



Department for
Communities and
Local Government

Enabling power for Allowable Solutions

Final Impact Assessment



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March 2015

ISBN: 978-1-4098-4561-4

Title: Enabling power for Allowable Solution IA No: DCLG n/a Lead department or agency: DCLG Other departments or agencies: DECC, BIS	Impact Assessment (IA)
	Date: 10/02/15
	Stage: Final
	Source of intervention: Domestic
	Type of measure: Primary legislation
	Contact for enquiries: Stephen Porter
Summary: Intervention and Options	RPC Opinion: Green

Cost of Preferred (or more likely) Option				
Total Net Present Value £m	Business Net Present £m	Net cost to business per year (EANCB on £m	In scope of One-In, One-NA	Measure qualifies as NA

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

To meet its target of an 80% reduction in greenhouse gas emissions by 2050, the emissions footprint of buildings by 2050 will need to be ‘almost zero’. Homes have a long lifespan and represent more than one quarter of the UK’s carbon dioxide emissions. The government has committed to implement zero carbon homes from 2016 to help it achieve this reduction target. Taking action at the point of build of new homes can lock in efficient design, reduce energy demand and avoid future retrofit costs, though market failures, including information failure and misaligned incentives, mean this abatement will not happen without government intervention. However, government recognises that it would not be cost-effective or technically feasible to meet the zero carbon homes standard in all cases solely through measures on the building itself. It therefore intends to introduce a scheme that will allow house builders to help achieve the zero carbon homes standard through off-site carbon abatement measures. This scheme has been termed ‘Allowable Solutions’. ‘Allowable Solutions’ should ensure additionality, competition and encourage innovation and cost effective abatement.

What are the policy objectives and the intended effects?

The overall policy objective is to introduce a flexible framework – Allowable Solutions – which will provide house builders with cost effective options for carbon abatement to meet the gap between the maximum on-site carbon emissions target and zero carbon homes standard. There are currently insufficient powers to introduce Allowable Solutions through secondary legislation (the Building Regulations) and so an enabling power will be required. The specific policy objective is to introduce the necessary enabling power intended to give the government power to introduce allowable solutions at a later date through secondary legislation.

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

Option 1: Do nothing. Allowable Solutions policy is not taken forward.

Option 2 (Preferred Option): Establish an Allowable Solutions carbon abatement scheme to accompany the on-site carbon emissions requirements. This will need enabling powers to allow the government to introduce the secondary legislation for Allowable Solutions at a later date. This will be delivered by providing house builders with a ‘menu’ of delivery routes. .

Option 3: Establish an Allowable Solutions carbon abatement scheme to accompany the on-site carbon emissions requirements. This will need enabling powers to allow the government to introduce the secondary legislation for Allowable Aolutions at a later date. This will be delivered by a mandated local authority Allowable Solutions’ scheme.

Will the policy be reviewed? Yes. If applicable, set review date: 2015/16

Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	Micro Tbc	< 20 Tbc	Small Tbc	Medium Yes	Large Yes
	What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ 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 for Communities



Date: 25/02/15

Description: Enabling power for off-site carbon abatement projects with house builder menu delivery route

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:

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

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

Costs will only be realised when the enabling power is used. Possible costs of taking forward the enabling power are presented across a range of scenarios, which represent different price caps (see paragraph 10.5). Possible administrative costs are presented, based on a menu of different delivery routes with competition from which the house builder can choose (section 13 – 16). In practice it would be expected that costs would be below this cap. Further work will be undertaken for a future consultation at which point costs will be monetised for a consultation stage impact assessment.

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	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate			

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

Benefits will only be realised when the enabling power is used. Possible benefits of taking forward the enabling power are presented in section 20.

Other key non-monetised benefits by ‘main affected groups’

N/A

Key assumptions/sensitivities/risks

Discount rate

The indicative estimates below are based on preliminary understanding of Allowable Solutions delivery which involve a considerable degree of uncertainty. The upper estimate of costs described assumes that all Allowable Solutions are at the cap price and the benefits estimate assumes 75% additionality. The actual costs and benefits will depend on the price cap and delivery method chose and the types of projects chosen and other factors. These exploratory initial estimates have not been monetised in this development stage summary sheet.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of	Measure
Costs:	Benefits:	Net:		

Description: Enabling power for off-site carbon abatement projects with mandated local authority delivery route

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate:

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

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

Costs will only be realised when the enabling power is used. Possible costs of taking forward the enabling power are presented across a range of scenarios, which represent different price caps (see paragraph 10.5). Possible administrative costs are presented in section 17. Further work will be undertaken for a future consultation at which point costs will be monetised for a consultation stage impact assessment.

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	Optional	Optional	Optional
High	Optional	Optional	Optional
Best Estimate			

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

Benefits will only be realised when the enabling power is used. Possible benefits of taking forward the enabling power are presented in section 20.

Other key non-monetised benefits by ‘main affected groups’

N/A

Key assumptions/sensitivities/risks

Discount rate

The indicative estimates below are based on preliminary understanding of Allowable Solutions delivery which involve a considerable degree of uncertainty. The upper estimate of costs described assumes that all Allowable Solutions are at the cap price and the benefits estimate assumes 75% additionality. The actual costs and benefits will depend on the price cap and delivery method chose and the types of projects chosen and other factors. These exploratory initial estimates have not been monetised in this development stage summary sheet.

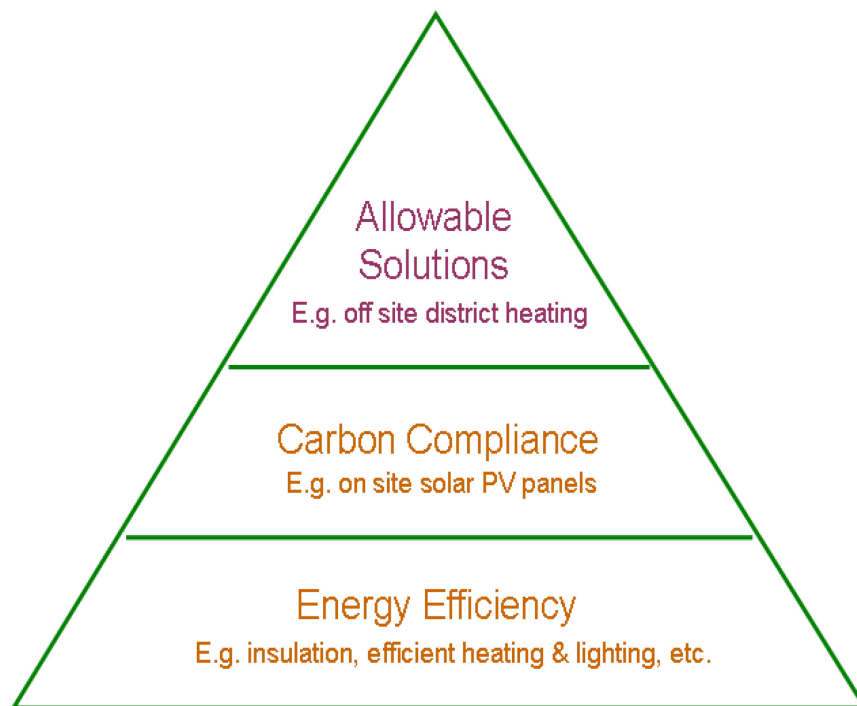
BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:	In scope of OIOO?	Measure
Costs:	Benefits:	Net:

Evidence Base

1. Introduction

1.1 The government is committed to zero carbon homes from 2016, which means that regulated emissions (those arising from heating, lighting, and other fixed building services) must have a net rate of zero. Theoretically this could be achieved solely through a combination of on-site measures including high standards of fabric energy efficiency; efficient building services and renewable energy measures. However, the government recognises that it may not be technically feasible or cost effective in all instances to meet the standard just through measures on or directly connected to the building. The government therefore intends to set a minimum on-site energy performance standard for new homes through the Building Regulations and for the remainder of the zero carbon homes standard to be met by house builders supporting off-site carbon abatement measures, doing more on-site measures or a combination of both – these are termed ‘Allowable Solutions’:



1.2 The zero carbon standard and the minimum on-site energy performance standard for new homes will be set in the Building Regulations to be introduced, following consultation, in 2016. However, while powers already exist to set those standards in the Building Regulations there are currently insufficient powers to provide for off-site carbon abatement measures (i.e. Allowable Solutions) to be allowed to demonstrate compliance with Building Regulations’ requirements for energy performance standards. Therefore, the government has introduced provisions in Section 37 of the Infrastructure Act 2015 to provide powers in the Building Act to enable Building Regulations to be made covering offsite carbon abatement measures.

- 1.3 The enabling powers will, in themselves, have no direct costs or benefits to business. The powers will be used to introduce secondary legislation to bring the zero carbon homes policy into force and there will be further consultation accompanied by relevant impact assessments on the secondary legislation once the powers are available. These further impact assessments will provide more detail on the practicalities of how the scheme will operate, and the associated costs and benefits of the policy.
- 1.4 Some onsite measures will be required as part of meeting the zero carbon standard. The government announced alongside the Queens' Speech that this threshold would be set in 2016 at a level requirements equivalent to the energy requirements set by level 4 of the Code for Sustainable Homes¹. This threshold has been used to set the baseline for considering the carbon to be abated by Allowable Solutions and as the 'do nothing' option.
- 1.5 The government has announced also that there would be an exemption for the requirements for small sites, which are most commonly developed by small house builders. An initial analysis of the impacts of the exemption is included in the small and micro business assessment section of this impact assessment.
- 1.7 Although the provisions Section 37 of the Infrastructure Act in themselves have no impacts on business, the government recognises the importance of indicating the range of potential impacts which might have effect when then powers are used. The government published a development stage impact assessment in Summer 2013 alongside its consultation on "Next Steps to Zero carbon – Allowable Solutions."² - which set out a projection of the estimated ranges of costs and benefits of Allowable Solutions. This impact assessment updates the analysis in last Summer's impact assessment in the light of information received in the consultation responses, responses to the Regulatory Policy Committee's comments on last Summer's impact assessment (see Annex A) and decisions made related to the introduction of the enabling legislation in the Infrastructure Act.

2. Background

- 2.1 Government has agreed to an 80% reduction of greenhouse gas emissions by 2050 relative to 1990 levels, which is legally binding under the Climate Change Act. This is in response to the overwhelming body of scientific evidence that indicates that climate change poses one of the greatest threats to modern society, with long term, persistent and costly effects.³ It is predominantly caused by emissions of greenhouse gases from human activities, particularly carbon dioxide which represented 85% of all greenhouse

¹ The Code for Sustainable Homes is a rating system of sustainability standards covering all aspects of sustainability, including energy performance, water usage etc. For the purposes of zero carbon and allowable solutions, all references made to "equivalent of Code 4" means setting the energy performance standards at the equivalent energy performance standards of level 4 of the Code for Sustainable Homes and does not include any of the other sustainability standards. Level 4 of the Code for Sustainable Homes broadly equates to an average 25% increase in energy efficiency across the build mix. More information can be found at: <https://www.gov.uk/Government/policies/improving-the-energy-efficiency-of-buildings-and-using-planning-to-protect-the-environment/supporting-pages/code-for-sustainable-homes>

² https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/6288/1905485.pdf

³ Stern Review on the Economics of Climate Change: http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/sternreview_index.htm

gas emissions in 2008.⁴ Around 26% of the UK's greenhouse gas emissions come from homes.⁵

- 2.2 The government's Carbon Plan finds that "by 2050 the emissions footprint of our buildings will need to be almost zero."⁶ This is in the context of requiring additional new homes in order to support a growing number of households in the UK. In its Low Carbon Construction Innovation and Growth Team Report, government highlighted the construction industry's pivotal role in the UK's carbon reduction programme.⁷
- 2.3 The Energy Efficiency Strategy⁸ and Strategy for Renewable Heat⁹ both identify the potential for further cost effective abatement from energy efficiency measures and renewable heat installations, but also point out that there remain significant barriers to achieving this potential.

