings in the model are:

- For Option 3, 20% of buildings adopt the recommendations for improved energy management and achieve a reduction of 5% in energy use from current levels as a result of this in Years 1 and 11 of the RIA period.

- For Option 4, 20% of buildings adopt the recommendations for improved energy management and achieve a reduction of 5% in energy in every year of the RIA period.

128 The assumption is equivalent to achieving a 1% reduction in energy use for all public buildings. Typically, introducing an energy management regime with regular monitoring and targeting will produce much greater savings than 1%.

129 No benefit is assumed to arise from investments in energy efficiency measures as these are unlikely to be triggered directly by Display Energy Certificates but are dependent on Government funding streams. Hence costs are limited to the cost of producing the OR based certificates.

130 Table 14 summarises the costs and benefits for Display Energy Certificate for public buildings. More detail on the model and assumptions are given in Annex C.

Table 14 – Costs and benefits arising from Article 7(3) in the public sector

	Units	**Option 3**	**Option 4**
NPV of costs of EPC	£m	110	275
NPV of energy benefits (management)	£m	154	776
Net cost of EPCs (Present Value basis)	£m	-44	-501
Estimate of carbon saved	m tonnes C	0.47	3.03
Cost per tonne of carbon saved	£/tonne	n/a (net benefit)	n/a (net benefit)
Carbon saved in 2020	m tonnes C p.a.	0.036	0.233

Article 8 – Boilers

With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall either:

a) lay down the necessary measures to establish a regular inspection of boilers fired by non-renewable liquid or solid fuel of an effective rated output of 20 kW to 100 kW. Such inspection may also be applied to boilers using other fuels.

Boilers of an effective rated output of more than 100 kW shall be inspected at least every two years. For gas boilers, this period may be extended to four years.

For heating installations with boilers of an effective rated output of more than 20 kW which are older than 15 years, Member States shall lay down the necessary measures to establish a one-off inspection of the whole heating installation. On the basis of this inspection, which shall include an assessment of the boiler efficiency and the boiler sizing compared to the heating requirements of the building, the experts shall provide advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions; or

b) take steps to ensure the provision of advice to the users on the replacement of boilers, other modifications to the heating system and on alternative solutions which may include inspections to assess the efficiency and appropriate size of the boiler. The overall impact of this approach should be broadly equivalent to that arising from the provisions set out in (a). Member States that choose this option shall submit a report on the equivalence of their approach to the Commission every two years.

131 The Directive offers two routes to compliance a) a programme of mandatory inspections for boilers and heating systems and for boilers over 15 years old a one-off whole system inspection and b) a programme of advice which may include inspections. Option b) must be shown to be as effective as option a) in a report to the Commission every two years i.e. by 4 Jan 2008.

132 Because of the substantial differences between the two sectors, domestic and non-domestic boilers have been considered separately. For example, in the non-domestic sector the vast majority of boilers are already subject to a service visit for maintenance, safety and/or insurance checks. Overall though, it is proposed to implement option b) provision of advice as this affords greater flexibility and substantially greater carbon savings. Direct advice to owners will be provided for all boilers where an annual service or maintenance visit is being carried out. This will be supplemented by advice campaigns.

133 For **Option 3** (i.e. Article 8a) the area of advice will cover replacement of boilers and adjustments. **Option 4** (i.e. Article 8b) will additionally include behavioural advice on the use of heating controls in the domestic sector.

134 In order to assess the costs and benefits arising from implementation of Article 8a number of key assumptions are required:

- For Article 8a where boilers <100kW the Directive requires 'regular' inspection of solid and oil-fired boilers so it has been assumed that this will be every 5 years which is consistent with the inspection periods for boilers >100kW. The Directive does not require gas-fired boilers <100kW to be inspected.

- Savings from boiler adjustments have been included, although these are small overall (particularly for gas-fired boilers) because these have been assumed only to be realised from boilers not already subject to an existing service visit.

- Where boilers are replaced early this has been assumed to be 5 years, and this will only be in a small proportion of cases (typically 1%) – the cost of replacing a boiler earlier than normal has been included.

- Where behavioural guidance on heating controls is provided it is assumed that a reasonable (but still fairly small) proportion adopt it (typically 5%)

135 Table 15a provides the costs and benefits for the dwellings sector and Table 15b is for the non-domestic sector. Table 15c shows the combined results.

Table 15a – Costs and benefits from Article 8 for dwellings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	114	970
NPV of energy benefits	£m	14	1055
Net cost of advice	£m	102	-85
Estimate of carbon saved	m tonnes C	0.20	4.94
Cost per tonne of carbon saved	£/tonne	500	Net benefit
Carbon saved in 2020	m tonnes C p.a.	0.026	0.346

Table 15b – Costs and benefits from Article 8 for buildings other than dwellings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	242	107
NPV of energy benefits	£m	240	66
Net cost of advice	£m	2.0	41.4
Estimate of carbon saved	m tonnes C	0.94	0.26
Cost per tonne of carbon saved	£/tonne	2.14	161
Carbon saved in 2020	m tonnes C p.a.	0.063	0.017

Table 15c – Costs and benefits from Article 8 for all buildings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	356	1077
NPV of energy benefits	£m	254	1121
Net cost of advice	£m	104	-43.6
Estimate of carbon saved	m tonnes C	1.14	5.20
Cost per tonne of carbon saved	£/tonne	91.2	Net benefit
Carbon saved in 2020	m tonnes C p.a.	0.089	0.363

Tables 15a and 15b highlight the differences between the two sectors as first noted in paragraph 132 above. For non-domestic boilers Option 3 (i.e. Article 8a, a mandatory inspection regime) is the better option both in terms of carbon saved and cost-effectiveness, although it has a higher cost. There is also the problem of the need to undertake a substantial number of heating system inspections which will require a large body of trained consultants. For domestic boilers though, Option 4 (i.e. Article 8b, an advice based approach) is the better approach but it does have the higher cost. Combining the two sets of results indicates that overall Option 4 is the best approach.

As noted in the text for Article 8 above, a Member State implementing the b) option needs to prepare a biennial report for the Commission to demonstrate its equivalent with the a) option. As part of this requirement the Department will review Article 8 implementation and if this shows that Option 3 should be pursued then the necessary inspection procedures will be put into place.

More detail on the model and assumptions are given in Annex D.

Article 9 – Air-conditioning systems

> *(9) With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall lay down the necessary measures to establish a regular inspection of air-conditioning systems of an effective rated output of more than 12 kW.*
>
> *This inspection shall include an assessment of the air-conditioning efficiency and the sizing compared to the cooling requirements of the building. Appropriate advice shall be provided to the users on possible improvement or replacement of the air-conditioning system and on alternative solutions.*

136 Article 9 requires Member States to make requirements for owners of buildings having air-conditioning systems, with a rated output of more than 12 kW of the cooling capacity of the included air-conditioning systems, to carry out regular inspections of their air conditioning plant.

137 This threshold of 12 kW is taken to apply to the total cooling capacity of the system, so that if a building owner or manager has the power to control the temperature of individual air-conditioning units (e.g. in a hotel), then these individual air-conditioning units should be considered components of a single air-conditioning system. This effectively means that smaller air-conditioning units would only be inspected when operating together to form an air-conditioning system of effective rated output of more than 12kW to serve a space or spaces under the control of one owner or operator.

138 Article 9 will require inspection of all systems over the size threshold. Some assessment of the numbers of systems has already been undertaken by BSRIA for the Article 9 working group. For an assessment of the likely costs of implementation see below.

139 There has been no identification of an enhanced implementation route for this Article, hence Option 4 is identical to Option 3.

Costs

140 Based on sales figures for the last ten years, it is possible to estimate the likely number of systems in operation. For smaller systems in particular, the figures give an upper and lower limit, producing a range for the possible costs. It is estimated that the cost of inspection of larger central systems will be approximately £6.5m p.a. The cost for smaller packaged systems is likely to be in the range from £4m to £12m, depending on the precise number of systems which fall within the scope of the requirements. This in turn depends on the number of packaged units which, taken together, form a system for the purposes of certification. The larger cost figure assumes that all packaged units sold in the last ten years are still in use and require individual certificates. Allowing for systems with multiple units under common control, and attrition of older units, it is likely that the cost will fall nearer to the mid point of the range, at £8m.

141 The frequency of inspections is a major factor in determining the costs of compliance. The text of the Directive does not state a frequency however the inspections need to be 'regular'. A typical lifetime for an air-conditioning system is 15 – 20 years. An inspection every 5 years would involve perhaps three inspections over its life. A longer interval of say 7 or 10 years between inspections could result in only one inspection during the life of the equipment which could not be considered to be 'regular'. Hence a five yearly interval is considered to meet the requirements of the Directive without any 'gold-plating', and to be both proportionate and to deliver reasonable benefits. This frequency is supported by the Chartered Institute of Building Services Engineers (CIBSE) and Federation of Environmental Trade Associations (FETA) industry working group.

142 It is proposed that, as far as possible, an inspection of the air conditioning systems in buildings will be incorporated into the routine maintenance arrangements. The national average extra time for the inspection might be around 2 man-days for larger, centralised systems, and up to 2 hours on average for a packaged unit or system of units. For the simplest systems already subject to regular competent maintenance the marginal time for inspection will be even shorter. Some larger systems are already subject to annual inspection to comply with the Pressure Systems Safety Regulations (PSSR). This is also likely to offer a route to combine inspections and further reduce the regulatory burden.

143 Persons accredited by an independent body attracting rates of £35 – £45 per hour gross would be expected to carry out the majority of inspections. So the average additional cost of being obliged to inspect centralised systems every five years will be about £120 per year, and for packaged units about £15 – £20 per year, if it is agreed that inspections should be repeated at five-year intervals.

144 Simplification of inspection procedures to include checklists and template reports will maximise productivity of assessors and also make the best use of available synergies from combining the assessment with other routine maintenance or inspection tasks, including the forthcoming F-Gas regulations and the PSSR inspections of larger systems. In particular, owners of very large systems which support business critical systems, such as chilled or cold storage facilities, already undertake significant continuous monitoring of the health, safety and energy performance of their installations, and this should be reflected in the inspection regime and therefore the additional costs for these operators.

Benefits

145 Regular inspection is expected to raise awareness of efficiency of air-conditioning systems and offer opportunities to improve performance and cut operating costs.

146 An inspection regime is expected to give added impetus to improvements, particularly of older, less efficient systems, and their replacement by more modern energy efficient units. Due to restrictions on replacement of refrigerant in older systems, established under other legislation, there is an added incentive to improve or replace older systems.

147 The principal benefit of air conditioning inspections will arise from the improved efficiency and reduced electricity consumption of existing and new systems. Reduced consumption will arise from improvements to the operation of existing systems and replacement of older, inefficient or oversized systems with new efficient systems.

148 It is not possible to predict how much saving will be due to each of these effects individually. However, it is possible to predict the potential benefits of air conditioning inspections in terms of the overall aggregate reduction in electricity consumption.

149 Although there is limited data on system numbers and sizes, the Defra Market Transformation Programme (MTP) provides the following data for expected energy use:

"Non-domestic and domestic air conditioning currently accounts for approximately 14.4 TWh of energy consumption and is predicted to rise to 19.8 TWh by 2020 as the demand for air conditioned buildings rises. Current levels of penetration of air conditioning in most buildings are still low. In the offices sector around 20% of the total floor area is currently air conditioned and in other sectors the level of penetration is very small. There are therefore very significant opportunities to reduce energy use by new systems as well as refurbishment of existing systems."
MTP Policy Brief, UK Energy Consumption of Air Conditioning systems 27/06/2006

150 Based on the MTP figures, potential electricity, cost and carbon savings from improved energy efficiency of air-conditioning systems due to inspections may be calculated. A 5% average reduction in energy consumption on the 2005 figure would deliver annual savings of £36m. This is considered an entirely reasonable level of saving to assume, however some of the savings will be achieved as a result of low cost measures and some through capital investments in new equipment. It will be achieved by a combination of some very large savings due to the replacement of older systems, and many smaller savings from improved performance of others. It is likely that a significant number of systems will deliver minimal energy savings. We have assumed that 50% of the savings will be obtained through low cost measures and the remaining 50% achieved with zero net present value benefit. This probably underestimates the financial benefits.

151 To calculate the benefits of inspections, an inspection frequency over 5 years is assumed with an initial inspection of systems over 250kW to be undertaken before January 2009. All other systems will be inspected by January 2011. A saving of 5% of 2005 energy consumption is assumed to be achieved from 2009 onwards. This underestimates the benefits if the anticipated increase in energy use predicted by the MTP data occurs.

152 It is further assumed that the saving is worth 7p/kWh, which is the typical current electricity price paid by medium sized commercial organisations[13], and that this price remains constant into the future.

[13] Table 3.4.2 gives 6.96p/kWh for medium sized consumers in Energy Statistics for December 2006, DTI

153 Additional benefits are likely to accrue in the form of improved workplace conditions due to improved performance of air-conditioning systems resulting from inspections.

Table 16 – Costs and benefits from Article 9 – air-conditioning inspections

	Units	**Options 3 and 4**
NPV of costs of inspections	£m	149
NPV of energy benefits	£m	213
Net cost of inspections	£m	-64
Estimate of carbon saved	m tonnes C	0.93
Cost per tonne of carbon saved	£/tonne	Net benefit
Carbon saved in 2020	m tonnes C p.a.	0.08

Lodgement of EPCs

154 It will be a requirement for the EPCs to be lodged in a register for the purposes of record keeping and quality control. If this register is set up appropriately it will also provide a method of assessing compliance and a source for data on which to develop future energy policies. In terms of Article 7(3) the register will enable benchmarks to be updated annually to provide a further incentive building owners to keep pace with their peers.

155 The costs were found to be relatively small and the benefits potentially very significant. Even though the register is not an express requirement of the Directive it is seen as very good value.

156 Costs for the register have been included in the estimates of the costs of EPCs on a per certificate basis. The requirement for a register is assumed to be included only in Option 4.

157 Further details on the proposals, costs and benefits for a register are given in Annex E.

Other impacts

Race equality impact assessment

158 The Home Office checklist for stage 1 screening has been reviewed. This suggests that there is unlikely to be any impact of the introduction of EPCs on racial equality.

Health impact assessment

159 The most significant potential health impacts of EPCs are likely to arise when cost effective measures are implemented and hence improve the internal environment. Plant inspections are likely to improve the performance of boilers and air conditioning systems, with beneficial effects on occupants. It is unlikely that the introduction of EPCs or plant inspection will have a negative impact on health.

Rural considerations

160 An assessment of rural impacts has been carried out using the checklist published by the Countryside Agency[14]. The main impacts identified are:

- The costs of EPCs in rural areas will be higher due to the need for a surveyor to visit the property and therefore incur additional travelling time.

