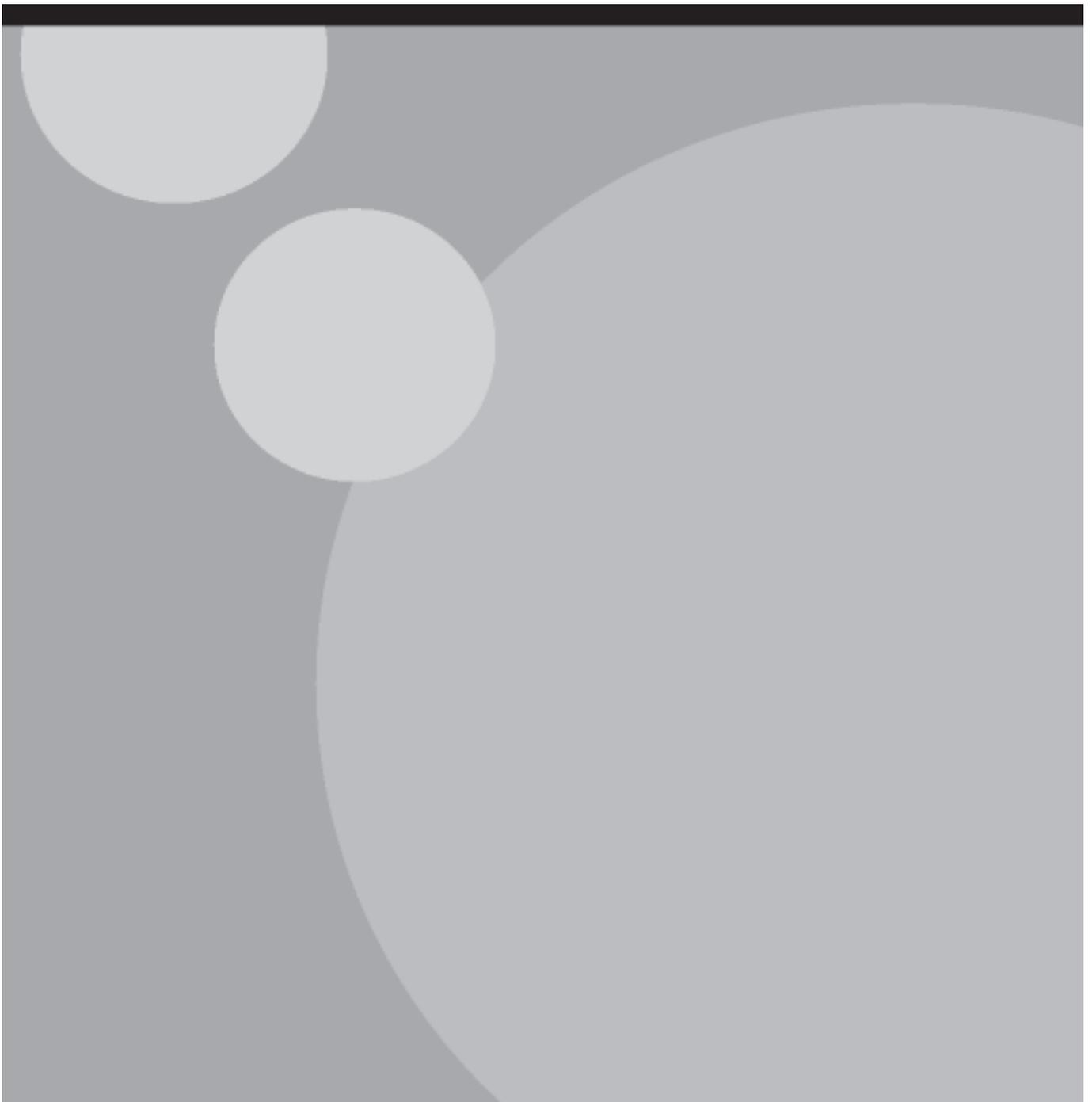




Changes to Part A (Structure) of the Building Regulations in England: Eurocodes

Consultation stage impact assessment





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Title: Changes to Part A (Structure) of the Building Regulations in England: Eurocodes IA No: DCLG/0076 Lead department or agency: Department for Communities And Local Government (DCLG) Other departments or agencies:	Impact Assessment (IA)		
	Date: 22/11/2011		
	Stage: Consultation		
	Source of intervention: EU		
	Type of measure: Secondary legislation		
Contact for enquiries: Shayne Coulson			

Summary: Intervention and Options	RPC: AMBER
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Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, One-Out?	Measure qualifies as
-£70.1m	-£70.1m	£7.68m (10 years)	No	NA

What is the problem under consideration? Why is government intervention necessary?
 On 1 April 2010 the British Standards referenced in the current Approved Document A (and to a more limited extent in Approved document C) were declared withdrawn by BSi. The withdrawn standards will no longer be maintained and after 2015 may be declared obsolete meaning they will become increasingly out-of-date. In addition, there is a risk that the UK could face legal challenge from Europe if we do not reference the replacement British Standards (incorporating Eurocodes) in the Approved Documents. Referencing only the withdrawn British Standards may be seen as putting up barriers to trade as well as presenting an increasing risk that guidance would, over time, not deliver the level of structural safety intended.