⁴ http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

⁵ Based on 2009 UK GHG emissions by final user, available at:

<http://192.168.201.210:9090/progress?pages&id=1050373056&sp2&fileName=MTIxNS0yMDA5LWZpbmFsLXVrLWdoZy1lbWlzc2lvbnMtZGF0YS10YWJsZXMuGx&url=aHR0cDovL3d3dy5kZWVjLmdvdi51ay9hc3NidHMvZGVjYy9TdGF0aXN0aWNzL2NsaW1hdGVfY2hhbmdlLzEyMTUtMjAwOS1maW5hbC11ay1naGctZW1pc3Npb25zLWRhdGEtdGFibGVzLnhscw==&referer=aHR0cDovL3d3dy5kZWVjLmdvdi51ay9hc3NidHMvZGVjYy9TdGF0aXN0aWNzL2NsaW1hdGVfY2hhbmdlLzEyMTUtMjAwOS1maW5hbC11ay1naGctZW1pc3Npb25zLWRhdGEtdGFibGVzLnhscw==&foo=3>

⁶ The Carbon Plan: Delivering our low carbon future (2011):

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf

⁷ HM Government (2010) Low Carbon Construction Innovation and Growth Team Report www.bis.gov.uk/constructionigt

⁸ https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf

⁹ <https://www.gov.uk/Government/publications/the-future-of-heating-meeting-the-challenge>

3. Zero Carbon Homes Standard

- 3.1 In Growth Review 2011, the government set out its revised definition of the zero carbon homes standard.¹⁰ The zero carbon homes standard will require all carbon emissions arising from energy use regulated under Building Regulations to be abated. Regulated energy is that from such things as heating, hot water, ventilation and fixed building services. It does not include appliances. The government wants to give builders flexibility to choose the most cost effective route to meet this requirement. Therefore, in May 2011 the government announced that where house builders can deliver more ambitious carbon reductions on the site they will have the option to do so but where it is not cost effective government will ensure a mechanism is available that allows house builders to meet their commitments off-site at a cost no higher than the government's long-term value of non-traded carbon.¹¹ government said the intention was to work with industry on options for a mechanism to deliver these offsite measures, which will:
- be made available to all developers operating in England
 - be cost effective by ensuring offsite measures are no higher than the government's long term value of carbon
 - ensure that any funds raised will be dedicated to carbon abatement.
- 3.2 Government plans to reach the zero carbon homes standards through a staged approach of steadily strengthening Building Regulation requirements. Building Regulations are functional: i.e. they set out performance standards to be met but do not prescribe specific means as to how to do so. Part L (Conservation of Fuel and Power) of the Building Regulations requires developers to meet carbon and energy targets through measures taken on the building ('on site' measures).
- 3.3 Steps so far have been:2010: - Requirement in Part L of the Building Regulations for a 25% improvement above previous (2006) standard (the zero carbon homes standard represents a 100% improvement on the 2006 standard).Changes to Part L published in Autumn 2013 and which came into force in April 2014, have required a 6% uplift from the 2010 standard (which equates to a 29% improvement from the 2006 standard). Both the Part L 2010 and Part L 2013 steps can be met by on site measures like energy efficiency measures (insulation); efficient building services; and/or building integrated renewable energy measures like solar panels.

¹⁰

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/184602/2011budget_growth.pdf.pdf

¹¹ Written Ministerial Statement by Housing Minister: May 2011:

<http://www.publications.parliament.uk/pa/cm201011/cmhansrd/cm110517/wmstext/110517m0001.htm>

4. Rationale of Policy

4.1 The zero carbon homes standard will require all carbon emissions arising from regulated energy use to be abated. Including Allowable Solutions as part of the zero carbon homes standard is intended to minimise the costs of doing so by unlocking off-site abatement which is more cost-effective than full on-site abatement. By providing funds for off-site abatement Allowable Solutions are also likely to spur innovation in low carbon technologies and improve the quality of information on untapped offsite abatement opportunities.

4.2 The May 2011 impact assessment set out the rationale for setting a zero carbon homes standard for new buildings. The arguments, in summary, are as follows:

- Green house gas emissions have an external effect which is an uncompensated interdependency. Emissions from new homes would not fall to the extent required in the absence of some form of government intervention, since these emissions cause a negative externality (climate change) for which there is no compensation (via market prices)
- The onsite abatement part of the policy tackles a few further issues. It avoids a 'lock in,' by taking action now more expensive retrofit measures can be avoided later
- Due to poorly aligned incentives, there may be little incentive to construct highly energy efficient homes. Developers may not reap the benefits of lower energy bills, which may accrue to the house holder and because they may not be valued sufficiently by home buyers, they may not be factored into the prices of new homes. A builder of new homes is not just competing with other home builders, but also with the sellers of properties which come onto the market second hand.
- Home builders are price takers, not price setters. The ability therefore to charge premia in respect of benefits which are not well understood or appreciated by the buyer may be limited. There may be an information failure on the side of the home buyers. Until recently only few buyers in a niche market attached a premium to energy efficiency improvements that come with abatement but in general future energy savings were not taken into account.¹² However, new evidence indicates that energy efficiency may now be a factor influencing the sale price of most residential dwellings in England. The most comprehensive research in this area to date is a recent report, which took into account over 300,000 property sales in England between 1995 and 2011.¹³

¹² Department of the Environment, Water, Heritage and the Arts (2008), "Energy Efficiency Rating and House Price in the ACT" (<http://www.nathers.gov.au/about/publications/eer-house-price-act.html>); Brounen and Kok (2010), RICS, "On the economics of EU energy labels in the housing market" (http://www.rics.org/site/download_feed.aspx?fileID=7754&fileExtension=PDF); Nevin, R. and Watson, G., "Evidence of Rational Market Valuations for Home Energy Efficiency", The Appraisal Journal, 1998 (<http://www.slideshare.net/resnet/the-appraisal-journal-evidence-of-rational-market-valuations-for-home-energy-efficiency>); and Longstreth, M., Coveney, A., Bowers, J., "The Effects of Changes in Implicit Energy Costs on Housing Prices", The Journal of Consumer Affairs, Vol. 19, No. 1, 1985 (<http://onlinelibrary.wiley.com/doi/10.1111/j.1745-6606.1985.tb00344.x/abstract>), Kok, N./Kahn, M., The Value of Green Labels in the California Housing Market, July 2012, http://www.usgbc.org/sites/default/files/ValueofGreenHomeLabelsStudy_July2012.pdf

¹³ Fuerst, F./McAllister, P./Nanda, A./Wyatt, P., An investigation of the effect of EPC ratings on house prices, Final Project Report, Department for Energy and Climate Change, 17 June 2013, https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/207196/20130613_-_Hedonic_Pricing_study_-_DECC_template_2_.pdf

- 4.3 The May 2011 impact assessment concluded that in the absence of the zero carbon homes standard, and assuming that 120,000 homes are built in 2013, rising to 190,000 by 2020, approximately 30 million tonnes of carbon dioxide could be added to the UK's carbon account and therefore would need to be abated by action in other sectors of the economy in order to meet carbon budgets. There would also be an additional strain on the UK's energy infrastructure and this would have implications for the UK's ability to meet the targets for renewable energy required by EU legislation.¹⁴
- 4.4 The rationale for legislating for off-site carbon abatement measures to be allowed to contribute to energy performance standards in the Building Regulations and hence to include Allowable Solutions within the zero carbon approach is two fold. First it may not be technically feasible to be able to achieve the zero carbon homes standard through on site measures alone for all types of dwelling and for all types of development. Second, even where on-site measures may be technically feasible, they can be expensive and may not be cost effective in comparison with off-site carbon abatement measures

Technical Feasibility

- 4.5 Though highly insulated and air tight dwellings, for example using the Passivhaus standard, can go a long way towards the zero carbon homes standard, it can be an expensive approach and in any case there would still be some residual emissions for energy use which fabric insulation cannot cater for (eg hot water). Likewise the ability to use solar panels is limited by available roof space; and the use of technologies like ground source heat pumps also is limited by the topography of the development.
- 4.6 The independent Zero Carbon Hub considered the technical feasibility of various onsite thresholds in detail in its report 'Carbon compliance – setting an appropriate limit for zero carbon new homes'¹⁵ (February 2011). Technical feasibility was modelled for a range of standard house types and sizes, using a variety of existing energy technologies. The modelling showed that most of the on site thresholds within the ranges it considered, which was up to and including the zero carbon homes standard, required the use of renewable energy measures.
- 4.7 The mainstream technology for on-site low and zero carbon electricity generation was considered to be photovoltaic panels. The Zero Carbon Hub's model calculated the amount of photovoltaic required to achieve different on site thresholds. The model assumed that if this amount exceeds 40% of total ground floor area of the building, it may be necessary to design homes to maximise solar benefits, which may not be technically feasible on every site. The Zero Carbon Hub therefore took 40% of total ground floor area as a proxy indicator for feasibility. The modelling shows that, using this indicator, it was not feasible to meet the zero carbon standard in for most housing development cases (results are presented in figure 9 on page 16 of the report which are colour-coded to indicate degrees of feasibility).

¹⁴ para 17 of May 2011 IA;

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/6288/1905485.pdf

¹⁵ http://www.zerocarbonhub.org/sites/default/files/resources/reports/Carbon_Compliance-Setting_an_Appropriate_Limit-Findings_and_Recommendations.pdf

Cost Effectiveness

4.8 Even where on-site measures may be technically feasible, they can be expensive and may not be cost effective in comparison to other approaches. The May 2011 impact assessment analysed options for a higher on site threshold which were significantly less cost effective than an approach including Allowable Solutions. Furthermore, cost impact analysis undertaken by EC Harris¹⁶ in September 2014 for government’s Housing Standards Review considered, among other matters, the costs of meeting the energy requirements (ENE1 and ENE2) of Level 5 of the Code for Sustainable Homes which is equivalent to meeting the zero carbon homes standard through on-site measures. We have presented the data in table 1 below from appendix 2 of the EC Harris cost analysis report and combined this with projected indicative build rates and mix (table 2 below) to give a summary of the additional costs to business created by moving to an all on-site zero carbon standard. The totals in these columns are for the combined cost of meeting ENE1 and ENE2 of the Code for Sustainable Homes.

Table 1: Costs of meeting ENE1 and ENE2 of Code for Sustainable Homes Levels 4 and 5 for different dwelling types

Building Type	Cost of meeting Code 4 over and above Part L 2013 (£)	Cost of Meeting Code 5 over and above Part L 2013 (£)	Cost of Meeting Code 5 over and above Code 4 (£)
Semi-detached	623	12243	11620
Detached	924	16961	16037
Mid-terrace	473	10230	9757
Flat	409	2961	2551

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Table 2: Indicative build mix of dwelling types

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Phase-in	0%	40%	60%	90%	100%	100%	100%	100%	100%	100%	100%
All Zero Carbon Homes per year	0	64000	102000	162000	190000	190000	190000	190000	190000	190000	190000
Detached per year	0	12,800	20,400	32,400	38,000	38,000	38,000	38,000	38,000	38,000	38,000
Semi-detached per year	0	18,368	29,274	46,494	54,530	54,530	54,530	54,530	54,530	54,530	54,530
Mid-terrace per year	0	8,704	13,872	22,032	25,840	25,840	25,840	25,840	25,840	25,840	25,840
Flat per year	0	24,128	38,454	61,074	71,630	71,630	71,630	71,630	71,630	71,630	71,630

Using these estimates of the individual price per unit and the phase-in projections for the build mix, discounting at 3.5% and adjusting for learning rates, a projection of the net present values over the 10 year period 2016 to 2026 is given in the below:

Table 3: Net present value (£ million) by dwelling type for an all on-site approach

Building Type	NPV (£ million)
Semi-detached	3,318
Detached	3,191
Mid-terrace	1,320
Flat	957
Total:	8,787

The total net present value of £8,787 million results in an Equivalent Annual Net Cost to Business of £1.02 billion. The Equivalent Annual Net Cost to Business is the annualised value of the net present value which is estimated over the ten year appraisal period and is used by government to compare different regulatory impacts.