- Agricultural tied premises need special attention in relation to Article 7(1) & (2) and discussions with appropriate Defra officials and stakeholders are in hand.

[14] Rural Proofing – policy makers' checklist – The Countryside Agency, CA35, October 2002

Small Firms Impact Test

161 The potential impact on small firms has been assessed by contacting a number of small and medium enterprises (SMEs) and discussing with them the impact of EPCs. For most small businesses renting the property there will be a benefit in having a better understanding of the energy efficiency of the building allowing comparisons to be made between premises. The small cost will be that associated with the cost incurred by the landlord procuring the EPC assuming this is passed on to the tenant. For small businesses acting as landlords, the impact will be similarly small – a small additional cost but a greater level of awareness of energy use in their buildings and which investments could be cost-effective. Potentially if these investment opportunities were taken up the cost of the EPC would be recovered in most cases.

162 All SMEs will be affected by the regulations whenever they buy or rent a building. They will also be affected if they own or occupy buildings with a heating system or with air conditioning equipment requiring inspection. Based on the figures given below and the responses of those consulted it is considered that the compliance costs for SMEs are reasonable.

Compliance with the Regulations

163 As indicated in Section 5, the cost of producing an Asset Rating for the purposes of an EPC on sale or rent is likely to be in the range of £250 -£500 for small non-domestic premises, and up to £2,000 for larger premises. The majority of SMEs will occupy smaller premises. Given that certificates have a validity of up to 10 years, this represents an annual cost of £25 – £50 for most SMEs. Those occupying large premises will face an annual cost of up to £200.

164 As indicated in Section 7, the costs of compliance with Article 8 for boilers and heating systems is in the region of £5 for the smallest installations, and may reach £50 for the largest SMEs.

165 Those SMEs that have air-conditioning systems will require inspections. For small systems these are likely to cost £80 – £100 and be repeated at least every 5 years. This represents an annual cost of no more then £20. Larger SMEs may face an annualised cost up to £100 pa.

166 Where SMEs occupy buildings which are in multiple occupancy, responsibility for the certification and inspection will fall on the owner, not the SME (unless they own air-conditioning plant requiring inspection, which will be the responsibility of the plant owner or operator). The compliance costs will then be shared between all occupants, reducing the burden on individual SMEs still further.

167 Small non-residential buildings of less than 50m^2 floor area will be exempt.

168 The regulations are unlikely to significantly affect start-up costs for SMEs, except those operating as developers or landlords. In both cases, at least part of the ongoing costs arising would be expected to be passed onto purchasers or tenants as applicable.

Consultations with SMEs

169 A number of consultations have been carried out with SMEs.

170 The 2004 public consultation on the proposed changes to Part L of the building regulations sought views on:

- The proposed changes to Part L
- The proposed methodology for the implementation of Articles 3-6
- Proposed measures for the implementation of Articles 7-10

171 In particular, this consultation sought views on the methodology for producing EPCs. Consultees which represent small businesses included:

Associated Self Build Architects
Association for Environment Conscious Building
Federation of Small Businesses
Small Business Service
Small Business Bureau Ltd.

172 Consultees which represent small businesses within a broader membership included:

British Chamber of Commerce
Confederation of British Industry
Federation of Master Builders.

173 The views of the chairman of a small regionally based property company were obtained. His company has a portfolio of domestic (including tied) properties, as well as offices, small industrial units, and some car showrooms and workshops. His view was that obtaining EPCs was merely one more thing to do as a property manager. He thought that EPCs will create a two-tier market, with good property being labelled as such, and poor property being downgraded. Notably, he suggested that poor energy performance will add to existing problems with asbestos and composite panels, which are attracting significant penalties on fire premiums due to concerns about their fire performance, to render a building obsolete. So it may accelerate redevelopment for the worst cases.

174 He suggested that there is currently a glut of property to rent, and that tenants can be selective. Also, because leases are getting shorter – "5 years is average, 10 years is doing well now" – the pressure on energy performance is likely to increase over time. He was also of the view that new offices will have to have air conditioning to be let. He agreed this is not ideal, but did not think he should make his staff work in an overheated environment, and so they had air-conditioning fitted this year: productivity and staff welfare matters.

175 The owner of a small specialist civil engineering consultancy with small offices was consulted on his view of the likely costs as outlined above. He considered that the figures given were not likely to concern him, as they are trivial compared to the business rates.

176 The Article 8 working group undertook a thorough cost benefit analysis of a range of options, with input from both the boiler industry, who would be required to provide the necessary skilled input to implement the Article, and from building owners and users. An over-riding objective of the group was to recommend procedures that would cost a few pounds per installation, and as far as possible be coupled with existing visits to the installation for service and maintenance.

177 The Article 9 working group was led by CIBSE and FETA. They developed a protocol for air conditioning inspections, and tested the methodology using a small business providing air conditioning maintenance and inspection services. This identified a need for a simpler protocol to cover small systems, which will be more cost effective. The figures above are based on these procedures.

178 We have been in consultation with the DTI Small Business Service throughout this process, and they are content with our approach and findings.

Competition Assessment

179 An assessment has been made of the anticipated effect on competition in the market using the 'competition filter' presented in the Draft OFT Competition Assessment Guideline (26th June 2006). As all companies are required to comply with the regulations whenever they construct, sell, or rent out buildings, it is not foreseen there would generally be any substantial lessening of competition. Particular competition issues would usually only arise in markets stimulated by the introduction of the regulations. The implementation of Articles 7, 9 and 10 all introduce forms of licensing scheme. These restrict entry into the market to those companies employing members of approved certification schemes using approved software as appropriate.

180 *Article 7: New residential buildings* – There is an existing market for SAP assessment of new dwellings. At present only a single organisation operates an accreditation scheme for people to carry out CO_2 emission rate calculations using SAP. SAP itself is available free of charge, while a number of companies sell software to carry out the calculations and some also provide a quality assurance check for input data. There are a limited number of approved software packages currently available.

181 *Article 7: Existing residential buildings* – There is no existing market for RDSAP assessment of existing dwellings. At present there is a single accredited training scheme for the production of EPCs for dwellings with floor area less than 450m^2 using RDSAP. It is unlikely any single company would unfairly dominate the market for RDSAP assessments on a national basis. For dwellings with a floor area greater than 450m^2, it is anticipated EPCs will be produced by a SAP 2005 accredited person.

182 *Article 7: New non-residential buildings* – There is an existing but new market for SBEM (or other approved software) assessment of new non-residential buildings. There are a limited number of approved software packages currently available.

183 *Article 7: Existing non-residential buildings* – There is no existing market for SBEM (or other accredited software) assessment of new non-residential buildings. There are a limited number of approved software packages currently available.

184 *SBEM or accredited software assessments*: These are likely to be carried out by SBEM accredited people, likely to be consulting engineers or energy consultants. There is a single authorised scheme, for companies with individuals certificated for their ability to calculate CO_2 emission rates for buildings using the user interface for the Simplified Building Energy Model (iSBEM).

185 *Article 8:* The approach being taken to Article 8 is to ensure the provision of advice to users on the replacement of boilers, other modifications to the heating system and on alternative solutions. Therefore there is no need to provide suitably qualified inspectors.

186 *Article 9:* There is an existing market for the inspection and servicing of air conditioning equipment. At present, these are carried out by consulting engineers, energy consultants or air conditioning service companies. It is concluded no single consulting engineering company attains a 10% share of the market on a national basis.

187 As a consequence of the particular requirements of Articles 8 and 9, the main industry sectors likely to be influenced indirectly are the heating, air conditioning, lighting, insulation, ventilation, glazing, solar shading, and renewable energy.

Communication

188 The introduction of EPCs will be supported by a significant communications exercise to help obtain the maximum benefit from the new regulations.

189 Effective two-way engagement with stakeholders, where information is transferred and is easily accessible and understood, is critical to the success of the EPBD programme. The programme has identified 36 broad stakeholder groupings. This covers a wide range of people, including homeowners, energy suppliers, social sector landlords and the national media. Engagement with this wide range of people will involve a range of techniques (such as meetings, conferences, websites, advertising campaigns). The different groups will need to be engaged at different times according to which phases they are affected by and whether the communication objectives have been reached.

190 This work requires a complex and dedicated programme of engagement activity. The cost of a communication programme of this size has been estimated to be in the range of £10m, based on Communities and Local Government experience of similar programmes.

191 A budget of £10m is included in the economic models for both Options.

192 Such a programme is complementary to the introduction of EPCs and factored into the benefits identified in this RIA.

Enforcement and Sanctions

193 For EPCs on new construction it is proposed to enforce the regulations through the Building Control system.

194 For EPCs on sale or rent Display Energy Certificates and air-conditioning inspections it is proposed to introduce a civil penalty scheme operated by Trading Standards Officers (TSOs) for non-compliance with the regulations, based on the model of Schedule 8 of the Housing Act 2004.

195 To provide both proportionate and effective sanctions across the non-domestic market it is proposed to link penalties to rateable value. This could be a percentage of rateable value (say 12.5%), subject to a minimum of £500 and a maximum of £5,000.

Costs

196 It is currently anticipated that an additional TSO would need to be employed in each local authority responsible for Trading Standards; in England and Wales there are 171 such authorities.

197 The salary and overhead costs of a TSO is estimated at £50k p.a. Additional administrative and legal support staff time would also be involved at an equivalent cost. The total estimate for enforcement costs is therefore 171 x £100k or £17.1m p.a. The costs are assumed to be allocated in the economic models as two-thirds to dwellings and one third to buildings other than dwellings.

Benefits

198 The benefits of a system of enforcement are firstly the avoidance of infraction proceedings as the Directive requires Member States to ensure that the requirements are met. Secondly, the level of compliance will be higher and as a result there will be a greater level of carbon saving.

199 There may be an element of cost recovery through the penalties imposed however this has not been included at this stage.

200 The compliance levels assumed are detailed in the relevant sections above but are expected to be highest for the private marketed sales of dwellings and the larger commercial transactions where solicitors will be employed and lowest for the private rented sector and small commercial buildings.

Monitoring and evaluation

201 The implementation of the Directive will take place progressively from June 2007 to January 2009. It is proposed that the impact will be monitored and a report produced to evaluate the benefits and assess the costs. It is proposed that this report will be produced approximately two years after implementation.

202 The option in Article 8 of providing advice instead of inspections has been proposed and the Directive requires that a report is produced which shows how the benefits from this option are as effective as the inspection option. This report will also be produced within two years of implementation of Article 8.

203 One of the benefits of introducing EPCs is that other policies could be put in place using the EPC structure as a way of making regulations for requiring additional investment, provision of grants or tax relief for example.

Implementation and Delivery Plan

204 The proposed implementation plan which takes account of the availability of accredited inspectors and aligns where practical with Common Commencement Dates is given in Table 17.

Table 17 – Proposed Implementation Plan

Coming into force date	Element to come into force
19 April 2007	No sectors, but establishment in law of necessary enabling activities – National Calculation Methodology, certificate design, qualification and accreditation regime etc.
1 June 2007	EPCs required for the marketed sales (and leaseholds) of existing dwellings Exclude HIP sales built to Part L 2006 (until 1st October 2007)
1 October 2007	EPCs required on construction – all dwellings. EPCs on HIP sales built to Part L 2006.
6 April 2008	EPCs for sale or rental of non-dwellings > 500 m^2 EPCs for construction for all non-dwellings Display certificates for all public buildings >1,000 m^2
1 October 2008	EPCs for rental of all dwellings. EPCs required for all remaining sales and leaseholds of dwellings (including non-HIPs marketed sales and all non-marketed sales). EPCs for sale or rental of all remaining non-dwellings
4 January 2009	First inspection of all existing air conditioning systems > 250 kW **
4 January 2011	First inspection of all existing air conditioning systems> 12 kW **

** regime of air conditioning inspections required to be established by Jan 2009 – inspections expected to commence from Jan 2008 as numbers of accredited inspectors become available

Conclusions and Recommendation

Definition of Options

The Options assessed in this RIA are:

- Option 1 is the 'do-nothing' option which would incur infraction proceedings.
- Option 2 is a voluntary approach which would also not comply with the Directive.
- Option 3 is a strict interpretation of the Directive
- Option 4 is the recommended set of implementation policies which was found to deliver additional carbon savings and lower costs.

The detailed assumptions of Options 3 and 4 are given in the body of the RIA however a summary of these assumptions is given in Table 18 below.

Table 18 – Comparison of Options 3 and 4 and summary of costs and benefits

Strict Interpretation Option 3 in RIA	**Current Implementation Plan Option 4 in RIA**	**Costs**	**Benefits**	**Recommendation**
Calculation methodology for EPCs based on RdSAP and SBEM (reduced data input required)	Calculation methodology for EPCs based on RDSAP and SBEM (reduced data input required)	RDSAP approach reduces costs for producing EPC by limiting number of data entry points and hence time needed for survey	Shorter time on site, lower costs	Overall the cost saving is significant and outweighs slight loss of accuracy and the use of RDSAP is recommended (see para 32 and Annex A)
Assessors to be qualified and/or accredited	Assessors to be accredited which in turn calls for suitable qualification or equivalence to be demonstrated Accreditation to include potential CRB checks for Domestic Energy Assessors (DEAs)	Additional costs required for setting up accreditation schemes, but this cost is relatively small in the context of the production of EPCs	Greater confidence in assessors, improved quality control, fit & proper issues resolved	Accreditation route and basic CRB checks for DEAs is recommended (see para 16)
EPCs to be accompanied by recommendations for cost-effective improvements	EPCs to be accompanied by behavioural advice and advice about renewable technologies in addition to recommendations for cost effective improvement	Costs for producing behavioural advice and renewable energy technologies are negligible as can be generated by software	Additional energy cost savings to occupiers amount to £786m, some additional carbon savings obtained	Behavioural advice and advice on renewable technologies should accompany certificate