What are the policy objectives and the intended effects?
 To continue to provide a regulatory framework into the future that ensures buildings are structurally safe for people in or around them in a way that complies with European requirements.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
 The two policy options considered in detail in this impact assessment are 1) do nothing and 2) update guidance to reference the Eurocodes. The "do nothing" option is not preferred because there would be an increasing risk beyond 2015, when the currently referenced withdrawn standards may be declared obsolete, that these design standards would become increasingly out-of-date as industry practice and construction techniques move further away from the withdrawn standards currently referenced in Approved Document A 2004. There is also a significant risk of successful legal challenge if we were not to update the standards currently referenced in Approved Document A to Eurocodes. Option 2 is preferred to avoid the adverse impacts set out under the "do nothing" option. In addition, incorporation of the Eurocodes should promote enhanced competition at a European level through standardisation - removing technical barriers to trade, fostering improvements in quality and innovation and ultimately creating job opportunities.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 04/2017						
Does implementation go beyond minimum EU requirements?			No			
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.		Micro Yes	< 20 Yes	Small Yes	Medium Yes	Large Yes
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			Traded:		Non-traded:	

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

Signed by the responsible Minister: _____ *Andrew Stunell* Date: 25 November 2011

Summary: Analysis & Evidence

Policy Option 2

Description: Update References to Eurocodes-based Standards

FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2013	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: 41.7	High: 98.5	Best Estimate: 70.1

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£41.7m	0	£41.7m
High	£98.5m	0	£98.5m
Best Estimate	£70.1m	0	£70.1m

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

Modelling illustrates that there may be between -0.3% to 0.4% change in the costs of construction, but overall we believe there is no significant net cost to industry. However, there will be transitional costs for firms of moving to Eurocodes of approximately £70.1m (present value cost over 2 years discounted at 3.5%) which will be borne principally by firms involved in structural engineering design through to 2015.

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

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

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

This option avoids the potential costs associated with Option 1. Also, as described above, modelling suggests that there may be small savings in the cost of construction for certain types of small scale developments - although overall we believe it will be cost neutral.

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

Although it is not possible to assess the benefits (or rather costs avoided), updating the standards referenced will continue to ensure that buildings are constructed using up-to-date and supported standards and thereby avoid potential health and safety-related costs. In addition, through standardisation, Eurocodes should promote enhanced competition at a European level - removing technical barriers to trade, fostering improvements in quality and innovation and ultimately creating job opportunities.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

Key assumptions about the scale of transition costs include: the proportion of firms that are small and medium-sized (we have tested the impact of assuming an 80:20 and 70:30 split in favour of smaller firms); certain individual elements of the total costings - such as on productivity and familiarisation; the additional cost that will be incurred on those firms moving voluntarily towards Eurocodes; and that large firms will already have implemented Eurocodes voluntarily by 2013.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m: (2011 prices)	In scope of OIOO?	Measure qualifies as
Costs: 8.14m	Benefits: 0	Net: 8.14m
No	NA	

Evidence Base (for summary sheets)

Problem under consideration

Background on the Building Regulations

- 1) The Building Regulations 2010 control certain building work - principally to protect the health, safety and welfare of people in or around buildings. Part A of Schedule 1 to the Regulations relates to structural aspects of building design and construction and Approved Document A contains statutory guidance that demonstrates how the provisions can be complied with.
- 2) The Regulations themselves are expressed in “functional” terms and do not dictate how the desired level of structural safety *must* be achieved. However, for the benefit of both industry and building control bodies, advice on how the requirements of the Building Regulations *may* be met are contained in guidance approved by the Secretary of State. This covers some of the more common building situations, but there may well be alternative ways of achieving compliance with the provisions. However, if followed, the guidance may be relied upon in any proceedings as tending to indicate compliance with the Building Regulations.
- 3) In a comparable way to other Approved Documents, the existing guidance in Approved Document A (last updated in 2004), references a number of British Standards relating to structural design which it states, if followed, will demonstrate compliance. These design standards provide a baseline set of technical performance requirements which relate to safety and serviceability for structural design, but are not exclusive of other options being used to show compliance.

The Eurocodes and British Standards

- 4) In 1975, the European Commission decided on action, based on Article 95 of the Treaty of Rome, with the objective of the elimination of technical obstacles to trade and the harmonisation of technical specifications. This included the initiative to establish a set of harmonised technical rules for the structural design of construction works (the Eurocodes).
- 5) The Eurocodes have been developed over a number of decades by the European Union (EU) Commission and the European standards body, CEN, (involving the British Standards Institution (BSi) for the UK), to remove barriers to trade created by different national design approaches across the EU. The Commission has outlined expectations that EU Member States will support this harmonisation and market liberalisation by ensuring national regulations refer to British Standards based upon the Eurocodes. These are, strictly speaking, BS EN's¹ (harmonised British Standards), but for clarity and convenience are referred to as Eurocodes in this text given they are commonly referred to as such. For the Building Regulations this would be achieved by aligning references and associated guidance in the Approved Documents with the Eurocodes. Other Member States and the Devolved Administrations are making, or have already made, similar changes.
- 6) As stated previously, Approved Document A makes extensive reference to British Standards to establish what is a reasonable level of structural safety in design. These cover standards relating to loadings, foundations/geotechnics and specific design standards to reflect different materials and methods of construction (for example, timber, masonry, concrete, steel, aluminium). The standards currently referenced are those that were in place in 2004 when Approved Document A was last updated.