- 4.9 The data in these tables demonstrates the extra cost to business of an all on-site approach. The biggest increase in costs per unit is for detached houses, however due to the comparatively low representation of detached units in the build mix, it does not have the overall biggest increase in costs. This will be for semi-detached units. The overall increase in costs to business will be over £1 billion per year with an all on-site approach and further reinforces the reasons for not choosing this as a realistic policy option.
- 4.10 The government announced an on-site threshold equivalent to that set by level 4 of the Code for Sustainable Homes. This is typically around 20% better than the current (Part L 2013) standard, across the build mix. The residual emissions, once the carbon compliance standard is met would be abated through Allowable Solutions, including

further onsite abatement where appropriate or an offsite Allowable Solutions option if this is more cost effective. The residual emissions, once the on site threshold level is met are 14.48 kgCO₂/m² for a detached house, 15.16 kgCO₂/m² for a semi/end of terrace house and 13.73 kgCO₂/m² for a mid terrace house, and 14.6 kgCO₂/m² for a flat.

5. Policy Objectives

- 5.1 The main policy objective for Allowable Solutions is to provide house builders with a comprehensive, cost effective way of meeting the zero carbon homes standard. This will enable house builders to meet their carbon abatement obligations under Building Regulations in ways which are affordable, takes account of viability considerations and so does not have a significant impact on housing supply.
- 5.2 The policy intention also is to unlock carbon savings which would not otherwise have been brought forward thus helping meet carbon budgets. In particular, the policy can help promote additional energy efficiency measures, which represent cost effective ways of meeting carbon budgets and also help support low and zero carbon heating systems. In so doing, Allowable Solutions can also help leverage in extra funds for carbon abatement opportunities from the private sector and promote innovation in developing carbon abatement opportunities which can have positive economic effects.
- 5.3 In early 2011, the government invited industry to come forward with ideas for how Allowable Solutions might be delivered. The independent Zero Carbon Hub has published two reports on this subject¹⁷.

6. Options

- 6.1 The government has made a commitment to introduce the zero carbon homes standard from 2016. Due to the high costs and technical difficulties in meeting the zero carbon homes standard solely through on-site measures this government does not and never has considered it realistic policy option to require it a wholly onsite approach is not offered as an option. The counterfactual used in the impact assessment is therefore a 'do nothing' option whereby there would be no enabling power and hence no off-site carbon abatement contribution to energy performance standards in the Building Regulations. However, the impact assessment does provide estimated costs of meeting the zero carbon homes standard through solely on-site measures which can be compared with the cost of meeting the standard through a minimum on-site standard plus off-site carbon abatement / Allowable Solutions (see paras 4.7 – 4.9 above).

¹⁷ Allowable Solutions for Tomorrow's New Homes. Towards a Workable Solution, July 2011, http://www.zerocarbonhub.org/resourcefiles/Allowable_Solutions_for_Tomorrows_New_Homes_2011.pdf ; Allowable Solution. Evaluating Opportunities and Priorities, September 2012, http://www.zerocarbonhub.org/resourcefiles/Allowable_Solutions_Oct_2012.pdf

- 6.2 The government has analysed two options for taking forward the delivery of allowable solutions. The first is to provide house builders with a choice as to how they can meet their obligations through Allowable Solutions through what is called a house builder menu option with multiple routes to deliver Allowable Solutions. Given the policy intention to allow house builders maximum choice, a house builder might choose one route for all their developments; they might choose different routes for different developments; they might choose a combination of routes to meet their obligation in respect of a single development. .
- 6.3 A number of local authorities have expressed interest in setting up local arrangements for Allowable Solutions. We have therefore included an option for local delivery which we have assumed is broadly akin to the Community Infrastructure Levy, where a local authority or multiple local authorities ask for contributions from developers, with administration costs based on those for the Community Infrastructure Levy.
- 6.4 The options analysed therefore are:
- Counter factual: Do nothing.** This low carbon option is the baseline. It is based on the carbon compliance threshold equal to Code 4 of Sustainable Codes
- Option 2: House builder ‘menu’ option,** a national delivery route including the possibility of house builders doing it themselves, using a matching/brokerage arrangement and/or a fund. **This is the preferred delivery option.**
- Option 3: Mandated Local authority approach,** with administration costs associated with Community Infrastructure Levy administration costs.
- 6.5 An initial analysis of these options was undertaken in the impact assessment published with summer 2013 consultation on Next Steps to Zero Carbon – Allowable Solutions¹⁸. The following sections update that analysis as appropriate. The updated analysis takes account of further information and feedback received in the responses to the consultation, provides responses to questions raised by the Regulatory Policy committee on last Summer’s impact assessment, and takes account of decisions made in relation to the introduction of the enabling legislation in the Infrastructure Act.
- 6.6 It should be emphasised that the government still has to take decisions on the issues discussed on the following sections and there will be further consultation on proposals as the government develops its thinking. This impact assessment therefore does not represent any final policy positions. Further impact assessments will be prepared for future stages of the policy development and consultation process.

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Allowable Solutions

The following sections set out analysis of possible costs, benefits and impacts of Allowable Solutions. It is based in the impact assessment published with summer 2013 consultation on Next Steps to Zero carbon – Allowable Solutions. It talks account of further information and feedback received in the responses to the consultation, provides responses to questions raised by the Regulatory Policy committee on last summer's impact assessment, and takes account of decisions made in relation to the introduction of the enabling legislation in the Infrastructure Act.

7. Basic Approach

- 7.1 The basic approach for Allowable Solutions is to provide the maximum flexibility for house builders to meet their obligations. To achieve this, the consultation last summer proposed that house builders could meet their Allowable Solutions obligations in the following ways.
- 7.2 The first step is for the house builder to work out exactly how much carbon they need to abate through Allowable Solutions. This will be done by using what is called the National Calculation Methodology. This is an established process under Building Regulations. House builders will then be able to meet the requirement through any mix of the options below, depending on what offers them the most cost effective method of meeting carbon abatement requirement:
 - i. Undertaking the full 100% of carbon abatement on site (or through connected measures such as a heat network)
 - ii. Meeting the remaining carbon abatement requirement themselves through off-site carbon abatement actions – the 'do-it-yourself' option. This could include improving other existing buildings (e.g. retrofit installations), renewable heat schemes or building to a higher standard than the current Part L requirements on developments with extant planning permission before October 2016
 - iii. Contracting with a third party Allowable Solutions provider for them to deliver carbon abatement measures sufficient to meet the house builders' remaining carbon abatement obligations on their behalf. (This could include a contract with a local authority where it is able to offer a carbon abatement service, but house builders will not be obliged to use the local authority service)
 - iv. Making a payment which is directed to a fund which then invests in projects which will deliver carbon abatement on their behalf.

- 7.3 Under option (iii) three potential models for third parties to provide Allowable Solutions projects or measures for house builders have been identified:
- (a) a direct transaction with a third party (bilateral)
 - (b) contracting through a simple register/matching service
 - (c) contracting through a brokerage service.
- 7.4 It is not possible to estimate at this point how many house builders will take one of these routes as opposed to another. We would expect house builders to choose a route based upon a number of considerations: cost, risks, opportunities, corporate policy. The consultation sought views on the likelihood of each of these routes being chosen. In general consultees favoured either the first or last of these routes.
- 7.5 However, a key point of the policy is to provide an indication of the maximum cost to builders. This is vital to enable house builders to plan for the future, in particular when making long term investments in land. The way this would operate would be for government to set a maximum capped price for Allowable Solutions. For example, under option (iii) this could operate as a maximum price for transactions under the matching or brokerage systems; and under option (iv) as the maximum price of the payment into a fund. Section 9 below explores options for this capped price, which it is proposed is set as a price per tonne of carbon with three price cap scenarios – low, central and high.
- 7.6 The setting of this maximum price would therefore set a target for Allowable Solutions providers to bring forward Allowable Solutions projects at a lower price to win custom; or for house builders to develop their own solutions under options (i) and (ii) at a lower cost. At this point it is impossible to estimate accurately how far Allowable Solutions might be brought forward at a price below the maximum cap. So the analysis in this impact assessment is based on the assumption that all Allowable Solutions are delivered at the maximum prices under each of the pricing scenarios described below. Costs per unit, overall costs and benefits, net present values and other impacts have been calculated on that basis.

8. Allowable Solutions measures

- 8.1 Last summer's consultation sought views on the sorts of measures which could be counted as Allowable Solutions. These would be available under both options 2 and 3. One approach proposed was to prescribe a list of measures - anything not on that list would not count; an alternative is to set criteria which have to be met which could be accompanied with a list of excluded measures.

8.2 The criteria proposed were:

- **complementarity.** Projects or measures counted as Allowable Solutions would complement but not displace projects supported separately by other government programmes
- **market additionality.** Projects or measures would be those which would not otherwise have been brought forward by the market because of delivery barriers. This recognises that there is a deadweight risk
- **cost effectiveness.** This would be achieved by setting a ceiling price i.e. a house builder would not need to pay above this price. Competition would operate to deliver Allowable Solutions projects and measures below this price
- **carbon impacts.** Allowable Solutions projects or measures would need to be capable of delivering verifiable carbon savings at a cost effective price
- **spatial criteria.** Allowable Solution projects should be demonstrably of benefit to the citizens of the United Kingdom, and should take place in the United Kingdom.

8.3 These principles are reflected further in the approach to pricing and delivery models set out below.

8.4 For the purposes of consideration and analysis, however, indicative types of Allowable Solutions projects/measures have been identified. These could include:

- creation or expansion of sustainable energy infrastructure (eg district heating schemes, district heating pipework to connect to existing schemes / support new schemes, community Combined Heat and Power plant)
- retro-fitting of low carbon technologies in existing buildings, such as hard-to-treat solid wall insulation in existing housing, retro-fitting of existing communal buildings and non-domestic buildings
- investment in low carbon electricity generation assets
- investment in energy efficient infrastructure, such as low carbon street lighting
- energy storage solutions and demand-side management
- electric vehicle charging points
- energy-from-waste plants, such as anaerobic digestion
- low carbon cooling.

8.5 Analysis has identified the potential supply of Allowable Solutions projects or measures:

- heat networks. The government's Heat Strategy references research which suggests that 20% of heat demand has a heat density at which residential heat networks become cost effective and that 14% of demand could be served by networks if barriers are overcome¹⁹. Other analysis quoted in the Heat Strategy suggests similar potential;

¹⁷ The potential and costs of district heating networks, Poyry April 2009, referenced in The future of heating, meeting the challenge, Department for Energy and Climate Change, March 2013.
https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/190149/16_04-DECC-The_Future_of_Heating_Accessible-10.pdf

- Department for Energy and Climate Change analysis for the energy efficiency strategy presents an energy efficiency marginal abatement cost curve which suggests that it could be cost effective to reduce energy demand in the domestic sector by 56TWh in 2020²⁰
- solid wall insulation has a technical potential of 6.9m homes in England²¹
- analysis of opportunities for non domestic energy efficiency as a sector in which multiple market failures prevent investment happening notwithstanding the opportunities potentially available to achieve cost effective abatement, as identified by the Green Investment Bank.²²

8.6 Looking further ahead and recognising that Allowable Solutions will continue to need to be available to abate carbon into the 2020s, the government's analysis of the fourth Carbon Budget period (2013 – 27) has identified the need for further abatement in the buildings sector and has identified further cost effective abatement potential in a number of areas which could be supported by Allowable Solutions.²³

8.7 In 2010-2011 the Homes and Communities Agency supported a small number of low carbon district heating schemes through its Low Carbon Infrastructure Fund. This demonstrated the potential for support to unlock schemes which would not otherwise have been brought forward. Some case studies based on the Low Carbon Infrastructure Fund are included in section 20 on benefits.²⁴

8.8 It is recognised that this assessment of potential at this point is necessarily at a macro scale though the Low Carbon Infrastructure Fund evaluation which focuses on specific opportunities, provides useful analysis of specific interventions.

9. Allowable Solution Price Cap

9.1 The government is committed to setting a ceiling price for the Allowable Solutions to provide certainty to house builders on their maximum exposure. A market based approach is proposed which will encourage competition to bring forward projects into the market at the lowest reasonable price, given the flexible, criteria based approach outlined above. This should ensure that the actual Allowable Solutions price is significantly below this cap price, depending on the cap price set. Previous impact assessments²⁵ explaining

²⁰ "The Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK - Strategy and Annexes" Annex E, the energy efficiency marginal abatement cost curve, Department for Energy and Climate Change, November 2012, Figure E3 p. 87.