Strict Interpretation Option 3 in RIA	**Current Implementation Plan Option 4 in RIA**	**Costs**	**Benefits**	**Recommendation**
EPCs to have validity of up to 10 years	New EPC when residential property is first marketed	Additional cost for Option 4 is estimated at £360m as more EPCs will be required	Certificate will have more credibility leading to greater take-up of measures, additional savings in EEC promotional costs and lower energy costs from behaviour. Estimated marginal cost £113/tonne C falling to £44/tonne C under some sensitivity scenarios	New EPC recommended as marginal cost of £114/tonne C is close to social cost of carbon (£94/tonne C)
Asset Ratings on Construction, Sale or Rent Asset or Operational Ratings for display	Operational Ratings (OR) for display – with energy rating every year and recommendations every 7 years	Higher costs as EPCs will be produced every year and recommendations every 7 years, Option 4 is £165m more costly	ORs produced each year will provide an incentive for energy management, leading to additional energy cost savings of £622m which exceed the additional cost, Recommendations every 7 years allows for measures to be reviewed against updated energy prices and technologies. Shows leadership and commitment by Government	OR type EPCs for display, to be produced each year, are recommended (see paras 117-170 and Annex C)
No lodgement of EPCs	Lodgement of EPCs in central register	Cost estimated at £1.50 per certificate (for dwellings)	Greater knowledge of energy performance of buildings to inform future policy, ability to control quality, EPCs can be reproduced	Benefits considered to outweigh costs (see Annex E)
Mandatory inspection or provision of advice for oil and solid fuel boilers over 20kW and gas boilers over 100kW	Provision of advice for all boilers	Higher cost as advice provided for all boilers	Benefits outweigh higher costs and there are additional carbon savings	Advice route is preferred because of greater overall carbon savings and is less onerous. Situation is to be kept under review, particularly with regard to non-domestic boilers. (See Annex D)

Strict Interpretation Option 3 in RIA	Current Implementation Plan Option 4 in RIA	Costs	Benefits	Recommendation
Inspection of air-conditioning systems over 12kW every 5 years	Inspection of air-conditioning systems over 12kW every 5 years	Directive does not specify period for regular inspections	5 years is considered optimum balance of costs and benefits	5 yearly frequency recommended
Exemptions as EPBD Article 4(3)	Exemptions as EPBD Article 4(3)	No additional costs	No reason to exclude EPCs for historic buildings but recognise constraints in making energy efficiency improvements	Exemptions to be taken up apart from residential buildings intended to be used less than 4 months of the year, dwellings under 50m^2 and historic buildings
Enforcement	Enforcement	£17.1m p.a. included – must do to avoid infraction	Benefits – compliance and carbon savings will be higher	Recommend light touch enforcing on basis of complaints and where appropriate checks
Communications campaign	Communications campaign	A cost of £10m included	Greater awareness of programme resulting in higher compliance levels and greater benefits	Communications campaign recommended for inclusion

Conclusions of cost benefit analysis

205 The costs and benefits are given in the sections above for each element of the Directive and expressed in Net Present Value terms for the period 2008 to 2020 (13 years). Given that the Directive is to be implemented as a whole and that it is in some cases difficult to separate out which part of the Directive will result in given benefits and costs it is also useful to present the costs and benefits of the whole of Articles 7-10 of the Directive.

206 The total costs and benefits for Articles 7 and 10 have been presented in two ways: as Net Present Values and total carbon savings in Table 19 and, in addition, in Table 20, the figures have been converted to average annual costs by dividing by 13 years (2008 to 2020). In these tables costs are shown as positive numbers. The total annual carbon saving estimated to occur in 2020 has also been provided.

207 It can be seen from Table 19 that Option 4 is preferred as it has lower net costs and higher carbon savings. Taking the Directive as a whole there is a net cost of £1,110m however the carbon saved is estimated at 39.1m tonnes which results in a cost per tonne of carbon saved of £28/tonne which is well below the central social cost of carbon of £94/tonne.

208 The benefits presented in Tables 19 and 20 do not reflect a number of other qualitative benefits of introducing EPCs including:

- Increasing an awareness of the need for energy efficiency across business and the general public
- Creating a platform for energy performance measurement on which future incentive mechanisms could be based

Table 19 – Summary of costs and benefits for Articles 7-10 NPV basis

	Units	Option 3	Option 4	Difference	
Net cost for implementation of Articles 7(1) and 7(2) dwellings	£m	1,567	1,051	-516	See Table 5
Net cost for implementation of Articles 7(1) and 7(2) buildings other than dwellings	£m	730	668	-62	See Table 10
Net cost for implementation of Article 7(3)	£m	-44	-501	-457	See Table 14
Net cost for implementation of Article 8	£m	104	-43.6	-147.6	See Table 15c
Net cost for implementation of Article 9	£m	-64	-64	0	See Table 16
Net cost for Articles 7-10	**£m**	**2,293**	**1,110**	**-1,183**	
Article 7(1) and 7(2) dwellings – carbon saved	m tonnes C	22.38	25.91	3.53	See Table 5
Article 7(1) and 7(2) non-dwellings – carbon saved	m tonnes C	3.76	4.05	0.30	See Table 10
Article 7(3) – carbon saved	m tonnes C	0.47	3.03	2.56	See Table 14
Article 8 – carbon saved	m tonnes C	1.14	5.2	4.06	See Table 15c
Article 9 – carbon saved	m tonnes C	0.93	0.93	0.0	See Table 16
Total Carbon saved	**m tonnes C**	**28.68**	**39.12**	**10.45**	
Cost per tonne of carbon saved	**£/tonne C**	**79.98**	**28.36**	**positive**	

Table 20 – Summary of costs and benefits for Articles 7-10- annual basis

	Units	Option 3	Option 4	Difference
Average annual net cost for Articles 7(1) and 7(2) dwellings	£m p.a.	120.5	80.8	-39.7
Average annual net cost for Articles 7(1) and 7(2) buildings other than dwellings	£m p.a.	56.2	51.4	-4.8
Average annual net cost for Article 7(3)	£m p.a.	-3.4	-38.5	-35.2
Average annual net cost for Article 8	£m p.a.	8.0	-3.4	-11.4
Average annual net cost for Article 9	£m p.a.	-4.9	-4.9	0.0
Average annual net cost for Articles 7-10	£m p.a.	176.4	85.3	-91
Carbon saved in 2020	m tonnes C p.a.	1.229	1.913	0.68
Cost per tonne of carbon saved	£/tonne C	79.98	28.36	positive

209 The sensitivity analysis considered a range of possible outcomes for Articles 7(1) and 7(2). These together with Articles 7(3), 8 and 9 result in a range of carbon savings for Option 4 in 2020 of between **1.5 and 2.3m tonnes C p.a.**

Recommendation

210 In view of the clear economic benefit and additional carbon saving, Option 4 is recommended as the policy package to be taken forward.

Annex A – Article 7(1) and 7(2) for Dwellings

1 This Annex provides further details relating to the EPC methodology for dwellings, and the costs and benefits associated with the introduction of a requirement for EPCs and associated energy efficiency recommendations.

Assessment Methodology – New dwellings

2 The calculation procedure for assessing the energy performance of new dwellings and generating the EPC is SAP. This uses data from drawings and specifications, plus test data relating to infiltration rates. SAP has already been adopted as the National Calculation Methodology for new dwellings to show compliance with Regulation 17c and Part L of the Building Regulations for England & Wales, pursuant to Article 3 of the EPBD.

3 The rationale for adopting this procedure as the basis for determining the energy rating for the certification under Article 7(1) and 7(2) is:

- It minimises transaction costs for new construction. The data and modelling required for a certificate will already be available to demonstrate compliance with the energy efficiency requirements of the Building Regulations.
- It builds on existing consumer practice for dwellings, in that a requirement to produce SAP ratings has been part of the legislation for new dwellings for many years.
- It is a familiar tool. Many social housing groups already use SAP ratings as a key measure of their housing stock.

Assessment Methodology – Existing dwellings

4 For the provision of EPCs on sale or rental of existing dwellings, the adopted methodology is derived from SAP but uses a reduced data set, and is called Reduced data SAP or RDSAP. It is based on the assumption that data, including dimensions, will have to be generated from a site survey primarily undertaken for this purpose. To take into account the difficulty of determining some factors on site (e.g. wall insulation values) and to reduce the amount of time required for such a site survey, the model makes assumptions about dwellings based on their type and year of construction. Hence RDSAP requires only 50 data inputs, whereas 200 inputs are required for a SAP assessment.

Definition of a unit requiring an EPC

5 Individual dwellings need certificates when constructed, sold or rented out. Where there are multiple dwelling units within a building, self contained units will require an individual EPC. If several units share core facilities, such as kitchens and bathrooms, only one certificate will be required for the whole building. Some houses in multiple occupation (HMOs) will include self-contained dwellings (each requiring its own EPC) and units with shared facilities, for which one certificate will suffice.

6 If a number of dwellings in the same block have identical energy characteristics, an EPC may be based on the assessment of another representative dwelling in the same

block, therefore reducing costs. For multiple dwellings in a single building structure (semi-detached homes, maisonettes, a row of terraced houses), the same approach will apply (e.g. the EPC for a semi-detached house can be used as a representative certificate for the other semi-detached house, provided the building and energy-related features are identical).

Options

7 For each of the dwelling sub-sectors two options have been considered:

- Option 3 – strict interpretation of the Directive
- Option 4 – additional requirements to improve the benefits.

8 The main additional requirements for Option 4 are:

- The provision of behavioural advice as part of the accompanying recommendations report;
- Lodgement of the EPC and associated recommendations report in a national register, to enhance quality assurance and checking and to assist in evaluating the benefits from the legislation and in developing national policy.

9 For private marketed sales, there is a third difference between Option 3 and Option 4, the validity period permitted by the Directive. For Option 3, the EPC has a validity of up to 10 years, the maximum validity period for all other EPCs. For Option 4, the EPC must have been produced in the last 3 months prior to first marketing.

Costs and Benefits

10 The following sections review the costs and benefits associated with the requirement for EPCs for the different dwelling sub-sectors:

- Private Marketed Sales
- Social Housing
- Private Rented Housing
- New Construction
- Other Dwellings.

Private Marketed Sales – Existing dwellings

11 For private marketed sales, the requirement to produce an EPC is allied to the requirement for a Home Information Pack (HIP) which, from 1 June 2007, the homeowner must produce when putting their home up for sale.

12 The HIP must contain an EPC and may also contain a Home Condition Report (HCR). The HCR includes any guarantees and warranties, and requires a suitably qualified building surveyor, termed a Home Inspector, to survey and report on the dwelling. Currently such a survey is usually commissioned on behalf of the prospective buyer and/or the mortgage lender. Through investing in an HCR, the seller is providing information to the prospective buyers, resulting in better informed prospective buyers and a quicker or more certain sale.

13 The cost of an EPC consists of 3 elements:

- Time to travel to and from the property and gather data on site;
- Entering the data and calculating the rating using the approved software (which incorporates the RDSAP model) to produce the EPC and recommendations report; and
- Complying with the accreditation procedures.

14 To comply with the HIP requirements, a home owner may choose to commission a stand alone EPC, prepared by a Domestic Energy Assessor or a Home Inspector, or to commission a HCR which incorporates the EPC. The marginal cost of the EPC may be lower in the latter case.

15 The integration of the EPC with the HIP has three consequences:

- The requirement for EPCs for private marketed sales will be introduced from 1 June 2007, to coincide with the introduction of the HIP requirements;
- The EPC can be produced as a stand alone document, or in conjunction with an HCR;
- For a HIP to be a reliable basis upon which to make a purchasing decision, the EPC must be less than 3 months old at the first point of marketing.

Hence, for **Option 4**, the EPC must also be less than 3 months old when the property is first marketed.

16 The Directive states that an EPC can have a validity of up to 10 years. Therefore, for **Option 3** a new EPC is only required if the existing one is more than 10 years old when the EPC is made available to prospective buyers.

17 If the building owner has chosen to improve the energy efficiency of the dwelling, such that its energy performance would be better than that shown on the certificate, they could choose to have a new EPC to reflect the enhanced rating, but they would not be obliged to do so. In practice, most home owners who had invested in significant energy efficiency measures would wish to have this reflected in the EPC made available to prospective buyers.

Costs

18 With Option 3, the average cost per dwelling for an EPC and recommendations report is expected to be £95.50, see Table A1. This is based on an energy assessor completing four dwellings per day, a rate that was found to be achievable during trials of the process[1]. For Option 4, the cost is marginally higher, at £97 per dwelling, as it is assumed that the EPC will be lodged in a central register. The same register would be used to centrally lodge all dwelling EPCs and, because of the volumes involved, the aggregated cost per EPC is estimated to be only £1.50. The total cost is based on a daily rate, which is assumed to take into account initial training, accreditation (including fit and proper checks) and Continuing Professional Development costs. In addition, a fee is assumed to be payable to the accreditation bodies for their costs in administration and carrying out quality checks.

19 It should be stressed that the above costs are average for an EPC for a privately owned dwelling. Clearly larger and/or more unusual properties will take longer to survey, and more remote properties will incur higher travel costs, with smaller properties in cities involving shorter survey times.

20 The cost of an EPC will be determined by the market, and a standard fee will not be set by Government. Home Inspectors, who are also trained building surveyors, may charge a higher daily rate than Domestic Energy Assessors. However, where they are also producing an HCR, the overall time required by the Home Inspector to produce the EPC is likely to be less than that required to produce a standalone EPC.

21 At present, HCRs are voluntary. However, if, at some future date, the HCR became mandatory, this may have an impact on the average cost of an EPC. In this case, the fee would reflect the extra-over cost compared to the cost of producing an HCR without an EPC.

22 The number of EPCs required is determined by the number of dwellings marketed, and not the number of dwellings sold.

Table A1 Estimated average cost of EPCs for private marketed sales

Option 3				**Option 4**			
Task	Time (days)	Day rate £/day	Cost	Task	Time (days)	Day rate £/day	Cost
Collect data	0.125	£350	£43.75	Collect data	0.125	£350	£43.75
Calculate rating	0.125	£350	£43.75	Calculate rating	0.125	£350	£43.75
Accreditation Bodies			£8.00	Accreditation Bodies			£8.00
Lodgement in register	-	-	N/A	Lodgement in register	-	-	£1.50
Total	0.25	-	£95.50	Total	0.25	-	£97

1 RdSAP Trials – research to inform the RIA, FM Nectar, Communities and Local Government, March 2007

Benefits

23 There are a number benefits associated with the provision of EPCs for private marketed sales:

For the seller:

- The EPC provides a third party evaluation of the energy efficiency of the dwelling which recognises inherently more energy efficient dwellings (e.g. recently constructed or low heat loss dwellings) and those where investment has been made in energy efficiency measures (such as cavity wall insulation). This may result in a quicker sale or a higher selling price for an energy efficient dwelling. For this reason, in time, home owners may choose to invest in improving the energy efficiency of their dwellings, on the basis that the improvement will be acknowledged, even if they choose to sell the property before the cost savings associated with the measures have repaid the capital investment.

- An overview of which features (fabric and services) are energy efficient and which are performing poorly, together with an indication of any cost-effective energy efficiency measures. This raises awareness of energy efficiency and may encourage the sellers, in their role as potential buyers, to consider this information when deciding which property they wish to buy, and how they could improve it.

- Based on the recommendations report and potential energy rating, some sellers may choose to undertake some of the measures and improve the energy rating of their property, reflecting this in an updated EPC prior to the sale.