¹ British Standard- European Norm

The Problem

- 7) On 1 April 2010 BSi withdrew the standards which are listed in the current Approved Document and implemented a new set based on the pan-European harmonised approach to structural design incorporated in the Eurocodes.
- 8) The withdrawn British Standards will no longer be technically maintained by BSi. In 2015 BSi is expected to declare the withdrawn standards obsolete so, in effect, the most up-to-date British Standards for structural design from that time onwards will be those based on the Eurocodes.
- 9) In addition, there is a risk, particularly beyond 2015 when any public policy justification for retaining references to possibly obsolete technical Standards would be extremely difficult to maintain and mean that the UK could face legal challenge from the European Commission, an EU Member State or industry if we do not align the Approved Documents with the Eurocodes. If we reference only the withdrawn British Standards, we may be seen as providing barriers to trade which prevent or restrict designers based in other EU States practising in England, thus breaching EU Treaty obligations; or which potentially hinder the use in England of structural products CE marked under the EU Construction Products legislation (which is a separate requirement).
- 10) Although Eurocodes will predominantly impact on the guidance contained in Approved Document A (Structure), there will also be a small number of consequential changes to references and text in Approved Document C (Site preparation and resistance to contaminants and moisture). For the sake of clarity, drafting in the Impact Assessment primarily refers to the changes to be made to Approved Document A (although information on the other consequential changes are dealt with at paragraph 61).

Rationale for intervention

- 11) Building Regulations apply to “building work” as defined (typically the erection, extension, alteration or conversion of a building) and seek to ensure buildings meet certain standards for minimum health, safety, welfare and sustainability. Part A seeks to ensure that a building’s structure is structurally safe and robust to resist the expected actions to be imposed upon them, for example, from wind or subsidence.
- 12) As the legislative provision is “functional”, statutory guidance contained in the Approved Documents sets some of the ways, for the more common buildings, of ensuring basic minimum health, safety etc standards are achieved when constructing buildings. This provides clarity for building control bodies and industry alike as it sets out what is sufficient (whilst allowing flexibility to provide alternative building approaches where beneficial). Importantly, it also ensures that a proper cost/benefit assessment and consultation with industry has been undertaken by Government to assess what reasonable minimum standards are appropriate (and avoids the risk of unnecessarily onerous and costly standards being imposed on industry).
- 13) DCLG undertook an exercise in the latter half of 2010 to determine what changes were necessary to the Building Regulations to ensure they remained fit-for-purpose, with a particular emphasis on identifying measures to reduce the cost of regulation to business and any other “must do” regulatory changes.
- 14) There were 248 responses from our external partners to this exercise. In addition, DCLG drew upon ideas and suggestions submitted to the Cabinet Office’s *Your Freedom* and DCLG’s own website. A summary and analysis of responses and details of the work being

considered in advance of the consultation this proposal forms a part of is contained in *Future changes to the Building Regulations – next steps*². As set out in this document:

“Few responses questioned the principle of regulations setting national standards that ensure buildings are built to baseline standards, although there was some comment that they were on firmest grounds in relation to health and safety rather than wider sustainability objectives. Many specifically recognised the positive role Building Regulations played and welcomed the fact that there was a nationally applied set of minimum requirements.”

- 15) The exercise undertaken last year demonstrated, therefore, that the general approach to regulating through the Building Regulations (functional requirements supported by guidance as to how to comply) was supported by external partners. In relation to Part A, those that responded did not question the existing regulations’ approach to delivering structural safety. However, whilst it was indicated that they were largely content with the technical content of the guidance, there was some concern expressed that technical references had not been updated to reflect the Eurocodes. This Impact Assessment supports further, more detailed public consultation on a proposal to update the existing provisions to reflect availability of the Eurocodes.

Policy Objective

- 16) To continue to provide a regulatory framework into the future that ensures buildings are structurally safe for people in or around them in a way that complies with European requirements.

The options considered

- 17) Two options are considered in detail in this Impact Assessment:
- i) Option 1 - do nothing
 - ii) Option 2 - update references to the newer, Eurocodes-based British Standards.
- 18) The “do nothing” option is not preferred because:
- There would be an increasing risk beyond 2015, when the currently referenced standards (which would not have been maintained in the intervening years and may by that time have been declared obsolete) would be increasingly out-of-date as industry practice and construction techniques move further away from the withdrawn standards referenced in Approved Document A
 - There is a significant risk of successful legal challenge if we were not to update the standards currently referenced in Approved Document A to Eurocodes ones (especially after 2015 when any policy justification for retaining references to obsolete standards would be difficult to maintain).
- 19) Option 2 is preferred to avoid the adverse impacts set out under the “do nothing” option above. However, in addition there are a number of additional consequential benefits that accrue, principally, in relation to delivering the benefits sought through the introduction of Eurocodes. In particular, Eurocodes have been designed with the following beneficial aims in mind:
- To provide a common approach for the design of buildings and other civil engineering works leading to enhanced competition at a European level
 - To boost business in the sector by removing technical barriers to trade within Europe