<https://www.gov.uk/Government/publications/energy-efficiency-opportunities-in-the-uk>

²¹ Final Stage Impact Assessment for the Green Deal and Energy Company Obligation, Department for Energy and Climate Change, November 2012.

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/42984/5533-final-stage-impact-assessment-for-the-green-deal-a.pdf, p. 35

²² The economics of the Green Investment Bank: costs and benefits, rationale and value for money, report prepared for BIS, Vivid Economics in association with McKinsey & Co., October 2011.

<http://www.bis.gov.uk/assets/biscore/business-sectors/docs/e/12-554-economics-of-the-green-investment-bank.pdf>

²³ https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/47613/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf See Table B7 and Charts B6-B8.

²⁴ <http://www.homesandcommunities.co.uk/district-heating-good-practice-learning-low-carbon-infrastructure-fund>

²⁵

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/226610/130731_ALLOWABLE_SOLUTIONS_CONDOC_FOR_PUBLISHING.pdf

the Allowable Solutions framework have used the non-traded carbon price values used in government policy appraisal to set this price cap. However, there are several options which could be adopted to set the price cap.

Option A) The current non-traded carbon price values used in government policy appraisal as central cap.

- 9.2 The price cap for Allowable Solutions could be set in line with the non traded carbon price series used in government policy appraisal. As the majority of Allowable Solutions would be provided in the non-traded sector the non-traded carbon price series can provide a reference point for the cost of potential Allowable Solutions. The non-traded carbon price series is the best estimate of the future price of non-traded carbon that is consistent with the level of marginal abatement costs) required to reach the carbon targets that the UK has adopted. The carbon values are based on estimated abatement costs of a range of measures. Setting the capped price of Allowable Solutions at this level will incentivise cost-effective abatement to mitigate climate change.
- 9.3 However, although the non-traded carbon price appraisal values are publically available and the underlying methodology has been subject to external scrutiny, the non-traded carbon prices are subject to uncertainty and there is a range around the central point estimate as reflected by the high and low non traded carbon price series. The preferred option for this analysis is to link the price to the non-traded value of carbon, as Allowable Solutions will be focussed on reducing emissions in the non traded sector, though this will be reviewed in due course as evidence is supplied on likely costs.
- 9.4 It is proposed that calculating the Allowable Solutions necessary to off-set any residual carbon would involve using the National Calculation Methodology (Standard Assessment Procedure or similar) to work out the residual carbon per year and then multiplying this figure by a 30 year abatement period. An earlier consultation sought opinions on whether a 30 or a 60 year period for Allowable Solutions should be used and while 60 years is often seen as the minimum design life of a house (for example based on Council of Mortgage Lenders guidance) many of the energy supply technologies which might be adopted under Allowable Solutions are likely to have a design life of around 30 years. Also setting a period of 30 years provides an approximation of the period beyond which the electricity grid will have been substantially decarbonised. Although Supplementary Green Book Guidance suggests an estimated pace for this decarbonisation for appraisal purposes, there is a degree of uncertainty associated with this and indeed with a range of assumptions about energy use in a new home 30 years after it is constructed. Figures from the Department for Energy and Climate Change show that it can be assumed there will be a reduction in the electricity emissions factor of 40% by 2020²⁶. Whilst there is a risk to zero carbon if the grid is not substantially decarbonised, the price of low carbon technologies is reducing all of the time. Figures from the Zero Carbon Hub/Sweet Group report “Cost Analysis, Meeting the Zero Carbon Standard”²⁷ suggested that the cost of

²⁶ https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/42918/4835-climate-change-agreements-cca-delivering-simplif.pdf

²⁷ http://www.zerocarbonhub.org/sites/default/files/resources/reports/Cost_Analysis-Meeting_the_Zero_Carbon_Standard.pdf

Solar Photovoltaic Cells were as low as £1,400-1,600 per kWp, contrasting with typical figures of £3,800 - £4,000 per kWp in 2010. If prices continue to become lower, then the market could drive homeowners towards replacing their low carbon technology with new low carbon technology. This would maintain the energy efficiency of their dwelling. Until we get nearer to 2020, it is not possible to be more specific about the extent to which the grid will be decarbonised. Further analysis of the implications of decarbonisation for the policy is needed, although an initial exploration of decarbonisation related issues is given in section 21 below.²⁸

- 9.5 Using the current October 2012 non-traded carbon price appraisal values (2012 prices) for a home built in 2017, which is required to abate 30 years of carbon, a simple average for the carbon price in the period 2017-46, would give £105 per tonne, while an average discounted at a constant 3.5% discount rate (Solar Photovoltaic Cells - year 2017) would reduce this to about £60 per tonne. The government intends to use the discounted price as routinely used in cost benefit analyses. Under this option the current estimated average non-traded carbon price of £60 per tonne for the period 2017-46, would have to be adjusted to reflect the inflation rate prevalent in 2017. This would have to be done irrespective of whether the Department of Energy and Climate Change's non-traded carbon price appraisal values are updated²⁹.

Option B) carbon price floor as low cap

- 9.6 The carbon price floor was introduced from 1 April 2013.³⁰ The government's target carbon price floor started at around £16 per tonne of carbon dioxide (tCO₂) and follows a linear path to £30/tCO₂ in 2020 and £70/tCO₂ in 2030 (both in 2009 prices).³¹ The aim of the price floor is to provide greater support and certainty in the carbon price to incentivise investment in low-carbon electricity generation. The carbon floor price has been set at a level to encourage investment without undermining the competitiveness of UK industry.
- 9.7 The carbon price floor trajectory will in practice set the minimum cost which UK based electricity generators will pay for carbon emissions associated with the production of electricity. This trajectory could also be used to derive a maximum price cap for Allowable Solutions. Although the majority of residual emissions after carbon compliance targets have been reached will probably be heat related, Building Regulations do not differentiate between the carbon externality caused due to electricity and heat usage. Also due to information and agency failures house builders do not in general take account of the externality arising from electricity usage in the absence of the zero carbon homes policy.

²⁸ The assessment period may be decreasing in the future reflecting the expected decarbonisation of the grid. If we used a 20 year assessment all prices and fund size would be 62% of the 30 year assessment period for the preferred non-traded option in the following analysis. The guidance estimate for decarbonisation can be found in supporting Table 3 at <https://www.gov.uk/Government/policies/using-evidence-and-analysis-to-inform-energy-and-climate-change-policies/supporting-pages/policy-appraisal>

²⁹ The non-traded carbon price appraisal values will be subject to review in 2016.

³⁰ <https://www.gov.uk/Government/consultations/carbon-price-floor-support-and-certainty-for-low-carbon-investment>

³¹ Budget 2014 announced a cap of £18 for the carbon price floor from 2016/17 to 2019/20. However, the full trajectory is not yet known so that the calculations here retain the assumptions of the previous IA.

9.8 To calculate a possible price cap using the carbon price floor 30 years of abatement was estimated from 2017 in 2009 prices using £23.18 in 2017, £25.91 in 2018, £27.96 in 2019, £30 in 2020 continuing up to £70 in 2030 out to 2046. Converting to 2012 prices, discounted at 3.5%, results in a price cap at **£36 per tonne**, which is the low cap option.

Option C) marginal onsite abatement cost as high cap

9.9 Some stakeholders have expressed the view that a high cap price could bring forward off-site abatement measures that otherwise would not be incentivised. However, this appears questionable since most developers may simply abate more onsite or use cheaper offsite measures available. One would also have to balance that for some smaller builders who cannot avoid paying the cap price it would negatively impact upon the viability of new house building. Furthermore a higher cap could negatively affect developers' access to finance for projects, as it would lead to more expensive lending for developers which may result in a decreased supply of new houses.

9.10 To undertake sensitivity in the impact assessment, an outlier based on the marginal cost of further onsite abatement beyond the on site threshold has been analysed. Previous analysis for Part L and by the Zero Carbon Hub have concluded that the most cost effective marginal onsite technology is likely to be solar photovoltaics, although it should be stressed that Part L is performance based and so technology neutral. Where a solar solution is preferred it is unlikely that developers receive direct benefits from bill savings which solar photovoltaics allows or directly receive Feed in Tariffs. Using analysis by Parsons Brinckerhoff for the Department for Energy and Climate Change on solar photovoltaic prices, this would set the cap at **£90 per tonne** (rounded) in 2012 prices. It is possible that house developers installing solar photovoltaics could receive a portion of the Feed in Tariff³². If developers received Feed in Tariffs support and this was netted off against the costs of solar photovoltaics, the marginal cost of using solar photovoltaics to deliver additional onsite abatement beyond the proposed on site threshold level in 2017, could be reduced to around £20 per tonne in 2012 prices³³. The Hub uses solar photovoltaics as the carbon compliance proxy because at the level proposed it is widely recognised that this is the cheapest technology at the margin.³⁴

9.11 The main considerations in deciding which pricing scenario to adopt are likely to be:

- the cost for house builders (see Table 4)
- the extent to which Allowable Solutions projects will be brought forward at the relevant price.

³² Such arrangements currently exist with so-called 'aggregators' who meet the costs of solar installation and maintenance in return for FITs tariffs.

³³ This assumes a Feed In Tariff depression profile as per the central scenario from the Feed In Tariffs Comprehensive Review Phase 2A Impact Assessment: however there is considerable uncertainty around future Feed In Tariffs given the depression mechanism which reduces tariffs based on observed deployment.

³⁴ After discussion with the Department for Energy and Climate Change the Standard Assessment Procedure analysis without energy savings is based on the Department for Energy and Climate Change's central estimate of the marginal cost for a sub-4kW roof mounted solar photovoltaics installation in 2016/17 of £1,416/ kwp in 2016/17 (2012 prices, source: Parsons Brinckerhoff, 'Solar PV Costs Update, May 2012'), a load factor of 850kWh/kW/yr (9.7%), 35 years lifetime (Department for Energy and Climate Change central assumptions for Feed In Tariffs modelling) to give a lifetime kwh per kw installed of £29,750. With a Standard Assessment Procedure emission factor of 0.527tCO₂/MWh this converts to £90.3 per lifetime tonne.

- 9.12 Whatever price is adopted, it is anticipated that the price will be reviewed and reset regularly, potentially every three years. We have used these three constant real prices for the whole of the appraisal period (2017 -26) for simplicity.
- 9.13 The benefits section presents some case studies of heat projects as examples of projects which could be considered at the prices proposed.

10. Maximum Cost per Dwelling and Maximum Size of the Allowable Solution Offset Fund

10.1 The maximum cost of the Allowable Solution for dwelling types is found by the chosen cap price and the residual emissions after compliance with the Building Regulations' requirements for onsite measures (the on site threshold). The residual emissions, once the onsite carbon compliance threshold is met are 14.48 kgCO₂/m² for a detached house, 15.16 kgCO₂/m² for a semi/end of terrace house and 13.73 kgCO₂/m² for a mid terrace house, and they are 14.6 kgCO₂/m² for a flat. We have used those figures to inform the analysis of the costs of Allowable Solutions. So for example, a 117.92 m² typical detached house with residual emissions of 14.48 kgCO₂/m² has a total residual of 1.708 tonnes per annum or 51.2 tonnes over 30 years. At a price of £60 per tonne this results in a maximum Allowable Solution price at the central cap of £3,074.

Maximum Allowable Solutions costs per dwelling (in 2012 prices, undiscounted), assuming minimum on-site zero carbon home carbon compliance and 30 years of CO₂ emissions required to abate, are given in Table 4 below. The "residual emissions" reported in the table are the total tonnes of carbon dioxide the home is estimated to emit over 30 years, excluding appliances, excluding the cost of building to the assumed onsite energy efficiency and carbon compliance standard from 2016.

Table 4: Maximum Allowable Solution costs per dwelling type with different cap prices.

Per dwelling	Detached	End terrace / semi	Mid terrace	Flat
Residual Emissions (t CO ₂)	51.23	34.7	31.42	23.91
£36/tonne	£1,845	£1,249	£1,131	£861
£60/tonne	£3,074	£2,082	£1,885	£1,435
£90/tonne	£4,611	£3,123	£2,828	£2,152

This excludes the cost of building to the energy efficiency and carbon compliance standards onsite.