For the prospective buyer

- An independent evaluation of the energy efficiency of the dwelling which identifies any cost-effective energy efficiency measures. Through the use of standard occupancy patterns (occupant numbers and heating patterns), it will be possible to compare the asset rating of different dwellings and include this as one element in the decision-making process;

- When planning for the purchase, a prospective owner can take into account typical bills for heating, hot water and lighting (running costs for appliances and any standing charges will be additional). Furthermore, the potential owner can consider the likely benefits in terms of reduced running costs resulting from investment in energy efficiency measures and consider options for funding this – additional borrowing or allocation of equity – prior to finalising their financial arrangements for the purchase of the property. A market is expected to develop with lenders using EPCs as a basis for green mortgages.

- Certain measures are only likely to be cost-effective or practical when other works are taking place within a dwelling, e.g. if a suspended floor is lifted (for rewiring or woodworm treatment) this is the ideal time to insulate the floor. Similarly, internal solid wall insulation is best undertaken when other refurbishment works, or as a minimum redecorating, are also planned. Recently moved homeowners are the most likely group to undertake such work and be able to take advantage of the optimum time to install such energy efficiency measures.

24 The assigned benefits assume that a percentage of home owners choose to invest in improving the energy efficiency of their dwellings, as a result of receiving the EPC and recommendations report. To avoid double counting, only investments additional to those driven by other policy instruments have been taken into account. The main RIA report discusses the interaction with the EEC programme.

25 Any benefits which accrue as a result of changes to boilers (upgrading before life expired) have not been attributed to the EPC, but are instead deemed to be benefits associated with Article 8 of the Directive (advice on boilers).

26 For Option 4, the benefits arising from the inclusion of behavioural advice are also taken into account. Such advice is not a requirement of the Directive. However, this benefit is restricted to savings in electricity costs. Savings in running costs for heating as a result of behavioural advice are allocated to the implementation of Article 8.

27 Although no distinction has been made in the communications/public information costs for Option 3 and Option 4, in the former case, where EPCs of different vintages (up to 10 years apart) are being compared, the public would need an understanding of how to compare them properly. For example, calculated running costs could be based on different unit fuel costs, and measures which are not currently cost effective given their capital costs and the costs of energy, may become so over a 10 year period. Furthermore, if all other HIP documents are current (i.e. less than 3 months old), prospective buyers may need encouragement to view an EPC which is up to 10 years old with the same degree of confidence.

Social Housing – Existing Dwellings

28 The requirement for an EPC for social housing will be triggered by two situations:

- A new tenancy (renewal of a lease by an existing tenant will not require an EPC);
- For large or small scale voluntary transfers of housing stock where property ownership is transferred for sale i.e. not simply gifted, each dwelling included within the sale will require an EPC (this is addressed under "Other Dwellings" paras 56-61).

29 As noted earlier, social landlords are subject to a range of policy drivers which encourage them to improve energy efficiency and reduce running costs for tenants: alleviation of fuel poverty; Home Energy Conservation Act targets; Decent Homes standard; Welsh Housing Quality Standard etc. As such, the introduction of EPCs is not expected to significantly increase investment in energy efficiency measures, and indeed may reduce available funds. It is therefore important that steps are taken to reduce compliance costs.

Costs – Local Authority Landlords

30 As before, the costs of the EPC are

- Time to travel to and from the property and gather data on site;
- Entering the data and calculating the rating using the approved software (which incorporates the RdSAP model) to produce the EPC and recommendations report;

- Complying with the accreditation procedures.

31 For Local Authority (LA) dwellings, there are opportunities for lower costs per EPC than for private marketed sales:

- The sector is characterised by having many similar properties – large estates of detached, semi-detached and terraced houses; maisonettes; and blocks of flats. This has the advantage that there is a greater potential for the use of common values and for certificates based on representative dwellings. Examples of common values are building age and type, floor dimensions, and boiler type. Where these apply, the time to gather the data and to produce individual EPCs can be significantly reduced

- Dwellings are co-located on the same estates, thus travel time can be reduced

- There are other reasons to visit a dwelling, and hence data gathering for the RDSAP model can be combined with data gathering for other reasons

- The Local Authority may already hold some core data centrally e.g. boiler make and model, on an asset register and details of which properties have had cavity fill insulation and when. This could increase the productivity of the assessor

- The accreditation requirements which will be put in place will ensure that in-house staff assessing buildings owned by their employers (or staff of contracted service providers) operate in an acceptably independent manner, and hence these individuals may be permitted to become energy assessors

- In Wales, the energy rating associated with the EPC will be accepted as demonstrating the SAP rating in respect of the Welsh Housing Quality Standard.

Thus the average cost per EPC is assumed to be £38 – £40, see Table A2.

32 However, where a SAP assessment for a dwelling was produced in the past, it will not be possible to use this to generate the EPC and instead an RDSAP-based EPC will need to be produced to ensure consistency and compliance with the Directive although if the data for the SAP rating still existed it could be used to calculate the RDSAP based EPC.

Table A2 Estimated average cost of EPCs for Local Authority owned dwellings

Option 3				**Option 4**			
Task	Time (days)	Day rate £/day	Cost Cost	Task	Time (days)	Day rate £/day	Cost
Collect data	0.05	£250	£12.50	Collect data	0.05	£250	£12.50
Calculate rating	0.05	£350	£17.50	Calculate rating	0.05	£350	£17.50
Accreditation Bodies			£8.00	Accreditation Bodies			£8.00
Lodgement in register	-	-	N/A	Lodgement in register	-	-	£1.50
Total	0.10	-	£38.00	Total	0.10	-	£39.50

33 Local Authority landlords are concerned that, unlike stock condition surveys, they are unable to adopt a sampling approach, and they will need an EPC for each eligible property. They are also concerned about a number of additional associated costs that they could incur:

- Training for Housing Managers to enable them to address tenant queries (e.g. how their individual fuel bills compare to those reported on the EPC and raised expectations that cost effective improvements will be implemented in the short-term)
- Training costs and fit and proper checks for in-house energy assessors (as required for Home Inspectors)
- Changes to in-house databases to enable maximum use from the collected data when planning capital works and maintenance programmes
- Loss of rent if an EPC cannot be obtained in time.

34 The issue relating to loss of rent is that some landlords believe that the best time for them to inspect a property and produce an EPC is when it is void between tenancies. However, if the landlord waits until this time before procuring the EPC and then offers the dwelling to prospective tenants, there will be a period during which they are receiving no rent. This is best overcome through obtaining a bank of EPCs (e.g. producing certificates for a whole estate at a time) as they have a 10 year validity period. This approach will reduce the cost per EPC, but will result in greater initial expenditure.

Benefits – Local Authority Landlords

35 A number of benefits are seen to arise as a result of the requirement to produce EPCs for local authority owned dwellings:

- The landlord will have information about the absolute and relative performance of the stock (for those dwellings with EPCs), allowing better targeting of the available energy improvement programme funds, and benefits in terms of reducing fuel poverty;
- The landlord may decide to invest in additional measures when improving individual dwellings, if these are demonstrated by the EPC to be cost-effective;
- For Option 4, the provision of behavioural advice to tenants on no cost actions that they can take to avoid wasting energy and to reduce bills.

Costs – Residential Social Landlords

36 For Residential Social Landlords (RSLs), who are mostly Housing Associations, there may be more limited opportunities to take advantage of the same per dwelling cost reductions as Local Authority landlords. This is because:

- Many RSLs own less than 250 dwellings and so are unlikely to use in-house energy assessors;
- They may have fewer properties within a given locality, generally increasing travelling time;

37 Thus the costs for RSLs are assumed to be on average £90 – £91 per dwelling, see Table A3.

38 Some of the Local Authority landlords' concerns about additional costs over and above the production of individual EPCs are shared by RSLs.

Table A3 Estimated average cost of EPCs for social housing owned by RSLs

Option 3				**Option 4**			
Task	Time (days)	Day rate £/day	Cost	Task	Time (days)	Day rate £/day	Cost
Collect data	0.125	£300	£37.50	Collect data	0.125	£300	£37.50
Calculate rating	0.125	£350	£43.75	Calculate rating	0.125	£350	£43.75
Accreditation Bodies			£8.00	Accreditation Bodies			£8.00
Lodgement in register	-	-	N/A	Lodgement in register	-	-	£1.50
Total	0.25	-	£89.25	Total	0.25	-	£90.75

Benefits – Residential Social Landlords

39 The benefits to RSLs will be similar to those for Local Authorities. Indeed, landlords with smaller portfolios may not previously have had access to information about cost-effective energy improvements.

Private Rented Sector – Existing Dwellings

40 The requirement for an EPC for private rented housing will be triggered by a new tenancy (as for the social sector, renewal of a lease by an existing tenant will not require an EPC). Turnover rates in the Private Rented Sector (PRS) are high, the average tenancy period is less than 2 years, and many tenants have only a 6 month contract. So a private sector landlord is likely to wish to have an EPC for a dwelling in case the tenant does not renew their lease, to avoid any loss of rent associated with an empty dwelling. Thus implementation in this sector is likely to result in a 'bow wave' of demand for EPCs.

41 The certificate and recommendations report will have a validity of up to 10 years. If a landlord upgrades the energy efficiency of their property, they are likely to wish to have a new EPC, both to reflect the higher rating, and so that the cost effective potential measures which have already been implemented are no longer identified to tenants.

42 Property in the PRS is characterised particularly by:

- Concerns that investments by landlords potentially lead to savings for the tenants, without a means to recoup the investment. As such, landlords are often reluctant to make these investments

- Often poor energy performance. A high percentage of properties are pre-1919, and have solid walls making it difficult to insulate them cost effectively

- Many landlords own just a few investment properties, rather than managing a significant portfolio which constitute their principal income. In many cases, rental income is close to the outgoings, and the return on investment is principally through an increase in the asset value.

Benefits to landlords

43 The benefits to landlords associated with the introduction of EPCs are:

- A tenant will have sufficient information to take into account typical running costs for standard occupancy, as well as any difference in rent, when deciding which property to choose. If one property is more energy efficient than another, the landlord has the potential to charge a higher rent for the energy efficient dwelling. Conversely, properties with a poor energy efficiency standard may take longer to rent out, and/or rents may need to be lowered. Furthermore, landlords may be incentivised to invest in upgrading the energy efficiency of their properties, supported by the Landlord's Energy Saving Allowance (LESA) scheme. In larger properties, obtaining a new tenant for a dwelling a month earlier may immediately pay for the investment measures

- Landlords will have information on cost effective energy saving measures

- Properly heated and ventilated properties are likely to result in healthier indoor environments and reduced maintenance costs.

Benefits to tenants

44 The benefits to tenants associated with the introduction of EPCs are:

- The prospective tenant will have information on typical energy running costs (heating, hot water and lighting) for consideration at the same time as rental payments, although for some the extent of their choice between properties may be very limited

- The tenant will be informed about steps they can take to reduce energy wastage and lower their energy bills

- The tenant (prospective or actual) will know what information the landlord has been provided with regarding cost effective improvement measures and may apply pressure to have them implemented.

Costs

45 For some private sector landlords, the cost of an EPC will be very similar to that for a private marketed sale, and this has been assumed generally to apply (see Table A1). The costs have to be seen in the context of an EPC with a validity of up to 10 years.

46 For landlords with extensive portfolios, there may be the opportunity to invest in training an in-house energy assessor and to benefit from economies of scale.

47 It is also recognised that in some sectors there may be a maximum rent level which is affordable to tenants, which could limit opportunities for obtaining a return on an investment in energy efficiency.

48 This sector is likely to have the lowest rates of compliance, because:

- Landlords may not be aware of their obligations to make available an EPC to prospective tenants
- It is not a requirement to have a written contract, and tenants may not be aware of their right to see a copy of the EPC
- Solicitors/conveyancers may not be involved (in contrast, with private marketed sales, these people may be assumed to alert potential purchasers to the need to receive the EPC from the building owner)
- The high turnover rate of tenants, and hence high incidence of needing to provide copy certificates
- Landlords may be anxious not to lose rent – a void period could be incurred as a result of not being able to market a property until there is a valid EPC
- Accordingly, a 90% rate of compliance has been assumed in this sector.

New Construction

49 The EPC for newly constructed dwellings will need to reflect the "as built" energy efficiency. It can be produced for a relatively low cost (£28 – £30) because it is based on the same SAP calculations that are required to be submitted to Building Control to demonstrate compliance with Part L of the Building Regulations and, as a result, a site survey to collect data is not required (see Table A4). Accordingly, only limited additional training will be required for an existing SAP assessor to become a SAP energy assessor under the terms of the National Occupational Standard.

50 As with other sub-sectors, there may be scope for the use of certificates for representative dwellings and/or common values. The costs in Table A4 recognises that many housing developments consist of multiple units with a degree of similarity.

Table A4 Estimated average cost of EPCs for new build dwellings

Option 3				**Option 4**			
Task	Time (days)	Day rate £/day	Cost	Task	Time (days)	Day rate £/day	Cost
Collect data	0.00	£400	£0	Collect data	0.00	£400	£0
Calculate rating	0.05	£400	£20	Calculate rating	0.05	£400	£20
Accreditation Bodies			£8	Accreditation Bodies			£8
Lodgement in register	-	-	£0	Lodgement in register	-	-	£1.50
Total	0.05	-	£28	Total	0.05	-	£29.50

Benefits – for the developer

51 It is not possible to produce an EPC until after completion of construction when the SAP model can be verified against as-built information. However, a predictive assessment can be provided in advance of construction to inform the market for off-plan sales.

52 The standards for new build dwellings will be driven mainly by Part L of the Building Regulations, the Code for Sustainable Homes and any local planning requirements.

53 However, there will be two benefits from carrying out a predictive assessment for an EPC:

- To determine the anticipated EPC rating; if the rating is borderline between two grades, the developer may wish to add measures to ensure the higher grade is obtained and the property can be marketed accordingly;

- To check if there are any additional cost effective measures not currently adopted, as this is the best time in a building's life to incorporate them.

Benefits for prospective buyers

54 The benefit for prospective buyers is the ability to compare the energy performance of different dwellings on a common basis. New build dwellings will generally be much more energy efficient than most older existing dwellings and the provision of an EPC for both will emphasise this difference. In the case of Option 4, there is also a benefit of behavioural advice to reduce energy consumption.

55 Where an EPC has been provided "on construction" its validity for resale will be the same as that for any private marketed sale (3 months for Option 4 or 10 years for Option 3). However, if the dwelling is subsequently rented out, the EPC is valid for up to 10 years.