² Future changes to the Building Regulations – next steps. Published by DCLG in December 2010. Available at www.communities.gov.uk/publications/planningandbuilding/buildingregsnextsteps

- To foster improvements in quality and innovation
 - To create job opportunities in the sector.
- 20) However, it is recognised that updating references will impose some additional, one-off costs on industry – principally to engineering firms designing to the new Eurocode-based standards. We believe that the current, highly competitive nature of the construction industry and the fact that design fees are often determined as a percentage of the project cost means any additional costs will be borne (and not passed-on to clients) by the design consultants. Conversely, in the longer-term, it is likely that these businesses may benefit from the development of Eurocodes and use in the European construction industry as a whole. However, to ease the potential burden on business, we aim to mitigate the impact in two main ways:
- For certain firms it may be unnecessary to move to the Eurocodes if, in their professional judgment, the previous British Standards are satisfactory for the types of work their businesses are responsible for. We intend to clarify that building control bodies should accept such an approach where a designer is able to demonstrate it is appropriate for the particular structure proposed
 - It is proposed that changes to Approved Document A will come into force in 2013. However, to allow firms time to adapt to a system principally based on the new Eurocodes and to spread the period over which costs might be incurred, we propose that guidance will be provided to make clear we would expect that the currently referenced withdrawn standards should be viewed as also demonstrating compliance with the Building Regulations until at least 2015.
- 21) DCLG contends, therefore, that the updating to Eurocodes would have been done in such a way as to minimise the cost to business, that is, with no “gold-plating” involved with the implementation of this policy.
- 22) More information on the costs and benefits is contained below.

Costs and benefits

- 23) In developing this Impact Assessment DCLG has drawn upon earlier work carried out in Scotland looking at the costs and benefits of incorporating Eurocodes into the Building Regulations in Scotland³. That work in itself draws upon earlier work carried out by the Institution of Structural Engineers (ISE) for the then Office of the Deputy Prime Minister on the transition to a working environment based on Eurocodes⁴. The costs and benefits detailed below are calculated using 2011 prices. For the purposes of calculating the Equivalent Annual Net Cost to Business in the summary sheet at the beginning of this Impact Assessment we have, as required, rebased to 2009 prices using the Treasury's GDP deflator.

Costs – Option 1

- 24) As stated previously, the currently referenced standards in Approved Document A are no longer technically maintained and DCLG would have increasing unease with referencing these standards beyond 2015 when they would have been subject to review. However, it is not possible to anticipate how future industry design and construction techniques will evolve and the adequacy, therefore, of currently referenced standards in terms of structural safety into the future (or to try and estimate the exact nature or scale of these costs).

³ Final Regulatory Impact Assessment on the Review of Section 1: Structure of the Technical Handbooks for Ways of Complying with the Building (Scotland) Regulations 2004 (as amended), February 2004. Available at www.scotland.gov.uk/Resource/Doc/917/0098818.pdf

⁴ National Strategy for Implementation of the Structural Eurocodes: Design Guidance. Report prepared for the Office of the Deputy Prime Minister by The Institution of Structural Engineers. April 2004. Available at www.istructe.org/publications/Downloads/eurocodes.pdf

- 25) In addition, this option imposes the potential risk of infraction and imposition from the European Court of Justice of financial sanctions on the UK. Payment of any fines levied on the UK will have to be absorbed in their entirety by the UK Government.
- 26) It is difficult to predict with any degree of certainty the amount of fine that may be imposed by the European Court of Justice in any individual case, but the likely level might be significant with a minimum lump sum of about €9.666m⁵ (based upon the UK's GDP) and a possible substantial daily fine of thousands of pounds for continuing non-compliance.

Benefits – Option 1

- 27) There are no benefits associated with this option.

Costs – Option 2

- 28) In developing an assessment of the costs of updating currently referenced standards to ones based on Eurocodes it is necessary to examine both the ongoing costs of constructing to these new standards and the one-off, transitional costs associated with the change.
- 29) It is important to note that referencing the “new” British Standards based on Eurocodes will provide the construction industry with an alternative, up-to-date, technical solution for meeting regulatory requirements. The construction industry is not obliged to adopt Eurocodes, but is likely to because the referenced standards typically become the industry norm. The figures contained in the Impact Assessment have been calculated on that basis.
- 30) DCLG has had initial analysis carried out on the **cost of construction** associated with building to the “old” and the “new” standards. This looked at four types of notional building:
- A two-storey detached house with masonry walls, timber floors and traditional timber rafter roof
 - A single-storey office block, constructed similarly to the above house
 - A seven-storey office building, constructed of reinforced concrete
 - A seven-storey office building similar to the concrete building, but now of steel and steel-concrete composite construction.