10.2 To determine the maximum size of the Allowable Solution Offset Fund estimates of house building numbers and the phasing in of the building regulation are needed. The historical information on housing starts and completions is given in Figure 2 of the House

Building statistical release³⁵. For this initial indicative work we assume a steady increase in build rate out to 2020 and then a consistent 190,000 new homes per year for the rest of the appraisal period. These assumptions are for modelling purposes only and are not a projection of future house building growth. It also assumes that the economic effects, including access to credit, which caused a drop in build from 2008 are addressed and action to boost supply further, such as Funding for Lending and Help to Buy, takes effect. This estimate reduces the risk of underestimating the aggregate cost of the policy for house builders. Further consideration and modelling of build rate estimates, including further sensitivity analysis, will be carried out for future impact assessments.

10.3 The phasing in assumption for different types of dwellings is outlined in Table 5:

Table 5: Phasing in assumption for Indicative build mix estimates.

	Phase-in	All Zero Carbon Homes pa	Detached pa	Semi-detached pa	Mid-terrace pa	Flat pa
2016	0%	0	0	0	0	0
2017	40%	64000	12,800	18,368	8,704	24,128
2018	60%	102000	20,400	29,274	13,872	38,454
2019	90%	162000	32,400	46,494	22,032	61,074
2020	100%	190000	38,000	54,530	25,840	71,630
2021	100%	190000	38,000	54,530	25,840	71,630
2022	100%	190000	38,000	54,530	25,840	71,630
2023	100%	190000	38,000	54,530	25,840	71,630
2024	100%	190000	38,000	54,530	25,840	71,630
2025	100%	190000	38,000	54,530	25,840	71,630
2026	100%	190000	38,000	54,530	25,840	71,630

Potential Allowable Solution Money Flows

10.4 The maximum potential money cost flows (discounted from 2013 at 3.5%) for Allowable Solutions projects over the ten year appraisal period are outlined in Table 6. It is assumed that the policy will start to operate from 2017. This assumes that all Allowable Solutions will be costed at the cap price outlined above. This is an overestimate of the cost in practice, as the delivery mechanisms below should ensure that actual Allowable Solutions costs are all delivered at less than the cap price. It represents an initial upper maximum potential cost for Allowable Solutions given the cap price.

³⁵ The latest release can be found at:

https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/199172/House_Building_release_-_March_Qtr_2013.pdf. Data on new orders in the construction industry has provided evidence of an increase in build rates for new homes since 2009. This data can be found at <http://www.ons.gov.uk/ons/rel/construction/new-orders-in-the-construction-industry/q1-2013/index.html>. Table 2

Table 6: Discounted annual maximum cost estimates over 10 years.

Year	AS funding pot pa: £36/tonne	AS funding pot pa: £60/tonne	AS funding pot pa: £90/tonne
2017	£67,254,212	£112,090,353	£168,135,529
2018	£103,561,739	£172,602,898	£258,904,347
2019	£158,918,269	£264,863,782	£397,295,673
2020	£180,082,729	£300,137,881	£450,206,822
2021	£173,992,975	£289,988,291	£434,982,437
2022	£168,109,154	£280,181,924	£420,272,886
2023	£162,424,304	£270,707,173	£406,060,759
2024	£156,931,694	£261,552,824	£392,329,236
2025	£151,624,826	£252,708,043	£379,062,064
2026	£146,497,416	£244,162,360	£366,243,540

- 10.5 Adding the discounted total for each year between 2017 and 2026 in Table 6 provides a present value cost of **£2.45bn** for the £60 cap. This then provides an equivalent annual net cost to business figure of **£286m (in 2009 prices)**. The £36 scenario in Table 6 results in a present value cost of £1.47bn and the high price scenario a present value cost of £3.67bn. The government intends to exempt smaller construction sites and has consulted on this. The percentage of Allowable Solutions' payments would accordingly have to be adjusted.³⁶ The government has commissioned analysis from the construction data company Barbour ABI (see section on small business assessment at para 22.16) which indicates that 21.4% of planning applications in England in 2013 were for sites with 10 or less dwelling units. The costs shown in tables 6 and 7 are quoted in this impact assessment, have not been adjusted to reflect any exemption (see paragraphs 21.11 – 21.12 for an analysis of the possible impacts of this exemption).
- 10.6 This estimated cost figure to business assumes that developers will bear the full burden of the cost of Allowable Solutions. This would be appropriate for projects where the cost per tonne is already net of any energy saving benefit stream. Where the house builder is undertaking Allowable Solutions itself, either alone or in partnership with others, it may be able to earn a portion of future revenue from energy savings as well, albeit that this is likely to be associated with taking on additional cost, risks and potentially hassle. Where the house builder is undertaking more abatement onsite it may recover some costs through a higher house price for a more energy efficient home.
- 10.7 Translated onto a financial year basis, discounted from 2013 at 3.5%, the potential Allowable Solutions money flows are set out in the table below.

Table 7: Maximum cost estimates over the first four financial years (£m)

£m	£36/tonne	£60/tonne	£90/tonne
2016/17	16.8	28.0	42.0
2017/18	76.3	127.2	190.8
2018/19	117.4	195.7	293.5
2019/20	164.2	273.7	410.5

- 10.8 The High price estimate above is most likely to ensure that there is a pipeline of abatement projects which can be undertaken, but risks a substantial additional cost burden for house builders which could impact on viability and built rates in some areas. Ultimately this would depend on the criteria associated with Allowable Solutions. The Low price estimate above could ensure that there is a lower ceiling on costs for house builders but at the risk that, given the criteria, it may not be possible to ensure a pipeline of abatement projects. These issues will be explored by further analysis carried out to inform future more detailed impact assessments.

11. Delivery Options

- 11.1 This section of the impact assessment describes the three delivery options, and the potential administrative costs associated with them. The costs of Allowable Solutions themselves are assumed for this analysis to be the same for each of the options. The difference will be in administration costs.
- 11.2 The administrative costs quoted in this section are illustrative only. At this stage, while we seek views on design principles, we cannot provide estimates of administrative costs with any certainty. That will depend on detailed design of the Allowable Solutions model which will follow at the next stage and which will be the subject of further consultation. We have identified some schemes which have some analogies with aspects of the way Allowable Solutions might be administered and have referenced these costs by way of illustration. **Where references are made to existing schemes and existing bodies, it should not be assumed that this indicates any preference by government for those bodies to be involved in the administration of Allowable Solutions.**

12. Do Nothing

- 12.1 The government has announced energy efficiency requirements equivalent to level 4 of the Code for Sustainable Homes as the minimum on-site carbon compliance level. Those thresholds therefore are the best proxy for a do nothing scenario i.e. a scenario without any Allowable Solutions provision, but still with a step-up to a new baseline.
- 12.2 Under a “do nothing” scenario, the costs of Allowable Solutions will not be incurred by house builders. However, it is not necessarily a cost free option as it is likely that some local authorities will instead set up their own Allowable Solutions schemes as some, such

as the London Borough of Islington³⁷ and Brighton and Hove³⁸, are doing already. Without a national framework for Allowable Solutions, local authorities would be free to set their own price levels and determine the sorts of measures which they would support. The price levels could be higher in some areas than others which would create uncertainty for developers and affect viability. Also, given that these schemes are likely to be focussed on the area of the local authority concerned, opportunities for more cost effective or strategic investments in carbon abatement schemes may be lost, leading to a less efficient allocation of resources to carbon abatement.

- 12.3 Furthermore, a “do nothing” option will have opportunity costs for society in terms of carbon savings foregone. As explained in section 4.2 there are insufficient market incentives to encourage house builders to bring forward zero carbon homes without government intervention. Therefore the benefits in terms of carbon savings described in section 20 will be foregone.
- 12.4 Furthermore, as the carbon savings from the zero carbon homes policy have already been factored into the government’s strategy for delivering the statutory carbon budgets set under the Climate Change Act, alternative interventions will need to be designed and implemented to find equivalent savings, which may not be as cost effective as Allowable Solutions.
- 12.5 There are no administrative costs associated with this option above any transition costs associated with the Building Regulations uplift in 2016. There will be costs associated with house builders having to familiarise themselves with new Regulations and training costs. We assume similar transition costs to those incurred for changes to Part L of the Building Regulations. The impact assessment accompanying the 2013 changes to Part L of the Building Regulations estimates the total transition cost for both homes and non-domestic buildings as £5.04m of which 46% or £2.3m is for new homes. This is broken down by external training, internal training, familiarisation and a cost to small construction firms from having initial applications turned down. The estimate is broken down as:

Table 8: Estimated Transition cost to business (£m)

External training cost	0.3
Internal training cost	0.5
Total training cost	0.8
Familiarisation cost	0.9
Application cost on small builders	0.6
Total transition cost	2.3

³⁷ Page 13 of [http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/\(2012-10-22\)-Environmental-Design-SPD-FINAL.pdf](http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/(2012-10-22)-Environmental-Design-SPD-FINAL.pdf)

³⁸ [http://www.brighton-hove.gov.uk/sites/brighton-hove.gov.uk/files/downloads/ldf/adopted Sustainable Building Design SPD 8 ANNEX.pdf](http://www.brighton-hove.gov.uk/sites/brighton-hove.gov.uk/files/downloads/ldf/adopted_Sustainable_Building_Design_SPD_8_ANNEX.pdf)

- 12.6 The 2016 Part L step is likely to require a more substantial and more complex tightening of standards than the previous change, including for energy efficiency standards. This is likely to involve a higher transition cost in order for those involved to understand and implement the new standard to comparable performance levels. An additional increase in internal and external training and familiarisation of 50% higher than assumed for 2013 Part L, gives an indicative upper estimate of one off transition cost for this initial analysis of **£3.5m**. Further work will be undertaken to assess this in more detail.
- 12.7 As noted above, there is a risk in a “do nothing” scenario that different local authority off-site funds could be established in isolation leading to lack of co-ordination, inconsistencies in approach, inefficiencies in delivery and potential additional cost burdens to house builders who would have to cope with a variety of different structures.
- 12.8 For simplicity and in order to assess the cost of Do Nothing against a clear baseline, this cost has not been monetised in this option. However, if different local schemes did emerge, there would be similarities with costs analysed under Option 3 below, where administrative costs of a mandated local authority approach are considered.

13. Option 1: House Builder ‘menu’ option.

- 13.1 As noted above, builders will have a choice of four routes to deliver the remaining carbon abatement above the onsite minimum likely to be required by the Building Regulations from 2016:
- i. Undertaking the full 100% of carbon abatement on site;
 - ii. Meeting the remaining carbon abatement requirement themselves through off-site carbon abatement actions – the ‘do-it-yourself’ option;
 - iii. Contracting with a third party Allowable Solutions provider or work with the local authority for them to deliver carbon abatement measures sufficient to meet the house builders’ obligations.
 - iv. Making a payment which is directed to a fund which then invests in projects which will deliver carbon abatement on their behalf.
- 13.2 Building control bodies would receive certification from these routes as part of their sign off process.
- 13.3 This approach allows for house builders to ‘mix and match’ and the consultation invited views on the likelihood of house builders choosing one of these routes as opposed to another. Consultation responses suggested that house builders would prefer option (iv) – the Fund – with some interest in option (iii) – contracting with a third party. However, at this point the government intends to continue to work on all four elements of the menu set out above. It also means that at this point ranges of potential administration costs only are provided. Where appropriate, analogous schemes are identified and relevant administrative costs referenced to as a way of indicating possible benchmarks. Additional familiarisation costs will involve house builders needing to take time to understand the implications of the different routes outlined below in order to decide their preferred approach. However, the house builder can choose simply to pay into a fund, as one route, which will involve very little familiarisation. So the decision to explore alternative routes, such as do-it-yourself or bilateral routes, will in itself be an option which they could avoid. This familiarisation cost has not been included in this impact assessment.

We agree however with the Regulatory Policy Committee that these costs exist and we will seek further evidence in a future consultation.