Other Dwellings

56 There are a number of additional circumstances where an EPC will be required:

- Stock transfer

- Right to buy / Right to Acquire

- First share of shared ownership

- Transfer of freehold

- Sale for demolition

- Combined dwelling and commercial premises

Stock transfer

57 Large or small scale voluntary transfers of housing stock involve a change of ownership (transfer of housing stock from a Local Authority to one or more RSLs or a PFI contractor), but not a change of tenancy. In Wales, a transfer would be to a Community Mutual (owned by the tenants). A single transfer typically involves a large number of dwellings, say several thousand.

58 Where such transfers are sales and not simply gifted each dwelling included within the sale will require an EPC. The requirement for individual certificates would add to the costs of the transfer and be a cause for concern where the transfer costs have

already been agreed. Furthermore the need to produce such a large number of certificates within a small space of time where a transfer date has already been agreed could cause a problem in terms of the availability of inspectors.

59 The HIP requirements do not apply, and so, for dwellings where an EPC has already been produced for the tenants, these can be used. Use of existing data and/or common values and certificates based on representative dwellings will be essential to reduce the cost per unit (enabling faster EPC production). In some cases, the required data may be able to be gathered as part of a Stock Condition Survey through extending its scope and making the maximum use of centrally held records such as heating system asset registers. This would reduce costs significantly.

60 If the transfer of ownership leads to the release of funds to improve the energy efficiency of the stock, replacement certificates would be desirable once the improvement works had been carried out when there is a change of tenant. In this case, if an inspector had access to the original dataset, for example they had produced the original EPCs, they could create new certificates for relatively little time, effort and cost.

61 The costs for stock transfer EPCs are deemed to be included in the cost model as all Local Authority dwellings are assumed to have an EPC produced in the first 3 years of the legislation, and these costs would be equally valid for stock transfer as for renting out.

Right to buy / Right to acquire

62 An EPC must be available for the prospective buyer at Section 125 notice stage i.e. part of the information that landlords have to give tenants whose claim to the Right to Buy (RTB) has been accepted, even if the tenant decides not to buy. These policies apply equally to applications for Right to Acquire, Social HomeBuy or similar schemes.

63 If an EPC already exists for the property because it has been previously issued to the tenant and it is still valid (i.e. less than 10 years old), then it can be used.

64 Typically, the cost to produce EPCs for dwellings which are not subsequently sold, as well as those that are, will be deducted from the capital receipts transferred to the Treasury. So this requirement would not impose an additional burden on social landlords.

65 The cost model includes the costs for EPCs for RTB as in all social housing sectors we have assumed that EPCs for all dwellings will be obtained in the first 3 years after legislation is introduced.

Shared ownership

66 Sales of single properties on shared equity terms, either by an RSL or by a developer, to individual purchasers will require an EPC. Subsequent purchase of a larger share of equity will not trigger the requirement for an EPC. If the RSL/developer sells their equity share, the requirements for a private marketed sale will apply.

Non-marketed sale of a dwelling

67 An EPC is required for a non-marketed sale and must be provided to the buyer prior to completion of the sale.

68 A part-exchange as part of a house sale is similar to a non-marketed sale. There is no requirement for a HIP as the dwelling is not marketed but nevertheless, an EPC must be provided to the buyer.

69 A self-build property will also require an EPC to be produced.

Accommodation provided by an employer

70 For accommodation provided by the employer, for example a pub manager or warden in student accommodation, the requirement for an EPC will apply when the building is constructed or sold. When it is rented out, the requirement will depend whether or not the tenant pays rent. If the tenant pays rent, the building owner should provide an EPC when the dwelling is let. If the tenant does not pay rent, there is no requirement for a certificate as the building is not being rented out.

Sale for demolition

71 There are some sales for demolition exempted in limited circumstances.

Sitting tenants

72 Dwellings with sitting tenants are not required to have a HIP, as the sale of the dwelling is regarded as a commercial transaction and thus not governed by the Housing Act. Nevertheless, the sale trigger will require an EPC using the RdSAP methodology.

Annex B – Articles 7(1) and 7(2) for Buildings other than Dwellings

Introduction

1 This Annex provides more details on the way in which Article 7(1) and 7(2) will be implemented for buildings other than dwellings and the estimated costs and benefits. The methodology is discussed first followed by sections on existing buildings and new construction.

Methodology

New Buildings

2 A calculation procedure, Simplified Building Energy Model (SBEM) for assessing the energy performance of new buildings other than dwellings has already been adopted as the national calculation methodology for England and Wales pursuant to Article 3 of the EPBD, under The Building and Approved Inspectors (Amendment) Regulations 2006. This procedure is proposed as the basis for certification of buildings other than dwellings under Article 7(1) because it will minimise costs for new construction. The majority of the calculations needed for a certificate will already have been done in order to demonstrate compliance with the energy efficiency requirements of the Building Regulations.

3 The type of certificate will be based on an Asset Rating of the energy performance which is a way of assessing the energy consumption and CO_2 emissions of the building when operated in a standardised way.

4 A mechanism is also required for producing recommendations for cost-effective measures for new buildings. It is reasonable to say that opportunities for cost-effective measures for new buildings are limited, however using the EPC to provide future owners with advice on how to operate the building efficiently would be worthwhile.

Existing Buildings

5 For sale or rental of existing buildings it is proposed to adopt SBEM for certification on sale or rent. An 'Asset Rating' will be produced which reflects the standard of the building's energy efficiency under standardised conditions of occupancy and use.

6 Some simplifications to the SBEM modelling procedures and the provision of additional default values has been carried out to minimise costs.

7 For buildings that are not dwellings, with a common heating system, the whole building can be certified as one. This has the advantage of reducing the total number of certificates required. It also means that owners need to certify their building once every ten years. Responses from the commercial property stakeholders suggests that this will be less onerous, less disruptive to the market and less costly than a mandatory requirement to certify sub-sections of buildings.

8 The trigger for certification of the building should be the sale or rental of the whole or any part of the building, using the definition of a building set out in Regulation 17 of the Building Regulations. This proposal is also supported by stakeholders.

Costs

9 In order to estimate the costs of producing an EPC, trials were carried out on a range of buildings of varying size and type. A separate report records the results of these trials[1]. The time taken varied from 1 day to 4 days for most building types, with a large shopping centre taking 11 days. For the majority of buildings, the cost of an EPC on sale or rent is likely to be in the range of £250-£500 for small premises, up to £2,000 for larger premises.

10 The main influence on costs is not size but complexity. Where there are common services and identical floorplates on each floor, the modelling can be rapid.

11 The spreadsheet model uses data from the Building Research Establishment (BRE) non-domestic building database to establish the numbers of buildings of different types and sizes.

12 To establish the cost incurred in each year of the analysis period (2008 to 2020) it is necessary to determine the number of EPCs required in each year. As the majority of buildings are assumed to be rented rather than sold, data on leases was used to determine the likely number of EPCs to be produced[2]. If an EPC is produced initially for rental then it can subsequently be reused for sale without an additional cost. Hence determining the rental costs will also cover for any future sales.

13 Additional costs will be required for the training, accreditation, quality control and lodgement processes and a cost of £20 to £40 per certificate has been estimated, depending on the size of building.

Benefits

14 Discussions have been held with key stakeholders, including the British Property Foundation (BPF), British Council of Offices, British Retail Consortium and the Investment Property Forum as well as with small business representatives. A specialist working group has been established to consider benefits, as well as issues of landlord tenant relationships.

15 Benefits to owners identified include:

- availability of ratings to meet Corporate Social Responsibility commitments
- access to information about expected energy costs which can be a factor (amongst a number) in a decision to rent or purchase
- access to information about cost-effective energy efficiency improvements

1 SBEM Trials for RIA, FM Nectar, March 2007

2 BPF IPD Annual Lease Review 2006

16 Benefits to tenants will arise because the accompanying list of improvements will provide them with a negotiating opportunity which could either lead to uptake of the recommendations, or reductions in rent to compensate for poor energy performance. Promoting such a dialogue is an advantage in overcoming the barrier to investment caused because the owner invests but the tenant sees the energy savings.

17 In order to quantify the benefits it is necessary to estimate the additional take-up of cost-effective measures as a result of the provision of EPCs. The take-up will be greater than would otherwise be the case because of:

- the provision of information on cost-effective improvements
- the provision of advice on low and no-cost measures (energy management or operational improvements)
- the desire to obtain higher property ratings to obtain a better price in the market
- pressure from tenants

18 The potential for energy efficiency in the non-domestic building sector has been estimated in work carried out for the Existing Buildings Review undertaken by Communities and Local Government. This potential can be divided into three groups of activities as in the table below.

Table B1

Energy efficiency measure	**Cost-effective potential**	**Additional percentage uptake from EPCs Option 3**	**Additional percentage uptake from EPCs Option 4**
	m tonnes C	%	%
Investments in energy efficiency	28.4	10	10
Energy management	2.5	0	5
Equipment management	3.5	0	5
CHP/heat pumps investment	9.2	10	10

19 At present there is lack of data on how the EPCs would contribute to enhanced take-up of these opportunities. We have assumed a range of take-up expressed in a percentage under each of the three categories above. From these percentages it has been possible to determine the lifetime savings in cost and carbon and the annual carbon saving in 2020 after the percentage take-up has been achieved.

20 The percentage take-up of the potential for energy management is relatively small as an Asset Rating approach does not provide a significant driver for operational improvements unlike the Operational Rating approach used for display certificates (see Annex C).

Variant Options Considered

21 Two types of rating have been developed, an Asset Rating approach which is based on a calculation procedure for the building and its services assuming a standardised occupancy pattern and the Operational Rating approach using data from actual energy consumptions obtained from meters.

22 The 2004 public consultation proposed the use of Asset Ratings to deliver EPCs for sale or rent. A majority of respondents supported this proposed approach. Asset Ratings provide a comparable rating system, allowing recipients of EPCs to compare potential investments or tenancies on a like for like basis. Operational Ratings are intrinsically linked to the actual occupancy pattern of the occupant(s) during the period over which the data is collected and also the amount of installed equipment. The variation in these factors means that making comparisons between property would be difficult. Asset Ratings have therefore been adopted as the option for delivering EPCs.

Annex C – Article 7(3) Public Display Certificates

Requirement

1 The full text of the Article 7(3) is:

Article 7(3) – Energy certificates for public buildings
Member States shall take measures to ensure that for buildings with a total useful floor area over 1,000m² occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public.

The range of recommended and current indoor temperatures and, when appropriate, other relevant climatic factors may also be clearly displayed.

2 The objective of Article 7 of the Directive (Energy Performance Certificate) is to encourage the improvement in the energy efficiency of buildings, particularly existing buildings by making performance data available. Article 7(1) is concerned with energy performance certification for buildings when they are constructed, sold or leased. Article 7(2) places some requirements on the content of the certificate which shall include references such as current legal standards and benchmarks, and shall be accompanied by recommendations for cost-effective improvements of the energy performance.

3 Overall, Article 7 can provide a key driver for owners to take action to improve energy efficiency, and the display of temperatures could discourage the profligate use of heating, air-conditioning and ventilation systems.

4 The focus of Article 7(3) is larger buildings (i.e. those with a total useful floor area >1,000m²) occupied by public bodies and public institutions which the Directive suggests (see Recitals 16) should set an example by taking environmental and energy considerations into account, and therefore should be subject to energy certification on a regular basis. Article 7(3), in the same way as Article 7(1), states that certificates should be no more than 10 years old. However, good practice would be to renew them more often to sustain regular and effective energy management.

5 Also of relevance here is Article 10 of the Directive (Independent experts) which states that "Member States shall ensure that the certification of buildings, [and] the drafting of accompanying recommendations ….. are carried out in an independent manner by qualified and/or accredited experts".

6 The display requirement applies to buildings occupied by public authorities and by institutions providing a public service to large numbers of persons. Where the requirement to display applies, the occupier will be obliged to have a building energy survey carried out in advance of the implementation date.

7 For those occupiers of buildings that are obliged to display it is also clear that compliance with the requirements will make it necessary to commission and pay

for more frequent energy surveys and the production of certificates conveying the operational performance. This extra certification could be required on a regular basis at intervals more frequent than the 10 year validity allowed for other buildings.

Options for implementation

8 As a first step there is a need to define clearly what is meant by "buildings… occupied by public authorities and by institutions providing public services" as these are the buildings that are subject to Article 7(3). The term 'public buildings' is used here for convenience. Initially at least, a 'narrow' interpretation is adopted the scope of which will include such public buildings as government offices, schools, hospitals etc., rather than a wider interpretation that could also include retail outlets, hotels etc.

9 The next step is to define the form of the energy performance assessment and associated certificate. The draft CEN standard prEN15217 *Energy performance of buildings – Methods for expressing energy performance and energy certification of buildings* recognises that there are two alternatives for energy certificates which can be used for different purposes:

- The **Asset Rating**, which is a theoretical calculation of the expected energy performance of the building based on a standardised set of activities and subject to a standardised climate i.e. isolated from the way it is used

- An **Operational Rating**, which is based on the measured performance of the building in use.

10 The EPC to be made available at sale or let (Article 7(1)) should be the Asset Rating (AR), since this best informs the purchaser or tenant about the likely performance of the asset being procured. The Operational Rating (OR) or Measured Rating though is a measure of performance that reflects both the energy efficiency potential of the building and the way that it is being operated. Experience shows that a major cause of excessive energy consumption is poor building management, and that the most cost effective energy savings are those no and low cost measures that are the product of improved energy management. **Accordingly, given that the balance of benefits and costs is heavily in favour of the OR, this is the recommended route for implementation for Article 7(3).**

11 Further, public buildings are unlikely to be sold or rented out and an EPC which allows comparison with other properties in the market is less relevant. The intention of this Article is to raise awareness of energy use in the general public and provide additional motivation to the public sector to improve energy performance and energy management of their buildings. However, public authorities may also wish to procure an AR in addition as an aid to understanding energy use within the building and for estimating the benefit of any energy saving investments, but this will not be a statutory requirement. Similarly, the public authority may use the OR approach at a more detailed level if suitable sub-metering is installed but again this is not discussed here as it will not be a statutory requirement.

[1] Measured Rating is the recommended term to be used for this type of certificate according to the draft CEN standards however Operational Rating (OR) is the term used in this RIA.

12 To encourage better energy management, a Display Energy Certificate (DEC) could be required annually. The Directive allows DECs to be valid for up to 10 years and a requirement for a DEC every year could be seen as too onerous. However, the use of the OR approach together with appropriate software should reduce the costs of producing the DEC so that an annual certificate is still cost-effective.

13 As the major concern on energy use is climate change the certificate will be based on the parameter of CO_2 emissions per m^2 of floor area. The grading will then be related to the median level of emissions for other buildings of similar type, derived from previous benchmark surveys. This is in contrast to the AR approach where the grading is related to the emissions of a building built to the 2006 edition of Part L.