⁵ In accordance with guidance set out in its Communication SEC (2005)1658 as amended by SEC (2010) 923, the Commission will recommend to the European Court of Justice (ECJ) a lump sum payment as a penalty for failing to comply with the first ECJ judgment up to the date of the second ECJ judgment and a penalty payment as a daily fine continuing from the date of the second judgment until compliance. The lump sum payment will be the minimum level set for the UK at €9,666,000. In the event that the Commission formula for calculating the lump sum payment exceeds the minimum, the higher amount will be recommended. The formula is the multiple of :

Basic flat rate lump sum payment (€210 per day) x coefficient for seriousness (on a scale 1 to 20) x 'n' factor (18.31 for the UK, based on capacity of the Member State to pay and the number of votes it has in the Council) x number of days of infringement. For penalty payment, the formula for the daily fine from the date of the second ECJ judgment is the multiple of :

Basic flat rate penalty payment (€640 per day) x coefficient for seriousness (on a scale 1 to 20) x coefficient for duration (1 to 3 calculated at a rate of 0.1 per month from the date of the first judgment to the second, reaching the maximum after 2 ½ years) x 'n' factor (18.31 for the UK). This means the daily rate could vary between €11,178 and €703,104.

31) The estimated build cost of these types of buildings is summarised below.

Building type	Construction costs using withdrawn British Standards (£)	Construction costs using Eurocodes-based British Standards (£)	Change (£)	Change (%)
Two storey detached house (masonry)	40,621	40,505	-116	-0.28
Single storey office	47,179	47,179	0	0
Seven storey concrete office building	1,806,688	1,801,081	-5,607	-0.3
Seven storey steel office building	1,682,105	1,689,455	7,350	0.4

32) This modelling illustrates that there may be between a -0.3% to 0.4% change in the cost of construction as a result of a move to referencing Eurocodes for these notional building types. This initially suggests that there is not any very significant net cost to industry overall. It is also in line with the initial engagement with industry which suggests that the cost of constructing to Eurocodes is broadly cost neutral (which would also be expected given that the implementation of Eurocodes through the British Standard sought to deliver approximately the same result, for example, on factors of safety in designs, as the previous, currently referenced, Standards).

33) An indicative attempt to estimate total costs and benefits (based on the number, type and construction method) suggests a net benefit of approximately £3m annually. This net benefit is small when set against total construction costs of over £8.4bn. This is a rough indicative estimation only and for the purpose of consultation, we are assuming that the impact on construction costs is neutral overall. However, we will test this contention further by asking external partners for further evidence on the cost of construction as part of the consultation process and, if necessary, carrying out further analysis to support policy development post-consultation and to inform an Impact Assessment at implementation stage.

34) The major potential cost of Option 2 relates to the transitional, one-off costs associated with moving from the standards currently referenced in Approved Document A to those based on Eurocodes. The previous work carried out by the Scottish Government built on the earlier work done by the ISE. Both provide a detailed breakdown of the component elements of the cost to business. The Scottish assessment updates some of the earlier costings and refines assumptions and this Impact Assessment, therefore, uses those costings as a starting point.

35) Both of these pieces of work looked at the cost to a notional firm of a move to Eurocodes – using a consultancy with 16 fee-earning technical staff as being typical of a firm affected. A cost per structural engineer is then arrived at and then a total figure calculated by multiplying this by the number of structural engineers operating in Scotland.

36) For the purposes of this Impact Assessment we propose to refine this costing further. We propose to do this in three main ways:

- Refining further the costs and assumptions making-up the individual elements of the costings
- Also looking at the costs of a very small (two-person) engineering consultancy as well as the notional 16 person firm
- Using information provided by BSi on the market for Eurocodes as a basis for estimating the total costs yet to be incurred by industry.

- 37) As stated above, the costs of Eurocodes are transitional ones as firms incur direct costs (in terms of purchase of standards and education/training costs) and more indirect ones (such as reduced productivity during a period of familiarisation). As a starting point we have examined the costs on two types of firm - a very small one with only two fee-earning structural engineers and a medium-sized one with 16 engineers. The costs for these two types of firm are set out below.

Two Person Firm

Item	Cost (£)
Cost of purchasing Eurocodes	2,000
Cost of buying guidance documents	250
Cost of updating software	4,500
Attendance at technical seminars (fee)	620
Attendance at technical seminars (lost hours)	550
Familiarisation	5,250
Alteration to in-house specification	5,250
Loss of productivity in first year	8,000
Total	26,420

16 Person Firm

Item	Cost (£)
Cost of purchasing Eurocodes	2,000
Cost of buying guidance documents	250
Cost of updating software	4,500
Attendance at technical seminars (fee)	1,240
Attendance at technical seminars (lost hours)	1,500
Familiarisation	42,000
Alteration to in-house specification	5,250
Loss of productivity in first year	64,000
Total	120,740

- 38) We are aware that the transitional costs for firms of moving to Eurocodes is dependent on the estimates set out above and the assumptions underlying them (in particular in relation to the cost of familiarisation and loss of productivity which are also the most difficult to authoritatively monetise). **We will therefore use the consultation exercise to specifically ask industry for further evidence to support even more robust future costings as we move towards a final policy decision.**