- 13.4 The familiarisation and training costs for house builders for meeting onsite standards will be as analysed in paragraph 12.3 above giving the same one off cost of £3.5m broken down as outlined above.
- 13.5 We do not envisage that there should be any extra compliance administration costs for house builders under **route (i) – 100% onsite** as this process follows the normal building regulations compliance process as the measures being taken can be accommodated within the National Compliance Methodology (Standard Assessment Procedure). Likewise, there would be no need for any extra verification arrangements as the compliance checking will be undertaken by building control as under current Building Regulations' requirements. However, there would be an additional process cost for delivering a 100% onsite cost. Estimates for Code Level 5 of the Code for Sustainable Homes suggest that this would be around £200 per dwelling. A proportion of this cost will be for non energy related aspects of the Code, such as water standards. Further work on this additional process cost will be undertaken, but an initial indicative estimate on the basis that the energy element of this is responsible for 50% of the Code process cost results in an administrative cost of **£100 per dwelling**.
- 13.6 Compliance with **route (ii) – do-it-yourself offsite** would be undertaken through similar processes to route (iii) below although with lower search and transaction costs as the work would be being undertaken 'in house'. An initial indicative estimate is that they would be half of the administrative costs of using third parties (option (iii) which estimates 5%) or 2.5%. The upper maximum equivalent annual cost, based on a scenario where all new homes used route (ii), is £286m which suggests a maximum administration cost of £7.1m. This is a ceiling estimate which is highly unlikely in practice. If a simple 20% breakdown for each route is assumed then this would suggest an upper **administration cost of £1.4m** per annum although it should be stressed that this is an indicative working assumption at this stage. It should be note that the £286m cost figure is based on all abatement at the £60 cap price to provide an upper estimate. In practice we would anticipate that house builders would only choose route (ii) if it could achieve abatement at substantially less than this.
- 13.7 Under **route (iii) - bilateral**, house builders and Allowable Solutions providers can negotiate bilaterally and agree a contract for the delivery of the project/measures and release of the carbon savings so obtained to the house builder. This could take the form of a one off transaction; or could be developed into a longer term engagement; or could involve a formal partnership e.g. in the form of the house builder and Allowable Solutions provider setting up a separate entity such as an energy savings company.
- 13.8 This route would include the possibility of involving a local authority as a partner in a local project. Potentially the local focus of the project could be an asset for the house builder especially if it involves a benefit to the area which is visible to local residents potentially affected by the new residential development. However, the house builder would still have the option of choosing one of the alternative routes, for instance if the local authority project was considered a costly abatement option.
- 13.9 Administration costs for route (iii) could involve search costs for house builders if they are seeking to undertake arrangements bilaterally and the transaction costs involved in setting these up. This approach has some analogies with the previous government's

Community Energy Savings Programme under which energy companies had to support community energy savings measures. The previous government's impact assessment³⁹ calculated the administrative costs for energy companies, such as search costs and transaction costs of around £27m on a programme valued at £365m i.e. around 7%. Annex A of the Community Energy Savings Programme impact assessment uses an empirical formula which assumes that low unit cost measures, such as loft insulation will have a higher percentage administration cost (20%) than high unit cost measures such as community combined heat and power installations (3%). We would expect that Allowable Solutions would involve higher unit cost measures. A working assumption would therefore be to assume an administrative on cost of 5% for house builders if they were seeking their own bilateral arrangements. If all projects above were delivered under this measure, which is a ceiling estimate highly unlikely in practice, then the upper maximum estimate would be an equivalent annual administrative cost of around £14.3m. If we take a simple 20% for each route assumption the cost estimate will be **£2.9m**. The Community Energy Savings Programme estimate assumes that both one-off transition costs and ongoing costs are included in this estimate. Again this is a working assumption. We will undertake further analysis to understand better administrative costs for future impact assessments.

14. Route (iii) - Matching/Brokerage

- 14.1 Another **route is (iii) – matching/brokerage** option which would involve setting up a matching or brokerage service for Allowable Solutions to enable a cost effective and transparent mechanism by which house builders can locate suitable providers. This would involve Allowable Solutions' providers placing their project on a register for house builders to access. This would minimise search costs. Transaction costs would be a matter for negotiation between the provider of the matching service, house builders and Allowable Solutions providers. There would be likely to be a fee for joining the register and then a transaction fee each time the register is used.
- 14.2 One possible analogy is the industry Robust Details Limited scheme under which house builders can use approved products as a way of demonstrating compliance with regulatory requirements to minimise the passage of sound. If this approach was followed, an Allowable Solutions provider would pay a fee to have their project registered as an Allowable Solutions measure (i.e. verified as meeting appropriate conditions) while a house builder could pay a fee to access the register of projects. Standard terms and conditions could be provided to simplify transactions. The Robust Details Limited schemes charges a fee of £30 per plot to use the scheme (borne by the house builder) and around £10,000 for a product approval (borne by the supplier).
- 14.3 A development of this approach would be a brokerage system. The Energy Company Obligation brokerage system has been set up to bring together energy suppliers who have to meet carbon reduction obligations and potential suppliers of Energy Company Obligation qualifying actions. Suppliers put forward lots of qualifying actions and energy suppliers bid against these. The highest bidder secures the lot. The model could be used

³⁹ http://www.legislation.gov.uk/ukxi/2009/1905/pdfs/ukxiem_20091905_en.pdf

for Allowable Solutions on the basis that house builders could offer to buy into projects or support measures which deliver sufficient carbon abatement to meet the house builder's obligations. Allowable Solutions providers would offer prices for their projects. In this case it would be the lowest bids which would win the lot. The Allowable Solutions capped price (see Section 9 above) would in effect act as a maximum price.

- 14.4 The Energy Company Obligation brokerage platform service is run for government by an outside supplier. The regulator, Ofgem, sets out the rules under which the Energy Company Obligation brokerage system works.
- 14.5 The consultation stage impact assessment for the Energy Company Obligation Brokerage scheme⁴⁰ makes estimates for the administration costs of the scheme which seem appropriate for an initial exploratory analysis of possible administration costs for any Allowable Solutions brokerage scheme. An important difference is between the Energy Company Obligation brokerage which involves a small number of energy supply companies, and Allowable Solutions which would be more likely to involve rather more of the larger house builders if the brokerage is designed so as to be an attractive route for meeting the regulation.
- 14.6 For this estimate we use the Energy Company Obligation brokerage impact assessment approach and assume a typical hourly wage rate of £44.14. This is based on a mid point between an estimate by EC Harris, a consultant active in the construction industry, and the Standard Cost Model approaching of taking Annual Survey of Hours and Earnings estimates and adding 30% for overheads. For one off familiarisation costs, it is estimated that 50% of house builders employing more than 13 staff (estimated at 675 firms) will seek to become familiar with the brokerage scheme, involving 15 hours work per firm, to give a rough initial estimate of £0.47m. This is likely to be an upper end estimate of the number of firms wishing to become familiar with a brokerage scheme. On the basis of the same indicative cost as Energy Company Obligation consultation impact assessment for installers and providers this would produce an initial indicative cost of £0.12m, to give a total one off familiarisation cost to business of **£0.6m**. Based on the government cost of setting up Energy Company Obligation Brokerage, gives an initial indicative estimate of **£0.5m**, though no conclusion has been reached at this preliminary stage on the potential financing of this. This gives a total one off cost of £1.1m.
- 14.7 Based on the Energy Company Obligation Brokerage running cost estimate, the running cost for the scheme will be approximately **£0.5m per annum**. Energy Company Obligation brokerage also includes an authorisation cost as it is important that energy suppliers (or for Allowable Solutions house builders) are given assurance as to the quality of potential businesses with whom they are matched. This should be comparable with Energy Company Obligation Brokerage involving a authorisation cost of £0.44m every five years or an average of **£0.1m per annum**.
- 14.8 Presumably costs for the operation of the brokerage would be in addition to the costs of managing the bilateral relationship as outlined for Route (iii) – bilateral above. However,

⁴⁰ https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/66557/7237-cons-stage-ia-eco-brokerage-cons.pdf

there would be potentially lower search and transaction costs. An initial indicative estimate, based on the costs being 70% of those for the full bilateral approach above would suggest a cost of £10m if all new homes adopted the Brokerage route or **£2m per annum** if the simple 20% proportion of the total build was through this route. Again this is very much an initial upper estimate based on the Allowable Solutions cost being at the central maximum cap price. Further analysis on administration costs of brokerage will be developed. As this is a voluntary route, no house builder is currently anticipated to be mandated to use brokerage, it would be expected that house builders would only use this route if it was substantially cheaper than the cap.

- 14.9 If the full brokerage specific costs outlined in the previous paragraphs are added to 20% of total build using this route then the total initial indicative administration cost element is **a one off cost of £1.1m and an ongoing cost of £2.9m per annum**. As already indicated, further analysis will be needed to estimate the likely up take of brokerage once the Allowable Solutions approach is firmed up. This would have the added benefit of enabling a more transparent and potentially more cost effective matching mechanism which could reduce costs of Allowable Solutions to house builders.

15. Route (iv) - Fund Option

- 15.1 Under this model, a national “funder of funds” would be established. This is the model which the Green Investment Bank has adopted for investments of less than c£30m (it is very unlikely that any individual Allowable Solutions project will come at all close to this threshold). In particular, the Green Investment Bank has committed £100m to two specialist fund managers to be invested for commercial returns in non domestic energy efficiency projects⁴¹.
- 15.2 Were the proceeds from a fund to be invested in a similar way, there is the potential to secure significant extra carbon savings through the mobilisation of additional private sector funds for co-investment; the fund price could potentially be adjusted to take this into account. We have made no assumptions about this in this impact assessment. Furthermore, if invested for commercial return, both Allowable Solutions payment capital and profits could be reinvested on a revolving fund basis to increase long-term potential carbon savings.
- 15.3 Under this model there would be the cost of collecting monies and then administering their disbursement by the funds. Administration costs will be dependent on decisions about the setting up and management of a Fund, especially whether an existing organisation could collect contributions and manage the Fund or whether a new structure would need to be established. One model for a national collection scheme exists with the way that the Environment Agency operates the CRC (Carbon Reduction Commitment) Energy Efficiency Scheme, and the administration of allowances under the EU emission trading scheme. The Environment Agency charges for these operations.

⁴¹ <http://news.bis.gov.uk/Press-Releases/Government-appoints-fund-managers-for-non-domestic-energy-efficiency-projects-67e4a.aspx>

The Environment Agency Corporate Plan for 2011/15 assumes a charge of £10m for 2010/11 and then £6m for running these schemes for each of the following four years⁴².

- 15.4 With regard to the administration costs of managing funds, we would expect that a management fee would be charged by the fund. This would be a matter for negotiation but, based on standard fund management fees, this might be in the region of 1-2% of the funds disbursed, charged to investors. A reduced price could potentially be negotiated if agreement is reached that the fund manager can benefit from a proportion of returns if these are above a particular minimum level. For the purposes of this initial analysis it is reasonable, based on similar schemes, to estimate a 2% administration charge for the funds as an indicative upper estimate for this approach. This would include a contribution to the setting up of the Fund and an ongoing cost for collecting funds from house builders and distributing to the Funder of Funds. The collection mechanism would also have a set up cost. For this initial exploratory analysis we make an indicative estimate, based on similar schemes, that the collection mechanism set up costs would be **around £4m**. Further work will be needed to make a more detailed estimate.
- 15.5 If all new homes are built using this route then the 2% administration charge above would incur an annual cost of around £5.7m or if we use the simple 20% proportion the cost incurred would be **£1.1m**. In practice it may well be that a much higher proportion of developers than 20% would use a well managed Fund once it is established, given that it would be simpler and involve fewer risks than the other routes.

16. Verification/Oversight

- 16.1 Verification arrangements will be needed to provide assurance of additionality and that expected carbon savings are delivered. It is envisaged that these will be a mix of *ex ante* and *ex post* verification arrangements. *Ex ante* arrangements will apply in respect of measures where a reasonably robust estimate can be made of the savings to be delivered by those measures. This is the model applied, for example, to the Energy Company Obligation as energy suppliers have to demonstrate that they have met their obligation by supporting what are called qualifying actions, for which carbon savings have to be calculated⁴³. The relevant carbon savings are calculated using a version of the National Calculation Methodology. This principle is, we believe, capable of being applied to a number of Allowable Solutions measures.
- 16.2 government has also established various quality assurance schemes for carbon reducing measures which also are potentially available for Allowable Solutions, for example the Micro-generation Certification Scheme, the Combined Heat and Power Good Quality Scheme, Green Deal/ Energy Company Obligation quality assurance scheme.