14 In the case of a new public building the DEC will need to show the AR on construction until there has been sufficient time of normal occupancy for the energy data to be collected from which an OR certificate can be produced. This may cause some confusion if the OR certificate results in a different grade to the AR. However, it would be necessary to display the AR otherwise Article 7(3) would not be implemented.

15 The technical details on how the OR can be calculated and how the grading scales could be obtained will be detailed in separate Departmental guidance.

16 In addition to the DEC there is a requirement for a list of cost-effective energy efficiency measures to be produced to accompany the certificate. The Directive does not specifically require that the measures themselves need to be publicly displayed. It is proposed that a generic list of measures appropriate for the type of building will be used. The energy assessor will use a tick box approach to tailor the recommendations to the given site, but will not carry out any detailed energy calculations or provide estimates of costs of implementation. Examples of these generic lists are available from Carbon Trust publications and will be made available for downloading from the Communities and Local Government website.

Options 3 and 4

17 In the light of the above discussion there are two options with regard to the implementation of Article 7(3):

Option 3. DEC and list of cost-effective energy efficiency measures (derived from a site survey) to be produced every 10 years

Option 4. DEC to be produced annually and list of cost-effective energy efficiency measures (derived from a site survey) to be produced every 7 years

18 For both options a narrow interpretation will be adopted, the scope of which will include such public buildings as government offices, schools, hospitals etc., and the DEC will take the form of an OR.

19 Specifically for Option 4, the 7-year period for the validity of measures is considered a reasonable interval as in this time measures on the original list should have been implemented or that a review is needed in the light of new technology, changes to energy prices etc.

20 The costs and benefits of Options 3 and 4 have been derived on the basis of these key points.

21 It is likely that once this certification procedure has been properly established the scope of DEC will be extended to include a wider category of buildings accessed by the public, e.g retail outlets, hotels etc. This is not considered further in this RIA and, if it was to be taken forward, would be the subject of another RIA.

Benefits

22 In generic terms the benefits of both Option 3 and 4 will be:

- Economic:
  - Reduction in fuel consumption (and hence cash saving) from improved energy efficiency of buildings following adoption of energy efficiency measures.
  - Possible wider economic benefits including job creation.

- Environmental:
  - Associated reduction in CO_2 emissions

- Social:
  - As noted in Recitals 16 of the Directive, the display of energy certificates in public buildings will result in a greater awareness of the importance of energy use and its environmental impact which may have a positive effect on the implementation of the other parts of the Directive as well as on members of the public.
  - Money saved as a result of better energy management could be used directly for the public services concerned with corresponding social benefits.

23 As discussed above the DECs will include a list of recommended energy efficiency measures which are deemed to be cost-effective. These will range from no and low cost measures such as better management, monitoring and motivation to more extensive and higher cost measures such as replacement heating systems which have the potential to produce significant savings. A very comprehensive list of measures is given in CIBSE Guide F.

24 However, the likelihood is that the focus will be on low and no cost measures for which surveys show that, typically, a 5% improvement in energy efficiency is possible. Further, to avoid any double counting of savings, larger savings from upgrading and/or the replacing boilers and heating systems are addressed in the Article 8 section of this RIA. The DECs can be used in conjunction with inspections and guidance resulting from Article 8 activities to reinforce the benefits arising from upgrading and replacing heating systems.

25 The first step in the assessment is to determine the population of buildings potentially affected by Article 7(3). The cost of implementation and likely energy savings all stem from this. For the purposes of this RIA an approximate estimate is made in order to determine the likely cost and benefit impacts. Analysis of data on the non-domestic building stock held by BRE shows that in total 42,300 buildings (38% of all buildings >1,000m^2, or 2.8% of all buildings) will be captured by the narrow definition.

26 The next step is to determine the likely cash and carbon savings that will result from these buildings adopting the recommended energy efficiency measures. As noted above, the focus of this RIA is low and no cost measures such as improved management, monitoring and motivation so take-up of these measures is likely to be quite high. Based on the aforementioned analysis of the non-domestic building stock a simple energy model of the stock was developed. This was based on the likely percentage of energy savings resulting from adopting these measures multiplied by the typical energy consumption figures for buildings in each of the sectors considered to derive the potential energy savings. Based on typical fuel costs it is also possible to estimate the cash saving produced by energy efficiency measures.

27 Table C1 contains the fossil fuel and electricity consumption data for buildings in each sector as well as the fuel cost and CO_2 emission rates that are used in this RIA.

Table C1 Fuel consumption and cost data used in analysis

Sector	**Electricity[a] (kWh/m^2)**	**Fossil[a] (kWh/m^2)**	**Cost (£/m^2) [Electricity 5p/kWh, Gas 2p/kWh][b]**	**CO_2 emission (kg/m^2) [Electricity 0.43 kg/kWh, Gas 0.19 kg/kWh][c]**
Education	167	75	9.83	85.9
Local Government	189	103	11.50	100.8
Hospital	328	136	19.11	166.8
Health Centre & Surgery	328	136	19.11	166.8
Other Sports & Entertainment	103	119	7.53	66.9
LA Sports Centre	103	119	7.53	66.9
Government Estate	189	103	11.50	100.8

[a] Source: Pout,CH, MacKenzie,F & Bettle,R "Carbon dioxide emissions from non-domestic buildings: 2000 and beyond". BRE Report 442, ISBN 1 86081 545 6, 2002.
[b] Source: Derived from Digest of UK Energy Statistics (DUKES), DTI
[c] Source: Defra website http://www.defra.gov.uk/environment/envrp/gas/05.htm

28 The assumptions on energy savings in the model are:

- For Option 3, 20% of buildings adopt the recommendations for improved energy management and achieve a reduction of 5% in energy use from current levels (as noted above this level of saving can arise from improved monitoring and management) as a result of this in Years 1 and 11 of the RIA period.

- For Option 4, 20% of buildings adopt the recommendations for improved energy management and achieve a reduction of 5% in energy in every year of the RIA period (as noted above annual certification reinforces the message of good energy management and thereby ensures the saving is maintained).

29 Using these assumptions produces the benefits in Table C2:

Table C2. Total benefits arising from implementation of Article 7(3) (2008-2020

	Units	Option 3	Option 4
NPV of energy benefits (management)*	£m	154	776
Estimate of carbon saved	m tonnes C	0.47	3.03

* Cash values discounted to present values using Treasury's 3.5% discount rate

Costs

30 In generic terms the costs of Option 3 and 4 will be:

- Economic:
  - Cost to government to implement the policy, e.g. developing necessary legislation to implement Article 7(3), working in conjunction with relevant sectors of industry, preparing guidance material and dissemination etc.
  - Cost for industry to implement policy, e.g. setting up management information systems (including accreditation scheme to provide advice), training and, where necessary, identifying buildings requiring certification
  - Cost to undertake building certification. Certification costs would be paid for by building owners and/or tenants and would include the cost of enforcement
  - Cost of any installed measures, although the assumption here is that measures are primarily zero cost.

- Environmental:
  - Building certification visits will lead to an increase in transport CO_2 emissions. These have been assessed, but in comparison to the overall CO_2 savings and the other implementation costs, this impact was found to be negligible.

31 As discussed above, the OR approach is designed to involve minimal cost. If good practice is being followed in metering and monitoring of energy expenditure then the energy consumption data should be readily available. The floor area will typically only be calculated once. The process of producing a DEC can be automated and the grading scales would be established nationally. Corrections for weather will be made by adjusting the grading scale rather than the consumption numbers so again that correction will be made nationally to reduce costs.

32 The list of cost-effective measures will be taken from a generic list prepared nationally by Communities and Local Government with the energy assessor simply highlighting those that have not been implemented and could be practical. The OR approach does not involve the use of a computerised building energy model so it will not be possible for the assessor to calculate details of energy savings resulting from individual measures.

33 Accordingly, a cost model has been developed that reflects this proposed form of implementation. Specifically, it is envisaged that the data collection and rating calculation activities could be undertaken fairly quickly and easily by one set of individuals on an annual basis (for Option 4); drawing up the set of energy efficiency measures will take longer and will require consultants with greater experience and expertise, but this will only be undertaken every 7 to 10 years depending on the option. Therefore,

the day rates for the latter set of consultants are likely to be greater than those undertaking the rating calculation. The time taken to carry out surveys in order to produce an OR and to recommend energy efficiency measures has been informed by trial surveys undertaken for producing ARs for office buildings, with the further assumption that such surveys will take longer for the largest buildings, typically several days for buildings with a floor area >10,000m^2.

34 Table C3 below summarises the likely effort and costs to generate ORs and lists of recommended energy efficiency measures.

Table C3 Unit costs to generate ORs and lists of recommended measures for public display certificates

Operational Rating (OR)	**Floor area (m^2)**				
	1,000-2,500	2,500-5,000	5,000-10,000	10,000-50,000	>50,000
OR only (man-days)	1	1.5	1.5	1.5	1.5
OR only (cost)	**£325**	**£475**	**£475**	**£475**	**£475**
OR & measures (man-days)	3	4	4.5	5	5.5
OR & measures (cost)	**£1,125**	**£1,475**	**£1,675**	**£1,875**	**£2,075**

35 On the basis of the number of affected buildings and the above unit costs, Table C4 below summarises the total costs of implementing Article 7(3) through Options 3 and 4.

Table C4 Total costs arising from implementation of Article 7(3) (2008-2020)

	Units	**Option 3**	**Option 4**
NPV of costs of EPC	£m	110	275

* Cash values discounted to present values using Treasury's 3.5% discount rate

Cost-benefit

36 The cost-benefit of implementing Article 7(3) can be derived by comparing the figures in Tables C2 and C4 above. Specifically, the net cost of Article 7.3 EPCs (on a present value basis) is obtained by taking the total cost cash figure from the total benefit cash figure, see Table C5.

Table C5 Cost-benefit arising from implementation of Article 7.3 (2008-2020)

	Units	**Option 3**	**Option 4**
Net cost of EPCs (Present Value basis)*	£m	-44	-501
Cost per tonne of carbon saved	£/tonne	n/a (net benefit)	n/a (net benefit)

* Cash values discounted to present values using Treasury's 3.5% discount rate

37 As Table C5 shows, under this set of assumptions, **the implementation of Article 7(3) is cost-effective for both Option 3 and 4**. For Option 4 the implementation is very cost-effective. Assuming 5% savings can be achieved, the take-up of measures has to fall to about 14% before Option 3 becomes cost-ineffective, and take-up has to fall to 7% before Option 4 becomes cost-ineffective, i.e. 0.35% saving for the whole group of buildings. These calculations do not include consideration of the social cost of carbon.

38 The total cumulative carbon savings for Options 3 and 4 are 0.47 and 3.03 MTonnes respectively, and is particularly large in the case of Option 4 and arises because Article 7.3 targets large buildings where significant savings can be achieved.

Annex D – Article 8 Boilers

Requirement

1 The purpose of Article 8 of the Directive is to improve the energy efficiency of boilers and heating systems. The Commission suggests that there are 10 million boilers in European homes that are more than 20 years old which, if replaced, would save 5% of the energy used for heating, so there is scope for significant savings. The text of Article 8 is given in the box below.

Article 8 – Inspection of boilers
With regard to reducing energy consumption and limiting carbon dioxide emissions, Member States shall either:

(a) lay down the necessary measures to establish a regular inspection of boilers fired by non-renewable liquid or solid fuel of an effective rated output of 20 kW to 100 kW. Such inspection may also be applied to boilers using other fuels.

Boilers of an effective rated output of more than 100 kW shall be inspected at least every two years. For gas boilers, this period may be extended to four years.

For heating installations with boilers of an effective rated output of more than 20 kW which are older than 15 years, Member States shall lay down the necessary measures to establish a one-off inspection of the whole heating installation. On the basis of this inspection, which shall include an assessment of the boiler efficiency and the boiler sizing compared to the heating requirements of the building, the experts shall provide advice to the users on the replacement of the boilers, other modifications to the heating system and on alternative solutions; or

(b) take steps to ensure the provision of advice to the users on the replacement of boilers, other modifications to the heating system and on alternative solutions which may include inspections to assess the efficiency and appropriate size of the boiler. The overall impact of this approach should be broadly equivalent to that arising from the provisions set out in (a). Member States that choose this option shall submit a report on the equivalence of their approach to the Commission every two years.

2 Essentially therefore there are two alternative implementation options for Article 8: (a) compulsory boiler inspection of specified boilers, or (b) provision of energy efficiency advice. However, some aspects of the Article are optional and there are areas of the Article where phrasing of the requirements is open to interpretation.

3 Although the Directive allows two distinct options for implementation there is still considerable overlap between them, e.g. the 'advice' option 8(b) may include inspections. Further, there are differing requirements depending on the output rating and fuel of the boiler. To this end it is helpful to summarise the requirement in tabular form for each of the key building types – see Table D1 overleaf.

Table D1 – Article 8 of the Directive – Boiler/heating system inspection regime

Building and boiler type	**Boiler <20kW**	**20kW<= Boiler <=100kW**			**Boiler >100kW**			**Boiler >=20kW and over 15 years old**
		Gas	Oil	Solid fuel	Gas	Oil	Solid fuel	
Normal dwelling (has domestic boiler)	No action required	Optional boiler inspection	Regular boiler inspection	Regular boiler inspection	Inapplicable			One-off inspection of whole heating system
Small non-domestic building (has domestic boiler)	No action required	Optional boiler inspection	Regular boiler inspection	Regular boiler inspection				One-off inspection of whole heating system
Large dwelling, or group of dwellings with communal heating (has non-domestic boiler)	Inapplicable	Optional boiler inspection	Regular boiler inspection	Regular boiler inspection	Boiler inspection every 4 years	Boiler inspection every 2 years	Boiler inspection every 2 years	One-off inspection of whole heating system
Normal non-domestic building (has non-domestic boiler)		Optional boiler inspection	Regular boiler inspection	Regular boiler inspection	Boiler inspection every 4 years	Boiler inspection every 2 years	Boiler inspection every 2 years	One-off inspection of whole heating system

Stakeholder engagement

4 To assist in the implementation of Article 8 an industry steering group was formed. The Group had representation from:

- SBGI (Society of British Gas Industries)
- ICOM (Industrial Commercial Energy Association)
- BARMA (Boiler and Radiator Manufacturers' Association Commercial Boiler Group)
- HHIC (Heating and Hotwater Information Council)
- CORGI (Confederation for the Registration of Gas Installers)
- OFTEC (Oil Fired Technical Association)
- HETAS (Heating Equipment Testing and Approval Scheme)
- British Gas service.

5 A number of these industry bodies represent the interests of many small businesses affected by the proposals, e.g. boiler inspection and installation firms.