- 39) In relation to the individual elements outlined above, the cost of purchasing the revised standards amounts to approximately £2,000. In addition, firms are likely to also purchase industry supporting technical design aids to help them understand the practical use of the standards which we estimate would cost in the region of £250 (we believe previous assessments of a cost of £700 - £1,000 is a significant over-estimate because it was based upon the broad assumption that all firms/engineers would be required to have all of the new Eurocodes suite of standards which is not the case, particularly small firms who may specialise).
- 40) In relation to the cost of updating software to reflect the different design approach set out in Eurocodes, engagement DCLG has had with software suppliers indicates that commonly-used industry software packages might be available for as little as £2,500 (which would incorporate updating to Eurocodes as part of the maintenance package). However, for the purposes of this assessment we are taking a cautious approach and have costed this element at £4,500 per firm – we will seek further evidence on this as part of the consultation exercise.
- 41) There will also be education and training requirements associated with a move towards Eurocodes. Initial work has indicated that courses covering loading and the principal structural materials are available for £310 in the London region. For a 16 person firm it has been assumed that four members of staff will each attend a relevant course (and then feedback information and knowledge to colleagues). For the smaller firm we have assumed that both engineers would train separately, because size of firm would make this the more practical option. We have also costed the lost hours as attendance at such a course based on losing a day's work (7.5 hours at £50 per hour). £50 per hour and a 7.5 hour day is also used for other relevant calculations below. The £50 charge out rate was sourced from the Institute for Structural Engineers and verified by other industry sources. These figures are used as a proportionate approach to calculating these costs to business.
- 42) Assessing the earlier work done on training, loss of productivity and familiarisation, we believe there remains an element of double-counting within the individual elements (the Scottish assessment reduced a previous 10% loss of productivity to 5% because of this). Whilst we do not at this stage question that 5% assumption (and the Scottish consultation did not provide evidence to suggest using a different figure) we do believe that an additional cost of 12 man days per person for familiarisation in addition to loss of productivity and training is an over-estimate⁶. We will therefore test at consultation the assumption that a more realistic familiarisation period is seven days per person (the figures above reflect that lower figure). In relation to loss of productivity, the figures above are based on a person's working year of 1,600 hours.
- 43) This has provided costs to two sizes of firms. The next stage is to use these figures to establish the **total cost to industry of Eurocodes**. As stated above, the Scottish assessment then used similar estimates (of a cost to a notional firm) to establish a cost per structural engineer and arrived at a total cost by multiplying it by an estimate of the total number of structural engineers. However, as illustrated above, such an approach is significantly influenced by the assumption of size of firm that a "typical" engineer works in (for a 16 person firm the average cost is £7,546 and for a two person firm it is £18,085). We therefore propose to use the cost for both types of firm set out above as a starting point for calculations.
- 44) Such an approach is dependent on two main factors – the actual costs per firm (and principally the size of firms chosen) and the number of firms these costs apply to.

⁶ In the original ISE estimate of the costs of Eurocodes 12 man days were assumed to be lost, in addition to the 10% loss in productivity.

- 45) The construction industry is characterised by small and medium-sized enterprises and we believe this is primarily where the main costs of Eurocodes implementation will fall (there are a small number of larger British-based firms in this sector, but these will operate internationally and will, we assume, have already encompassed the use of Eurocodes, and the associated costs, voluntarily).
- 46) We assume, therefore, that costs principally fall on very small firms (two structural engineers) and more medium-sized enterprises (sixteen structural engineers). We also assume that of those firms affected, 80% will be smaller to medium-sized firms and 20% will be larger firms.
- 47) In estimating the number of firms that might be affected, work carried out on DCLG's behalf by BSi has proved valuable evidence about the specific part of the industry that would be affected by this proposal. An analysis of sales records of the currently referenced design standards shows there were approximately 4,000 individual firms that purchased these standards. It is fair to assume, therefore, that the potential market for standards based on Eurocodes would be a very similar figure.
- 48) BSi have also looked at the sales of the new British Standards based on Eurocodes. This shows that 3,000 of those 4,000 firms have already purchased some Eurocodes. This suggests that industry is, to a significant extent, moving towards these new standards voluntarily – whether it be because they see benefits in terms of using standards that allow them to compete outside of the UK or because they have taken a professional decision to use the most up-to-date British Standards as a basis for their design and construction work.
- 49) However, average expenditure on purchase of the actual standards is currently only around £470 per firm. This means that on average these firms have spent only around a quarter of what we would expect firms to spend on purchasing the standards necessary. This suggests that some firms may be simply purchasing limited numbers of design standards to assess their potential implication, that some firms are perhaps choosing to move over gradually and/or some specialised firms would only have a limited standards requirement.
- 50) In addition, sales figures show that (as of June 2011) 235 firms had bought Eurocodes for the first time in the previous 12 months. If this trend were to continue it seems not unreasonable to assume that by 2013 only around 600 firms that might be expected to be a potential purchaser of Eurocodes had not yet purchased anything.
- 51) Further, the functional nature of the Building Regulations means that Eurocodes need not necessarily be used even if guidance in Approved Document A were updated to reference them. Instead engineers would be able to set out to a building control body why the alternative design approach they have taken satisfactorily addresses the safety provisions in the regulations. We believe that such an approach is likely only to be appropriate for the smaller sized firms (and perhaps some of the medium-sized firms) whose work is of a nature that will mean currently referenced (withdrawn) standards remain robust for continued use. We want to test with industry at consultation the number of firms that would be likely to take such an approach, however, for the purposes of consultation we estimate that around 300 firms will continue to use currently referenced standards.
- 52) Therefore only approximately 300 firms will have not committed to Eurocodes at all. For the purposes of establishing a total cost we assume that 240 of these will be the smaller, two person firm and 60 the larger 16 person firm (see paragraphs 35 and 44 above). This represents total costs of £13,585,200. Two hundred and forty firms will face estimated costs of £26,420 and 60 will have costs of £120,740.
- 53) However, there remain another 3,000 firms that as of now have incurred only 25% of the potential expenditure and the further 400 that we expect to purchase Eurocodes by 2013 voluntarily. Again the total costs are heavily dependent on the assumptions about how far these firms would move voluntarily towards Eurocodes in the absence of Option 2 being