⁴² <https://publications.environment-agency.gov.uk/skeleton/publications/ViewPublication.aspx?id=d2133106-545d-44d4-8bc7-24236826fef0>

⁴³

[http://www.ofgem.gov.uk/Sustainability/Environment/ECO/guidance/Documents1/Energy%20Companies%20Obligation%20\(ECO\)%20Guidance%20for%20Suppliers%20-%2015%20March.pdf](http://www.ofgem.gov.uk/Sustainability/Environment/ECO/guidance/Documents1/Energy%20Companies%20Obligation%20(ECO)%20Guidance%20for%20Suppliers%20-%2015%20March.pdf)

- 16.3 *Ex post* verification would involve measuring the delivery of savings. This may be most appropriate for district heating schemes where preliminary estimates of carbon savings only could be provided *ex ante* and therefore *ex post* monitoring would be needed.
- 16.4 Costs will depend on whether verification/oversight is undertaken by an existing body or a new body is set up. Existing schemes with oversight arrangements which might be analogous to the verification requirements to support Allowable Solutions include⁴⁴:
- Green Deal oversight body: set up cost of around £10m over 2 years, ongoing cost of £3m pa
 - Energy Company Obligation administrator: set up costs £1.3m; ongoing costs £2.5m pa.

Our initial view is that verification and oversight activities for Allowable Solutions might be more akin to the tasks undertaken by the Energy Company Obligation administrator.

- 16.5 It should be noted that the robustness of and resources put into monitoring and verification processes are likely to have an impact on the level of additionality achieved for the policy. Further work is therefore needed on the resource requirement for verification as the policy options develop further during and post consultation. Any estimate for this impact assessment is therefore only preliminary and indicative. In addition, there is likely to be some overlap between the administration cost estimates in this impact assessment and verification requirements. For the purposes of this impact assessment we make an initial indicative assumption, based on comparable initiatives such as Energy Company Obligation, Green Deal and Carbon Reduction Commitment Energy Efficiency Scheme, that additional verification costs for all new build will be approximately **£3m pa** and that set up costs are included in the administration estimates.
- 16.6 No assumption is made as to whether verification costs are recoverable from house builders eg as an on cost to the price of Allowable Solutions, or funded in some other way.
- 16.7 The proposed enabling provisions in the primary legislation will also allow for the creation and maintenance of a register for keeping track of the use of certificates of carbon abatement measures undertaken to be used as evidence of compliance with Building Regulations. Based on an interview with a contract manager of an existing running register it is estimated that the total net present costs over ten years for the register would be in the border of £7.3 million, including set up costs of £1.4 million. This is after adjusting for differences in volume, required data items and potential change requests to service delivery. Detailed information cannot be disclosed because the information is commercially sensitive. Set-up costs are assumed to be recouped over the period.

⁴⁴ Final Stage Impact Assessment for the Green Deal and Energy Company Obligation, p.76 and p. 94. The IA provides an NPV of £9.2m for the set-up cost of the oversight body and the price base is 2011.
https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/42984/5533-final-stage-impact-assessment-for-the-green-deal-a.pdf

17. Option 3: Mandatory Local Authority Solution

17.1 This would go further than giving the developer the choice of involving the local authority as a possible partner in a route (iii) – bilateral option above, or bidding for Fund resources under option (iv), but would involve the developer being required to work through the local authority where they have identified an appropriate pipeline of projects. This increases the risk for the house builder that the costs of Allowable Solutions will be higher due to constraints on abatement opportunities available and less competition. The key aspects of the local authority delivery route modelled for this analysis are:

- the local planning authority prepares a policy in its local plan requiring house builders to pay into a local Allowable Solutions fund or support local Allowable Solutions projects which the local authority has identified;
- the local authority manages the disbursement of the funds to local Allowable Solutions projects which it has identified and which meet the national criteria and meet verification assurance requirements.

17.2 The key administration costs therefore are for the local planning authority to put in place its plan and the arrangements for collecting funds and disbursing the monies.

17.3 This model is very close to that of the Community Infrastructure Levy under which developers make a payment to the local planning authority which is then used to support local infrastructure (indeed local authorities can already use Community Infrastructure Levy funds to support many of the measures suggested for Allowable Solutions).

17.4 Given that similarity, we have used Community Infrastructure Levy set up and operating costs as a proxy for the administration costs for this option. The Community Infrastructure Levy impact assessment⁴⁵ sets out the activities which were assumed when the set up costs and running costs were estimated. These activities are analogous to those we would expect a local authority managing Allowable Solutions through local arrangements to undertake. The Community Infrastructure Levy is voluntary. However, we have assumed for this analysis that all local authorities will be included in this delivery model.

17.5 The Community Infrastructure Levy impact assessment estimated that set up and operating costs for the Community Infrastructure Levy as follows:

Table 9: Costs to a local authority of setting up a Community Infrastructure Levy-type payment system

<u>Activity</u>	<u>Unit Cost £</u>
Community Infrastructure Levy setup costs	91,000
Community Infrastructure Levy ongoing costs (1 st year / subsequent years)	17,000 / 76,000

17.6 Scaling these costs up for every local planning authorities in England gives overall set up costs of £35m and, in a full year of running, £24m.

⁴⁵ <http://www.communities.gov.uk/documents/localGovernment/pdf/1829714.pdf>

- 17.7 These costs would be incurred if a local authority set up an Allowable Solutions scheme separately. However, local authorities might include Allowable Solutions within its Community Infrastructure Levy scheme. If this were to be the case, many set up costs would have been incurred and would be sunk, and operating costs would be those of running the Community Infrastructure Levy overall as it is assumed that back office services would be shared. So, as a sensitivity, we have assumed that the only local authorities incurring set up and administrative costs for Allowable Solutions would be those which have not set up a Community Infrastructure Levy, only. The Community Infrastructure Levy Impact Assessment estimates that 82% of local authorities will have Community Infrastructure Levy arrangements in place, leaving 18% that would need to set up a separate set of arrangements to administer Allowable Solutions in their local area. Under this scenario, set up costs would total **£7m** and annual operating costs of around **£5m** per annum.
- 17.8 Recent changes to the Community Infrastructure Levy enables local planning authorities to use up to 5% of the Community Infrastructure Levy to cover their administration costs. A similar approach to financing administrative costs could be taken for Allowable Solutions so there is no extra cost for local authorities.
- 17.9 House builders would also incur direct costs in engaging with a local authority Allowable Solutions scheme. These could potentially be substantial for both the cost of Allowable Solutions and the administration given that the house builder would not have a choice of alternative routes as outlined in Option 2 above. There will be variation across house builders in the time costs per dwelling of each task, since large sites / developments will benefit from substantial economies of scale, whereas smaller sites / developments would face higher per dwelling costs. To keep the analysis clear and manageable, the below time costs are central estimates per dwelling and illustrative at this stage. We have assumed an extra time involvement of 30 minutes per dwelling for a house builder. Using the wage of £44.14 per hour for the construction industry at design manager level in para 14.6 above, this gives a cost of £28.50 per dwelling. This could be an overestimate if the mechanism can be handled more routinely or for larger developments. This would need to be scaled up by the number of dwellings constructed. If we assume the average build rate over the ten year period (undiscounted) this works out at **£4.7m** per annum.

18. Building Control Costs

- 18.1 Additional costs to building control are expected to be small, given the administration and verification mechanisms outlined above, arising through the need to verify additional paperwork certifying that house builders have appropriately fulfilled their Allowable Solutions obligations. If we make an indicative assumption of 2.5 hours time to administrate a 50 dwelling development this works out at approximately 3 minutes per dwelling. Using the same approach as above, mid-point between Annual Survey of Hours and Earnings + 30% and an EC Harris estimate for inspectors of standards, we assume an hourly wage of £39.50. Taking the average build over the 10 year period gives a total administration cost for building control of £0.3m. Given the current approach to building control charging it would be expected that this would be passed on in charges to house builders.

19. Summary and Comparison of Administration Costs

19.1 This section summarises the analysis of the types of administrative costs which might be incurred and compares the options against a set of qualitative criteria to aid consideration.

Table 10: Illustrative Administration and Verification Cost Estimates (£m)

Route	One off	Annual	Annual	Annual	10 Year Present Value Cost	Simple proportion	Present Value Cost	Fund heavy Scenario	Present Value Cost
Option 2	Transition	Admin All Build	Verification All Build	Building Control All Build	All Build	20% each for option 2	20% each for option 2	Assumes 70% use the Fund	Fund heavy
Route (i) - 100% onsite	0	8.3	0	0	114.9	20%	22.8	3%	3.4
Route (ii) - do-it-yourself offsite	0	7.1	3.7	0.3	76.4	20%	15.3	7%	5.4
Route (iii) – Bilateral	0	14.3	3.7	0.3	125.8	20%	25.2	10%	12.6
Route (iii) - Brokerage	1.1	10	3.7	0.3	97.3	20%	19.5	10%	9.7
Route (iv) – Fund	4	5.7	3.7	0.3	70.5	20%	14.1	70%	49.4
Option 2 Total	5.1						96.9		80.5
Option 3									
Local Authority	7	9.7	3.7	0.3	100.5				

Columns labelled 'All Build' assume that the entire new build stock is built to each of the Option 2 routes. The One Off costs are in addition to the Do Nothing one off cost which estimated at £3.5m. Present Value Costs are over 10 years discounted at 3.5% from 2013. Option 3 costs are those based on local authorities already having a Community Infrastructure Levy in place.

19.2 Table 10 above gives an indicative summary estimate of administration and verification costs. The columns labelled 'All Build' are based on every new home being constructed to each of the Option 2 'routes.' It is too early in the policy development process to make any informed estimate of which route house builders are likely to choose in practice. This will ultimately depend on their perceptions of the likely costs and hassle involved in each route once they have been designed in detail. For this impact assessment we have made an indicative exploratory estimate of the total administration cost in the Table. A simple 20% allocation for each route gives a total administration cost of **£85m** over ten years. Consultation responses suggested that most house builders anticipate that they would prefer to make a simple payment into a Fund as long as the Fund is transparent, cost effective and can enable them to fulfil their obligation. Also it is likely that the 100% onsite option will not be common. The final column therefore outlines a scenario by which 70% of house builders choose the Fund and only 3% build 100% onsite. This is very much an indicative assumption at this stage. It suggests that the administration cost, where the Fund is the most common route, may be **£79m** over ten years which is around

£6m less than the simple 20% allocation. Further analysis will be needed on take up for the different routes as the policy firms up.

- 19.3 The initial exploratory estimate of £79m is an upper estimate in that it is based on an assumption that Allowable Solutions will be delivered at the central cap price for Option 2 and that more cost effective administration solutions are not available. This suggests that these costs would be approximately 3-4% of the £2.4bn cost of Allowable Solutions given above. In practice we would expect competition and the choice between routes to keep both Allowable Solutions delivery costs and administration costs down and so they are likely to be less than this initial estimate. It should also be born in mind, however, that there will be a trade off between the effort put into effective verification in particular and the level of 'additionality' achieved. There may therefore be a case for increasing the verification costs in order to deliver higher additionality than the 75% currently assumed in the analysis above. Route (ii) has lower administration costs than Route (iii), and may enable the developer to earn revenue from undertaking projects in house. However, this route could also involve risks and disruption for the developer. For instance there could be liability risks and logistical challenges from needing to manage additional projects, such as retrofit, at the same time as constructing the new homes.
- 19.4 The initial estimate suggests that administration for Option 3 is likely to be higher, which reflects the localised nature of administration in each local authority. This again is an upper estimate which could be reduced if local authorities were to work together on joint schemes, although it does assume that existing Community Infrastructure Levy arrangements can reduce costs.