6 The group's remit was to propose practical and cost-effective routes for implementation. With this in mind the group considered each of the boiler types and building sectors in Table D1 as well as relevant sub-sectors (e.g. owner occupied, social rented and private rented housing) and looked to see how existing voluntary and mandatory inspection activities could be developed in order to meet the requirements of Article 8. Crucial to implementation is the decision as to whether to implement Article 8(a) or 8(b), or even a combination of the two. The baseline is effectively full implementation of Article 8(a), because if Article 8(b) is the chosen option then a Member State needs to demonstrate to the Commission that the 'impact' (presumed to be measured in energy and carbon savings) is equivalent to Article 8(a).

7 The Article 8 working group made a number of recommendations:

(i) Implement Article 8(b) Advice to avoid the over-prescriptive requirements of 8(a) and, to ensure the impact is as great as 8(a), widen the scope of boilers covered (ostensibly include gas boilers <20kW) which also eliminates the need to distinguish them.

(ii) For boilers <100kW the primary delivery route for delivery of advice should be visits already carried out for the purpose of servicing, routine maintenance and safety checking (e.g. voluntary boiler servicing in the owner occupier sector, mandatory boiler safety checks in the private rented sector etc.). By combining this with an existing visit the cost per visit is much cheaper than a special visit**.** This should be supplemented by information campaigns aimed at householders by government agencies and energy supply companies e.g. through the EEC, and this will also address those not covered by existing visits.

(iii) For installations in which the total output of the boiler system >100kW the owner must either:

- arrange regular inspection of the boiler(s) or heating system in accordance with Article 8(a) – the inspection should conform with a standard or code of practice and preferably undertaken as part of a planned service, maintenance or insurance visit; or;

- analyse their energy consumption as measured by systematic collection of meter readings at frequent intervals, in conformity with a standard or code of practice.

In either case, this activity would result in the provision of advice to the building owner.

8 The rationale behind these recommendations is to ensure that implementation is both cost-effective and practical by developing existing service and maintenance visits and supplementing this with an information/awareness programme. Recommendation (ii) – which is primarily aimed at domestic boilers – recognises the potential difficulties of implementing the requirements of Article 8(a) so the focus is on advice. The more onerous obligation in (iii) – where the vast majority of installations will be in non-domestic buildings – is justified by the savings that will be achieved**.**

Options

Introduction

9 As noted above, there are two options with regard to the implementation of Article 8:

Option 3. Implement Article 8(a) – Compulsory inspection of boilers
Option 4. Implement Article 8(b) – Provision of energy efficiency advice

10 Option 3 represents the baseline in terms of costs and energy and carbon savings because if Option 4 is chosen then a Member State needs to demonstrate to the Commission that the 'impact' of implementing Article 8(b) is equivalent to Article 8(a).

11 The industry working group's recommendations distinguished between boilers in the domestic and non-domestic sectors because the positions in these two sectors are very different. In other words, as noted above, one option may not be the most appropriate route for implementation for both sectors. Therefore, in this RIA, the recommendations of the working group have been developed[1] and boilers in the two sectors are considered separately.

12 **Overall and initially at least, implementation will be through the provision of advice for all boilers as this affords greater flexibility and substantially greater carbon savings.**

[1] This RIA does not consider the working group's option of meter reading. It is felt that to take into account relevant characteristics of the site, and be capable of identifying cases of abnormal energy usage that may be caused by poor performance of the heating system is likely to require significant input and as such is unlikely to be cost-effective.

13 A monitoring regime will be set up to enable the biannual report to the European Commission required by the EPBD by January 2008; to enable assessment of the efficacy of the implemented information option in order that decisions may be made in the future on whether to:

- continue with Article 8(b) as implemented
- continue with Article 8(b) as implemented but regulate for inspections of boilers over 100kW
- abandon the information option and regulate for inspections.

14 Options 3 and 4 have been assessed in terms of a number of Key Performance Indicators (KPIs), such as cost of implementation, energy savings produced and overall cost-effectiveness. They have also been assessed from a practical standpoint, i.e. whether the heating industry would be able to cope with an increase in inspection and installation activity within the envisaged timeframe of implementation. As illustrated in Table D1 and as set out in the working group's implementation recommendations there are a number of alternatives within each option to consider, for example whether to include gas boilers <100kW.

Assumptions

15 In order to assess the costs and benefits associated with Options 3 and 4 a number of assumptions regarding the scope of a boiler and heating system inspection and the provision of advice were needed.

16 Firstly, allowance needs to be made for the level of existing boiler service and inspection activity taking place. Specifically, the majority of domestic customers already voluntarily have annual boiler service visits: data from British Gas suggests that about 75% of gas boilers are serviced or are subject to inspection; OFTEC suggests that the figure for oil-fired boilers is comparable and HETAS suggests that virtually all solid fuel boilers are serviced and/or have their chimney swept regularly. The figure in the non-domestic sector is likely to be higher given that boilers are larger and greater consumers of energy, and is probably about 90% across all boiler types. Many boilers in this sector are already inspected for insurance purposes.

17 Therefore, as noted by the working group, use of existing service visits is seen as the most effective route for implementation of both Options 3 and 4. All boilers requiring inspection under Article 8(a) (see Table D1) firstly need to be identified and sent leaflets, and so for Option 3 where there is no existing service visit then a specific inspection visit is required which will entail a greater unit cost. For Option 4 the focus is boilers which have an existing service visit regardless of whether they meet the fuel and rating requirements of Article 8(a). Therefore, Option 4 addresses far more boilers as it includes gas-fired boilers <100kW, as well as boilers <20kW of which there is a great number, particularly in the domestic sector. This will increase the overall cost, but it will also increase the scope for savings significantly that more than outweighs these additional costs. Leaflets would be sent to all boiler owners and managers for Option 4, although it is assumed that their impact on those that currently do not have a service visit is likely to be minimal.

[2] This is made up of householders with gas boilers who have service contracts with British Gas or other companies together with those boilers in the rented sector that are required to be checked for safety annually. Some landlords have a boiler service at the same time as the safety inspection, although many do not.

18 The Directive states the frequency of inspection for boilers >100kW (every 4 years for solid fuel and oil-fired boilers, and every 2 years for gas-fired boilers) but it only says that inspections for boilers <100kW should be 'regular' (see Table D.1). Therefore, for the purposes of this RIA, it has been assumed that in this case 'regular' is every 5 years.

19 A draft European standard – CEN/TC 228 'Inspection of boilers and heating systems' – has been published and is intended to support Article 8. This, in due course, should clarify what is required by way of an inspection. The standard is likely to require different classes of inspection depending upon boiler rating, fuel type etc., so that non-domestic boilers are more likely to have a variety of measurements taken compared to domestic boilers. The current draft of the standard requires advice to be given, although strict interpretation of Article 8(a) does not require this. It is unlikely though that people will pay for an inspection that does not include some advice.

20 In particular, the proposed Class 0 inspection procedure excludes measurement, testing and adjustment and, with regard to the boiler, is concerned with identifying the boiler model, fuel used, its characteristics (e.g. age, type, output etc.) and its efficiency. The advice provided would be a comparison of the performance of the boiler with that of a new boiler. The proposed Class 0 inspection procedure for the whole heating system would also include a review of the heating controls as well as the size, age, type and insulation quality of the building. In addition there would be an inspection of the hot water service vessel controls and its insulation characteristics. Heating system advice would be a comparison of the performance achieved by the system with that achieved by one meeting current good practice, as well as an assessment of the boiler power compared to the heating demand of the building. Standard inspection and advice reports for both boiler and heating system inspections would be made available.

21 The likely requirements of these classes have been considered when developing costs and benefits for the inspection. When formulating costs and savings, it was assumed that domestic boiler inspection will be more like the proposed Class 0 procedure whereas inspection of larger boilers will involve more in depth measurement and analysis.

22 Similarly, the developing understanding of the requirements in CEN/TC 228 suggests that boiler inspection with measurements is favoured over boiler inspection without measurements for large boilers and so the latter alternative has not been considered. Further to this, it has been assumed that system inspection in the non-domestic sector would be undertaken by consultants rather than boiler maintenance personnel as it is felt that they will have the required broader experience and training necessary to carry out such inspections.

23 With regard to Option 4 the intention would be to build-on the existing service provisions described above. Here energy efficiency advice would be provided by the boiler technician during a visit. This would be supplemented by leaflets to all boiler owners and managers encouraging them to have their boilers/heating systems maintained in order to improve operational efficiency, and then assessed to identify any cost-effective system improvements that will save energy. The material would also include general advice to encourage owners to replace old and inefficient boilers and/or install better heating controls.

24 It is also suggested that such material would include advice on effective use of existing controls to improve understanding of their use. This guidance would be primarily aimed at householders as research suggests that heating controls are not always properly understood. For example, some householders turn room thermostats and Thermostatic Radiator Valves (TRVs) up to maximum under the mis-apprehension that this will heat the house more quickly. Once set to this position the controls may not be altered. Similarly, more effective use of controls can improve energy efficiency, e.g. the Energy Saving Trust (EST) states that turning a thermostat down 1°C can reduce fuel bills by 10%, and recommends better use of timers so that heating is not on during unoccupied periods or late at night etc. It is estimated that the national energy savings forgone as a result of controls installed but not used is 14 TWh/year[3].

25 The domestic heating industry is already looking to improve the energy efficiency skills of its installers in the light of changes to Part L of the Building Regulations with regard to heating systems, and it is likely that any implementation of Article 8(b) would accelerate this process. Specifically, the EST is helping the industry through 'Train the Trainer' workshops so that trainers can become approved providers of the new Energy Efficiency Installer Certificate training programme. A large number of manufacturers have agreed to incorporate the Certificate (specifically the Certificate in Energy Efficiency for Domestic Heating, City & Guilds 6084 Level 3) into their existing installer training programmes**.**

26 In addition, the gas industry in conjunction with the British Standards Institute is developing a Publicly Available Specification for the maintenance of domestic gas-fired appliances and associated installations. The document covers a wide range of topics including: arranging service visits; scope of routine and corrective maintenance; commissioning appliances; checks on ventilation, flueing and carbon monoxide (CO) alarms; as well as provision of energy efficiency advice.

27 Leaflets would be used, firstly to reinforce advice given during service visits and secondly to encourage householders and boiler owners without service visits to have an inspection and install energy efficiency measures. The working group supported the provision of advice during service visits since concern was expressed that householders and boiler owners may be confused by the purpose of a service visit (which is mainly concerned with health and safety) and then an additional visit/requirement for an energy efficiency inspection and advice. The advice provided during the service visit would take the form of a standard report as described above.

Benefits

28 In generic terms the benefits of Options 3 and 4 will be:

- Economic:
  - Reduction in fuel consumption (and hence cash saving) from improved energy efficiency of boilers following their adjustment and maintenance.
  - Reduction in fuel consumption from early replacement of old and inefficient boilers
  - Reduction in fuel consumption from more effective use of existing controls
  - Possible wider economic benefits including job creation.

[3] Further information can be found in the Market Transformation Programme (MTP) report RPDH15: Use of domestic heating controls which is on the MTP website.

- Environmental:
  – Associated reduction in carbon dioxide (CO_2) emissions

- Social:
  – Although not explicitly discussed in the Directive implementation of Article 8 will also support the government's fuel poverty strategy by improving the thermal comfort of affected households, particularly if linked to other initiatives such as Warm Front and EEC.

29 The key benefit is the replacement of old and inefficient boilers. There is no requirement for households and boiler owners to implement energy efficiency measures. However, if they choose to replace a domestic boiler, reasonable provision as set out in Building Regulations is to install a high-efficiency condensing boiler unless exceptional circumstances identify that this is impractical or uneconomic. A replacement solid fuel boiler will need to have an efficiency not less than that recommended for its type in the HETAS certification scheme. Therefore, implementation of Article 8 should produce significant savings when boilers are replaced earlier than they otherwise might. Boilers are usually only replaced when they break down and/or replacement parts are unavailable.

30 Reduction in fuel consumption as a result of boiler adjustment is likely to be minor in comparison to early boiler replacement. The working group felt that the scope for adjusting gas-fired boilers to improve their efficiency was minimal, and although there is greater potential for adjusting solid fuel and oil-fired boilers to improve their efficiency (typically 2-3%) these make-up only a relatively small proportion of the overall boiler population (less than 10% of all boilers).

31 There is perhaps greater scope to improve energy efficiency through upgrading heating controls and more effective use of existing controls as explained above. Addition of heating controls to a domestic heating system is estimated to save between 4 and 17% on average depending on the boiler and the level of existing controls[4].

32 In order to avoid any double counting within the RIA the benefits for Article 8 focus on energy efficiency improvements arising from early replacement of boilers, adjustment of boilers and better use of existing controls. The section of the RIA on Article 7(1) and 7(2) considers the installation of improved heating controls as part of the promotion of other energy efficiency measures through energy certification. Nevertheless, it is envisaged that guidance provided through Article 8 will work in tandem with that provided in Article 7 certificates. Therefore, based on the above figures, it is estimated that more effective use of existing controls will save 4%.

33 Boiler stock/energy models (covering both the domestic and non-domestic building stocks) together with a cost-benefit model were developed to calculate the aforementioned KPIs for Options 3 and 4. The domestic boiler model used draws heavily from that already developed for the MTP. There is not an equivalent MTP non-domestic boiler model so a simplified model was developed that drew on numerous sources including boiler sales data, information on the non-domestic building stock and CIBSE rules of thumb for the heating requirements of non-domestic buildings.

4 Controls for domestic central heating and hot water – Guidance for specifiers and installers. Good Practice Guide (GPG) 302.

34 Underpinning these models are a number of important assumptions relating to the uptake of advice. For both options the level of boiler replacement is assumed to be low (i.e. 0.5% of visits), although it is assumed to be greater (1%) for older boilers (i.e. those >15 years). This is based on experience with energy suppliers' EEC schemes. Generally, the non-domestic sector is more responsive, particularly in the public sector. Where a boiler is replaced early (the replaced boiler is assumed to conform to the stock average) it is taken to be 5 years early, i.e. after 5 years the saving falls to zero. The annual savings in the domestic sector have also been reduced by 30% to allow for improvements in thermal comfort.

35 The uptake of guidance on better use of heating controls in the domestic sector is taken to be 5% which is greater than the uptake for boiler replacement simply because this measure has no cost. This benefit is only applied to Option 4 and not Option 3 since the focus here is a strict interpretation of Article 8(a).

36 With regard to boiler adjustment it is assumed that boilers that are already subject to a service visit will not require any form of adjustment so no savings are available. It is assumed though that 10% of boilers without an existing service visit will be adjusted and produce savings when they are inspected.