taken forward. If we were to assume all of these firms are voluntarily already on their way towards adopting Eurocodes then there is no additional cost. If we were to assume that all of these firms would actually still have on average 75% of the cost to incur (and we use the previous 80/20 split for the type of firm) then there would be an additional cost of £115,474,200 on top of that set out at in the paragraph above. Neither of these assumptions appears realistic, given anecdotal evidence of a mixed picture of firms already adopting Eurocodes and the table below illustrates the impact on this additional cost having yet to be incurred by 25% and 75% of these firms. Again these were derived from the costs cited in paragraph 35 above. We propose for the purposes of this consultation to assume a mid-point of £57,737,100 and test at consultation how far industry is moving to the voluntary take-up of Eurocodes even in the absence of a regulatory driver.

54) The figures and assumptions set out above are summarised in the table below.

Item/Assumption	Number of firms	Cost (£m) – 1 Year	Cost (£m) – over 2 Years Discounted
Potential market for the Eurocodes (number of firms)	4,000		
Minus the 3,000 firms that have already purchased Eurocodes	1,000		
Minus the 400 firms that we estimate will purchase Eurocodes by 2013	600		
Minus the 300 firms that we assume will continue to use currently referenced standards	300		
Total number of firms that have not purchased any Eurocodes by 2013	300		
20% (60 firms) incurring the cost of a 16 person firm of £120,740		7.2	7.1
80% (240 firms) incurring the cost of a 2 person firm of £26,420		6.4	6.2
Total cost to firms that have not purchased Eurocodes		13.6	13.4
Number of firms that by 2013 will have purchased Eurocodes	3,400		
Central estimate of the additional cost relating to (50% of) the 3,400 firms		57.7	56.8
Total Cost – Central Estimate		71.3	70.1
High Estimate - Additional cost if 75% of these 3,400 firms still have 75% of the costs to incur		86.6	85.1
Low Estimate - Additional cost if 25% of these 3,400 firms still have 75% of the costs to incur		28.9	28.4
Total Cost Range		42.5 – 100.1	41.7– 98.5

- 55) Further, to illustrate how assumptions affect the overall estimated cost of Option 2, we have also applied a sensitivity test around the size of firms that would incur additional costs. We have considered what would happen if 70% of firms were of a smaller size and 30% of firms were of a larger size. The central estimate would be £85 million - a 21% difference between costs in a central case in both scenarios.
- 56) However, we believe that an assumption of an 80/20 split is a reasonable one to make for the purposes of consultation. On that basis, we estimate that the total cost of regulation would be approximately £71.3m in constant prices. We assume this happens equally over the first two years with a net present cost of £70.1m.
- 57) In addition, changes to the Building Regulations generally incur costs for building control bodies. The building control function is carried out by both local authorities and private sector Approved Inspectors. It will be up to the building control body to determine how they satisfy themselves that the Regulations have been complied with. However, where they select to check the structural design, this work will generally be carried out by a structural engineer (either employed directly or by buying-in this expertise). As such we believe the costs to building control bodies is accounted for in the assessment of the cost to the structural engineering sector set out above.

Benefits – Option 2

- 58) As stated above (see paragraphs 30-31), for smaller-scale development the actual cost of construction may be marginally lower using the Eurocodes-based standards than those currently referenced in Approved Document A. However, savings are relatively modest and may be largely offset by very small increases in the cost of constructing certain types of larger-scale building. For that reason we are not claiming any benefit in terms of reduced costs of construction of moving to Eurocodes in this Impact Assessment. We will test further at consultation whether it is reasonable to contend that there are no net benefits/costs relating to the cost of construction.
- 59) Although it is not possible to assess the benefits (or rather costs avoided), updating the standards referenced will continue to ensure that buildings are constructed using up-to-date and supported standards which ensure adequate minimum safety standards are maintained (beyond the 2015 date when existing standards are expected to be declared obsolete).
- 60) In addition, an additional positive is that industry as a whole will benefit from the benefits envisaged for the take-up of Eurocodes across Europe. These are:
- Providing a common design criteria and methods of meeting necessary requirements for mechanical resistance, stability and resistance to fire, including aspects of serviceability, durability and economy
 - Providing a common understanding and usage regarding the design of structures between owners, operators and users, designers, contractors and manufacturers of construction products
 - Facilitating the exchange of construction services between Member States
 - Facilitating the marketing and use of structural components and kits in Member States
 - Facilitating the marketing and use of materials and constituent products, the properties of which enter into design calculations as a common basis for research and development, in the construction industry
 - Allowing the preparation of common design aids and software
 - Increasing the competitiveness of the European structural and civil engineering firms, contractors, designers and product manufacturers in their world-wide activities.

Other Eurocodes consequential changes

61) In addition to the principal changes to Approved Document A, there are a small number of other changes to Approved Documents A (Structure), and C (Site preparation and resistance to contaminants and moisture), to reflect the updating of the currently referenced standards to ones based on Eurocodes. These consequential changes are:

Approved Document A

- Updating of wind speed map and associated texts for small residential buildings design guidance under A1/2 to reflect Eurocodes loading standards
- Updating of robustness guidance under A3 to reflect Eurocodes disproportionate collapse/robustness standards.

Approved Document C

- Updating of site investigation techniques under Section 1 to reflect Eurocodes geotechnical standards.

62) As with the main changes above we do not believe there to be any net increase in the cost of construction as a result of this updating. Also, as these changes affect the same people in industry as the principal changes to Approved Document A, we do not believe there to be any additional transitional costs to those firms. Similarly, the benefits to accrue are as for those non-monetised ones set out above.

Risks and Assumptions

63) The assumptions used in arriving at the costs of pursuing Option 2 are dealt with in turn in the preceding paragraphs. The consultation on this proposal will specifically seek evidence and views on the approach taken in this consultation stage Impact Assessment. In particular, given the impact on final estimates of costs, it will seek views on the following assumptions/costs:

- Costs/savings associated with the cost of construction are on the whole neutral
- The estimates on the individual elements of the cost on firms – in particular software, other design aids, productivity and familiarisation costs
- That large firms would have incurred the costs of moving to Eurocodes voluntarily
- That the make-up of those firms that will incur additional cost is 80:20 in favour of the smallest firms
- The number of firms that will not move over to Eurocodes within the 2015 timescale or at all
- That approximately a half of firms that will have purchased Eurocodes have yet to incur 75% of their costs.

64) We have considered risks in terms of the adverse effects this policy might have on small business although we have described how these might be mitigated below (see Small Firms Impact Test).

Wider impacts

Equalities Impact Test

65) An initial equalities screening of the proposed policy was carried out and determined that a full equalities impact test was not required as the proposal does not adversely affect any minority groups.

Competition Assessment

- 66) The proposed policy updates the standards that buildings should generally be constructed to. As such it does not make any significant change to how the UK market will operate, although the aims of Eurocodes are to improve competition and trade at the European level by the removal of technical barriers. An initial assessment indicates, therefore, that the policy proposal will not directly or indirectly limit the number or range of suppliers, limit the ability of suppliers to compete or reduce suppliers' incentives to compete vigorously.

Small Firms Impact Test

- 67) Generally, there are likely to be costs to many small and medium enterprises resulting from the implementation of the Eurocodes, in terms of training staff, in purchasing the Eurocodes (and supporting design aids) and in some initial reduction in productivity. Smaller firms are also less likely to have already incurred the cost of switching voluntarily to Eurocodes, partly because of the reasons above, but principally because they are less likely to be able to realise the benefits that Eurocodes potentially provide in terms of competing for work outside of the UK.
- 68) However, as stated above, although guidance in the Approved Document will be updated to reference standards based on Eurocodes, because of the functional nature of the Regulations, this represents only one way of achieving compliance. In order to ensure this flexibility is properly understood by business and building control bodies, it is proposed to supplement guidance in the Approved Document with additional advice that clarifies that:
- Until standards become obsolete in 2015, use of previously referenced standards would demonstrate compliance with the Building Regulations
 - Beyond 2015 use of these standards may still be acceptable and that building control bodies should accept an approach where a designer is able to demonstrate it is appropriate for the particular structure proposed. This is particularly likely to be appropriate for smaller-scale development.
- 69) This will assist business and small firms in particular, in two ways. First, it will provide at least an additional two years for firms to prepare for, and spread the costs over, the switch to a regime based on Eurocodes. Secondly, it will also allow certain types of firm, principally those very small firms whose work is made up of smaller-scale buildings in the domestic sector, to continue to use the currently referenced British Standards, thereby avoiding the additional costs associated with a switch to Eurocodes at all.
- 70) On that basis, it is considered that the proposals to change the guidance apply in a proportional and equitable way. As the changes are necessary to provide a regulatory framework into the future that complies with European requirements we will be seeking confirmation that they are out-of-scope of the moratorium on regulations affecting small businesses.

Environmental Impact Tests

- 71) It has been determined that this policy will not result in additional greenhouse gasses being emitted and have no impact on the wider environment.

Social Impact Tests

- 72) We do not expect the proposal to have any social implications.

Sustainable Development

- 73) We do not expect the proposal to have any sustainable development implications.

Summary and preferred option with description of implementation plan

- 74) Option 2 is preferred as it provides a regulatory framework into the future that continues to ensure buildings are structurally safe for people using them or circulating around them whilst complying with European requirements.