37 Tables D2a to D2c summarise the benefits of this analysis.

Table D2a –Benefits from Article 8 for dwellings

	Units	**Option 3**	**Option 4**
NPV of energy benefits	£m	14	1055
Estimate of carbon saved	m tonnes C	0.20	4.94

Table D2b – Benefits from Article 8 for buildings other than dwellings

	Units	**Option 3**	**Option 4**
NPV of energy benefits	£m	240	66
Estimate of carbon saved	m tonnes C	0.94	0.26

Table D2c –Benefits from Article 8 for all buildings

	Units	**Option 3**	**Option 4**
NPV of energy benefits	£m	254	1121
Estimate of carbon saved	m tonnes C	1.14	5.20

38 Tables D2a and D2b illustrate the aforementioned differences between the domestic and non-domestic sectors. Table D2a shows that in the domestic sector Option 4 will save far more carbon than Option 3 but this is because, as noted above, it addresses a far large boiler population and also has savings from better use of existing controls. Option 3 will only save a small amount of carbon in the domestic sector because they are only a small number of domestic boilers >20kW which are captured by Article 8(a). The opposite is true for the non-domestic sector (Table 72b). However,

the difference in this sector is not as pronounced as it is between the options in the domestic sector. Overall the advice option (Option 4) represents best value in terms of fiscal and carbon benefits.

Costs

39 In general terms the costs for Options 3 and 4 will be:

- Economic:
  - Cost to government to implement the policy
  - Cost for industry to implement policy, e.g. setting up management information systems (including competent persons' scheme to provide advice), recruiting and training technicians to undertake inspections and provide energy efficiency advice
  - Cost to undertake inspection of boiler or whole heating system, and cost to provide advice during service visits.

- Environmental:
  - Additional boiler inspection visits will lead to an increase in transport CO_2 emissions, although in comparison to the CO_2 savings these were found to be negligible
  - Other potential environmental impacts include the production and subsequent disposal of advice leaflets, and the need to dispose of additional boilers following the early installation of replacement boilers, although it has not been possible to quantify these impacts.

- Social:
  - The main social impact is that householders and boiler owners who currently do not have a service visit may not welcome any requirement under Article 8(a) to have a compulsory boiler inspection.

40 The cost of developing a suitable advice leaflet is likely to be relatively small, only about £10,000. The cost to print and to sort/post a leaflet is only a few pence per leaflet when the number of leaflets is large, but the overall cost is high when it is delivered to all householders and boiler owners throughout the country. For Option 3 the discounted cost for leaflets amounts to £1.5m whereas that for Option 4 is about £10m. The Option 3 cost is much lower simply because it is focuses on those boilers captured by Article 8(a) – but it does also include a cost for setting up an information system to identify all affected boilers.

41 Training of technicians to enable them to provide advice will also have a cost. The working group suggests that this could amount to about £150 per technician which, if provided for all personnel, amounts to nearly £10m. However, as noted above, the domestic heating industry is already looking to improve the energy efficiency skills of its workforce.

42 Training for large sites may need to address two areas depending on the route taken: boiler inspectors and system inspectors. It is envisaged that boiler inspectors could be covered in the same way as the domestic heating industry. System inspectors are likely to be drawn from existing ranks of energy auditors. It seems extremely likely that there will be a shortage of qualified personnel especially as other parts of the

Directive are also likely to place demands on this group. Additional energy auditors could perhaps be drawn from building services design work with some retraining. A sum of £10m has therefore also been included to cover training requirements in the non-domestic sector.

43 The unit costs for undertaking the various inspection visits have been estimated in discussion with the industry working group. These have been broken down in terms of building sector, whether the inspection forms part of an existing service visit, whether it is a boiler or a full heating system inspection and whether the boiler >100kW. These unit costs are summarised in the Table D.3 below:

Table D3 – Unit costs of boiler and heating system inspections

			Cost	
Sector	**Boiler type**	**Inspection type**	***With* existing service visit**	***Without* existing service visit**
Domestic	All	Boiler	£2	£60
		Heating system	£10	£70
Non-domestic	<100kW	Boiler	£30	£300
		Heating system	£150	£300
	>100kW	Boiler	£50	£1,000
		Heating system	£150	£1,000

44 In line with the assumption of Article 8 stimulating a boiler replacement 5 years early (and generating the associated savings) the cost of installing a new boiler 5 years earlier has also been included in the overall cost assessment. For domestic boilers an average unit cost of £1,500 has been used, and for non-domestic boiler the average unit cost was £3,000.

45 The costs are summarised in Tables D4a to D4c below.

Table D4a – Costs of Article 8 for all dwellings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	114	970

Table D4b – Costs of Article 8 for buildings other than dwellings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	242	107

Table D4c – Costs of Article 8 for all buildings

	Units	**Option 3**	**Option 4**
NPV of costs of advice	£m	356	1077

46 As with the equivalent benefit tables, Tables D4a and D4b show the pronounced differences between the domestic and non-domestic sectors. In the domestic sector, Option 4 is much more expensive than Option 3, but this is simply because it targets far more boilers. In the non-domestic sector the costs for Option 3 are greater because Article 8(a) captures many of these boilers.

Cost-benefit

47 The cost-benefit of implementing Article 8 (i.e. either 8(a) or 8(b)) can be derived from comparing Tables D2 and D4. Specifically, the net cost of Article 8 (on a present value basis) is obtained by taking the total cost cash figure from the total benefit cash figure, see Tables D5a to D5c.

Table D5a – Cost-benefit for Article 8 for buildings other than dwellings

	Units	**Option 3**	**Option 4**
Net cost of advice	£m	102	-85
Cost per tonne of carbon saved	£/tonne	500	Net benefit

Table D5b – Cost-benefit for Article 8 for buildings other than dwellings

	Units	**Option 3**	**Option 4**
Net cost of advice	£m	2.0	41.4
Cost per tonne of carbon saved	£/tonne	2.14	161

Table D5c – Cost-benefit for Article 8 for all buildings

	Units	**Option 3**	**Option 4**
Net cost of advice	£m	104	-43.6
Cost per tonne of carbon saved	£/tonne	91.2	Net benefit

48 In the domestic sector Option 4 is cost-effective whereas Option 3 is not – it has a cost of £500 per tonne of carbon saved. Combining the two sectors (Table D5c) though shows that Option 4 is cost-effective overall, and also saves the most carbon (Table D2c).

Sectors and groups affected

49 These proposals will affect all sectors of the economy, and the energy efficiency consultancy and heating industries in particular. The following groups are affected:

- Householders, building owners, tenants, operators and facilities managers:
  - If Option 3 was implemented this would mean that some 2.7 million sites would be subject to mandatory boiler inspections.
  - If Option 4 was implemented then potentially all sites are addressed (about 23 million), although none of them would be subject to a mandatory inspection. In either case many (about three quarters) already have a boiler service and/or safety inspection visit.

- Heating installers/maintenance technicians:
  - The working group indicated that there are currently some 60,000 CORGI registered technicians involved in gas boiler servicing and inspection.
  - There are 3,000 OFTEC registered technicians servicing oil-fired boilers.
  - HETAS has 1,300 technicians involved in servicing solid fuel boilers.

- Energy auditors. The number of energy consultants suitable to undertake heating system inspections is difficult to assess, but:
  - The Institute of Energy has a consultant list with 39 energy efficiency experts.
  - CIBSE has a register of 26 companies offering energy audits so this might correspond to some 75-100 individual consultants.
  - The Carbon Trust operates a list with the Institute of Energy and this has around 40 consultants.

50 In the domestic sector it is estimated that there are some 12.5 million boiler service visits per year, the vast majority (about 11 million) covering gas-fired boilers. The increase in inspection visits envisaged under Option 3 amounts to about 0.75% per year, and that for Option 4 amounts to about 0.4% (it is assumed that these inspections are distributed evenly each year in accordance with the frequency of inspection required under Article 8). Although not significant increases, this could put a strain on specific sectors of the inspection industry. In particular, Option 3 would impact on the sector covering oil-fired boilers because Article 8(a) targets these boilers and not all customers have an existing service contract.

51 There are about 1 million domestic boiler replacements per year. Therefore, the envisaged increase in boiler replacements amounts to an annual average increase of about 0.5% for Option 3, and nearly 10% for Option 4.

52 The situation in the non-domestic sector is likely to be much the same. There are probably about 580,000 boiler service visits per year and so Option 3 represents an increase of about 0.5% per year, and Option 4 represents an increase of about 0.3%. Therefore, Option 3 would again have the greater impact which would mostly be in the gas and oil-fired boiler sectors.

53 A significant difficulty with Option 3 is the practicality of identifying all the boilers affected by Article 8(a). There would be a need to work closely with the fuel supply companies and inspection bodies in order to undertake the identification process. This should be straightforward where there is an existing service visit but will be difficult where there is no such visit. This would cover 590,000 sites in the domestic sector and 27,000 sites in the non-domestic sector.

54 Article 8 as a whole will have an impact on the boiler inspection and installation industries. Both implementation options will lead to an increase in inspection visits and boiler adjustments. This will possibly lead to a need to recruit additional personnel. A more significant impact will probably be the requirement for training of technicians to provide energy efficiency advice.

Annex E – The Register

Background

1 A central register containing EPCs and recommendation reports, DECs and the advisory reports is beyond the Directive's requirements. Nevertheless, the potential costs and benefits associated with the creation and maintenance of such a register have been considered.

2 In respect of a central register, there are two options:

- Option 1 Do Nothing. In this case, records would only be held by a number of accreditation bodies (as well as by the energy assessors and recipients);
- Option 2 A central Register is maintained by the Secretary of State or on behalf of the Secretary of State. This would enable wider access to the EPCs, and in time would facilitate analysis of data.

The costs and benefits associated with these options are described below.

3 The creation of a central Register for all EPCs for dwellings could be an extension of the register developed for lodgement of HCRs for private marketed sales.

Option 1 – No central register

Costs and Benefits

4 There will be no cost incurred with this option and no benefits.

Option 2 – A central register

Proposed Data Arrangements

5 The material to be lodged with the Register would consist of:

(i) EPCs for construction, sale and rent;

(ii) recommendation reports which include recommendations for improvements to the building energy performance;

(iii) DECs;

(iv) advisory reports;

(v) data collected to produce these certificates and reports

For simplicity, items i) to iv) are referred to simply as EPCs.

6 The EPC Register would be maintained by the Secretary of State and operated by a contractor, and would contain all the EPCs produced by energy assessors. In due course, it may become necessary to operate two or more registers if separate ones were deemed to be required for commercial property EPCs and DECs.

Costs

7 The cost depends on the type and volume of information to be held and the uses to which the information will be put. Costs will be incurred for set up, data entry and updates, retrieval of records and long term storage (20 years from the date of first registration).

8 A single register will be used for EPCs for dwellings on construction, sales and rent. The fee for successfully lodging a report onto the register has already been agreed for HIP domestic sales, at £1.49. The register operator can only charge a fee for the successful lodgement of a report onto the register. They are not allowed to charge for report cancellations, or unsuccessful lodgements (i.e. that fail validation), nor for changing the status of reports.

9 The increased numbers of registered EPCs associated with broadening the scope of the recorded EPCs to all dwellings, not simply private marketed sales means that this unit cost may come down.

10 As yet no fee has been agreed for registering EPCs for any non-domestic transactions. The contract for the register operation for non-domestic transactions will not be let until after the laying of the Statutory Instrument and hence a precise figure cannot be determined. Nevertheless it is expected to be very small in relation to the cost of producing the EPC.

11 The fee will need to be reviewed periodically. Current thinking is that it should be reconsidered every three years.

12 The proposed approach; that of adding the fee for registration and lodgement to the cost of the service provided, whether an EPC, a DEC, or an advisory report, means that this expense is met by the sector concerned.

Benefits

13 Four core benefits have been identified for establishing a central register of EPCs:

(i) Ease of management and associated low cost
Electronically lodged "eCertificates" are simpler to administer, audit and are lower cost than paper based alternatives. Any paper based alternative will be more expensive, complex to administer and more open to fraud.

(ii) Verification
Introducing a requirement that each EPC should be lodged in a secure register by the accreditation body to which the energy assessor who produced it belongs, reduces the risk of forgery or fraud. It also provides a simple method of verification at a later stage if any concerns about the authenticity of the EPC were raised.

(iii) Replacement
Inevitably, some EPCs will be lost over time. It would be a significant extra cost for the consumer to have to replace these by having a further energy assessment. A register of EPCs allows the quick and cheap recreation of any mislaid EPC.

(iv) Benchmarking
Although the nature of benchmarks is not defined in the Directive, to be relevant and effective they will require the collation and analysis of information about the data that has led to the creation of EPCs. Given the number of EPCs involved and the degree of analysis that will be required, anything other than the electronic storage and manipulation of information would be impracticable. A register of EPCs and associated input data provides the basis for the analysis of information to establish benchmarks.

14 Additionally, the case for a central register of EPCs is reinforced by the following:

(i) Quality Control EPCs will rapidly lose credibility if they are felt to be arbitrary, inconsistent, or of low overall quality. A regime of quality control will be required which is likely to need a register of EPCs to allow comparison and setting of standards.

(ii) Achieving energy and carbon reductions With a register of EPCs, appropriate information could be readily extracted at national or regional level (or for example could be focused around particular types of building such as Victorian terraced houses) to be used in information campaigns.

(iii) Better information to national and regional planners The information available from a register of EPCs could be of significant value to national and regional planners in, for example, making decisions about the targeting of improvement grants allied to energy improvements. A register could assist in providing information on the energy efficiency of buildings in a given locality e.g. improved accuracy of HECA[1] reporting.

(iv) Better information to the energy industry Aggregate information about the energy assessments of buildings would help industry plan energy improvement products and their marketing more effectively, again contributing to the achievement of energy and carbon reductions.

15 Although there are likely to be concerns about privacy, data protection and data access, arrangements will be put in place to ensure:

- Personal data will not be captured

- Data have appropriate protection and access control. This is complemented by a new criminal offence for the unlawful disclosure of information taken from or derived from an EPC. This is to avoid, for example, the possibility of home improvement companies targeting specific individual properties on the basis of the EPC.

16 As described above, a central register of EPCs, DECs, and the advisory reports can be achieved for a very low cost per lodged report and brings many advantages. Therefore this approach is recommended.

[1] HECA is the Home Energy Conservation Act. It requires every UK local authority with housing responsibilities to prepare, publish and submit to the Secretary of State an energy conservation report identifying practicable and cost-effective measures to significantly improve the energy efficiency of all residential accommodation in their area; and to report on progress made in implementing the measures.

Declaration

I have read the Regulatory Impact Assessment contained in this document, and I am satisfied that the balance of cost and benefit is the right one in the circumstances.

Signed by the responsible Minister _____

Ruth Kelly MP
Secretary of State for Communities
and Local Government
And Minister for Women

Date _____

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