Assessment of Options

19.5 The delivery options have been assessed against the following qualitative criteria.

Table 11: Administration delivery options

	House Builder DIY	Bilateral	Matching / brokerage	Fund	Local
Comprehensive coverage	Yes	Yes	Yes	Yes	Dependent on local authority decisions.
Administrative cost efficiency	Reduced search and transaction costs as undertaken 'in house'.	Search and transaction costs for house builders.	Transaction costs for matching and brokerage system would need to be covered.	Collection and disbursement costs would need to be covered.	High overhead with multiple local schemes
Simplicity for house builders	House builder has control of measures	House builder needing to invest in search and contracting with Allowable Solutions' providers	House builder relies on matching service which does the work in identifying potential suitable measures or projects.	House builder makes payment and has no further involvement	House builder makes payment and has no further involvement
Incentivising lower cost Allowable Solutions projects	Incentive for house builder to bring forward their own cost effective measures	Market based approach so incentive for Allowable Solutions' providers to bring forward lower cost projects	Market based approach so incentive for Allowable Solutions' providers to bring forward lower cost projects	Fund would compete for capital with other Allowable Solutions, so incentive to reduce cost of carbon savings over time	Fixed price for fund so no incentive for Allowable Solutions projects to be offered at lower price
Ability to bring forward Allowable Solutions projects	Assumes house builder brings forward their own measures	Dependent on market bringing forward projects	Dependent on market bringing forward projects. Potential opportunity to leverage extra funds.	Opportunity to invest in large scale projects of national importance, in particular by leveraging extra funds	Dependent on availability of local schemes
Wider benefits	Retrofit projects could reduce energy bills for existing homes.	Retrofit projects could reduce energy bills for existing homes. Energy services market stimulated.	Retrofit projects could reduce energy bills for existing homes. Energy services market stimulated.	Opportunity to invest in large scale projects of national importance.	May encourage local ownership of Allowable Solutions projects

20. Benefits

- 20.1 Assuming that the actual abatement projects have the same 30 year lifetime as assumed when calculating the residual carbon emissions for new homes above, in comparison with the carbon compliance baseline the abatement potential per annum given by the residual emissions rises from 0.07 MtCO₂ in 2017 up to 1.85 MtCO₂ from 2026. The impact over 10 years of policy and assuming abatement is over a 30 year lifetime, has been calculated using the residual emissions per dwelling in Table 4, the build rate/mix in Table 5 above and the central non-traded carbon price, in line with supplementary Green Book guidance⁴⁶. At a 3.5% discount rate this gives a present value benefit of **£3bn**. The supplementary guidance also provides low and high estimates for the non-traded carbon price. These result in a present value benefit of £1.5bn and £4.5bn respectively.
- 20.2 This present value benefit estimate assumes 100% additionality. In practice the level of additionality will depend on the design of the policy, in particular the verification mechanisms in place. As a sensitivity we have assumed only 75% additionality, based on a sensitivity analysis undertaken for the Green Investment Bank of investments in non domestic energy efficiency (ref Annex 2 of Green Investment Bank impact assessment⁴⁷). While basic monitoring and verification mechanisms should ensure that the majority of the abatement would not have taken place in the absence of this policy, it is likely that a portion of the abatement would have occurred eventually in any case. It may be for instance that a project would have been brought forward but at a lower scale. A larger resource allocated to verification would increase the administrative costs above but potentially succeed in increasing the additionality achieved. The implications of overlaps with other policies, such as ECO or the Renewables Obligation, need to be considered including how the carbon is allocated where funding is obtained from multiple sources. The government needs to carefully consider its approach to additionality, as being too strict on what counts as “additional” could cause the admin cost of the policy to rise, since the government would, in effect, be forcing the developers to have to search for the Allowable Solutions projects. A more relaxed approach would mean keeping the costs of the policy to house-builders down, but would mean that the policy would be less additional. Further work is needed to explore this in more detail. Additionality of 75% would give a present value benefit of £2.25bn (Low: £1.12bn, High: £3.37bn).
- 20.3 The above is based upon a scenario where all of the Allowable Solutions’ projects are abating non-traded carbon. At the moment the government is not minded to exclude traded carbon. Since the policy has not prescribed specific abatement measures a judgement as to what proportion of carbon would be non-traded inevitably has a high degree of uncertainty at this stage. While it might be expected that a high proportion of cost effective abatement might be emissions outside the emissions trading scheme, there may well be a proportion of traded emissions if these are not excluded from the proposed Allowable Solutions approach. In the event that all carbon is traded the central estimate becomes £2.72bn (Range: £1.33bn-£4.09bn) which suggests that the benefits are not

⁴⁶ <https://www.gov.uk/Government/policies/using-evidence-and-analysis-to-inform-energy-and-climate-change-policies/supporting-pages/policy-appraisal-supporting-table-3>. The emission prices from the previous 2013 IA were used for the calculations.

⁴⁷ <http://www.parliament.uk/documents/impact-assessments/IA12-014G.pdf>

significantly dependent on the assumed traded to non-traded proportion. For an initial estimate, a typical 80% non-traded and 20% traded breakdown, where the majority of abatement is heat or insulation but with some power savings, gives a total present value benefit, with 75% additionality, of **£2.21bn (Low: £1.09bn, High: £3.32bn)**.

- 20.4 Although Allowable Solutions projects will obviously generate energy saving benefits the above cost analysis in £ per tonne is based on an assumption that the Allowable Solutions contribution will be calculated net of both the energy saving benefits and other project costs not paid for by the Allowable Solutions. The following example is an oversimplification but illustrates the point. If a project has say an estimated present value cost of £5m and present value energy saving benefits of £4m it will not be viable for a private sector development. If, however, Allowable Solutions funding is added on terms which make the project viable then the carbon savings will be realised. However, the £4m costs in the project which can be funded by the energy benefits will not be included in the Allowable Solutions calculation. This does not exclude the possibility that the Allowable Solutions fund might require a proportion of the energy savings to be recycled into the fund. However, for this initial analysis we have excluded both the additional costs not covered by Allowable Solutions and the energy saving benefits which will help pay for other costs not covered by Allowable Solutions. The focus is then on the specific Allowable Solution contribution and the value of the carbon saved.
- 20.5 There are also several non-monetised benefits common to all options (besides 'do-nothing'). These potentially include:
- avoided cost of extra renewable energy generation capacity. The UK has to meet targets for renewable energy generation. Allowable Solutions, by reducing demand, or through promoting cost effective measures, can reduce the need for more expensive renewable energy generation
 - promoting opportunities for innovation, business and employment. Allowable Solutions, through promoting retrofit and renewable energy schemes, could support jobs directly and, indirectly, in the supply chain. On the other hand, any negative impacts on housing supply could have a negative impact on jobs. There could be spill over benefits for industry also in terms of economies of scale from additional opportunities for undertaking retrofits or developing low or zero carbon heating schemes
 - reduced energy demand, can improve energy security and resilience
 - a local connection between Allowable Solutions projects and the developments which are supporting them, can promote and encourage greater understanding of, and ownership by local communities, opportunities to reduce carbon.

Case Studies

- 20.6 Examples of possible abatement can be found in the publication "District Heating Good Practice: Learning from the Low Carbon Infrastructure Fund"⁴⁸. This publication reports grants from the Homes and Communities Agency and provides detailed case studies for

⁴⁸ <http://www.homesandcommunities.co.uk/district-heating-good-practice-learning-low-carbon-infrastructure-fund>

13 different projects of varying size and technologies with estimates for carbon saved per annum. If it is assumed that the average life of these projects is 25 years, which is typically assumed for such projects, then a total grant allocation delivers a potential saving of around 1.3m tonnes of carbon dioxide. This suggests an average price of around **£16 of grant per tonne**.

- 20.7 The wide range for different projects of £6-£346 of grant per tonne suggests that carbon saved is only one objective for some of the projects which aimed to support the development of low carbon district heating infrastructure. All but one of the larger projects are delivered at under £30 per tonne. This is a very high level of analysis which gives an indicative sense of the kind of projects which may be considered for delivery by Allowable Solutions. However, it is clear from analysis by the Department for Energy and Climate Change that a larger pipeline of projects may require a higher level of funding per tonne⁴⁹.
- 20.8 The Low Carbon Infrastructure Fund case studies are for a grant funded model rather than one offering investment finance at a lower return which could earn future revenue for a revolving fund. Further more detailed work is needed and we will be seeking further evidence on projects which could be financed through Allowable Solutions in a future consultation.

Conclusion

- 20.9 The enabling power will have no cost to business and it should be stressed that this is an initial indicative analysis with further much more detailed work to be undertaken for future impact assessments. The analysis does suggest that a policy design which ensures that abatement is achieved at significantly below the capped prices or could ensure that additionality over 75% is achieved could be sufficient to ensure a positive social net present value for the policy. This will depend upon how far below the maximum cap price it is possible to deliver Allowable Solutions in practice.
- 20.10 Option 2, House builder Menu Option, at a cap price of £60 per tonne was the preferred delivery option for the analysis for the consultation. This was because it offers a wider range of abatement opportunities and competition between routes in order to enable the house builder to meet the Allowable Solutions requirement through additional verified abatement at the lowest cost. This will also provide a financial incentive for house builders to explore innovative methods to achieve further emissions abatement onsite for the new homes. A more energy efficient new home may also attract a higher premium as the recent research cited in Section 4 has suggested. Option 1, do nothing, will provide no such incentive and so will not stimulate the same level of innovation. Option 3, will constrain abatement opportunities for house builders to those identified by the local authority and so is likely to increase the cost of abatement compared with Option 2 which involves more choice and competition between routes. The government has still to decide the price of Allowable Solutions and this will be confirmed for the implementing secondary legislation and will be the subject of further impact assessment.

⁴⁹ <https://www.gov.uk/Government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/heat-networks>

Rationale and Evidence that justify the level of analysis used in the Impact Assessment (the proportionality approach).

20.11 The policy is still at a preliminary stage of development for eventual implementation from 2016. Future work will involve further analysis and gathering of evidence as the approach to Allowable Solutions firms up, followed by a full **formal consultation** on the implementing secondary legislation where detailed proposals will be put to interested parties, alongside a published consultation stage impact assessment. This will be in advance of a final proposal, accompanying impact assessment and then eventual implementation, after an appropriate lead in period. The impact assessment identifies interested parties and describes qualitatively the likely impacts in detail. It also quantifies and partially monetises these impacts with a particular focus on the maximum costs which are likely to be incurred. It is therefore proportionate for this stage of development for a policy which will be subject to a full formal consultation at a later date and is still a number of years from being introduced.

21 Risks and Assumptions

- 21.1 A number of risks and assumptions have been identified in the preliminary analysis above. Particularly important are:
- assessments of the cost of delivering Allowable Solutions are currently an upper estimate based on assuming that all Allowable Solutions are priced at the maximum cap proposed. Whilst the approach outlined above should ensure that in practice the costs are substantially below the cap, there is still uncertainty regarding these costs which will only be reduced when further detail is worked out for the delivery mechanism. There is related uncertainty regarding administration and verification costs;
 - the high level benefits estimate above assumes 75% additionality. The actual degree of additionality and benefits realised will depend on the delivery method chosen, the types of projects undertaken and the extent of resource put into administration and verification to ensure that projects are additional;
 - there are a number of other risks and assumptions above, including the build rate and mix, the carbon compliance levels assumed in the do nothing and other options and the impact of decarbonisation. This final issue is considered next.

Decarbonisation related issues

- 21.2 The impact of decarbonisation on Allowable Solutions is complex. The following should be treated as an initial exploratory analysis which will require further work for future impact assessments.
- 21.3 An example of the complexity is that the impact of decarbonisation on the quantity of Allowable Solutions required varies according to the technology choices made to meet the onsite carbon compliance requirement for 2016 Part L in the Do Nothing.
- 21.4 The current approach to Part L is performance based and does not prescribe any particular energy efficiency or renewables technology. Most new homes today are

connected to the gas grid and solar photovoltaics could well be commonly used as a building integrated renewables option to meet the onsite abatement carbon compliance requirement from 2016. Technologies such as energy efficient lighting, which reduce residual traded emissions could be combined with electricity producing renewables. The result is that the traded residual carbon emissions for these new homes are likely to be very small, zero or even negative, when averaged over a year. For such homes the quantity of Allowable Solutions required may not reduce as the grid decarbonises and may even increase. This would also depend on any future adjustment to the onsite carbon compliance level as a result of decarbonisation.

- 21.5 A proportion of homes are off the gas grid and some of these will include an element of electric heating. Even for some homes on the gas grid, emerging technologies such as gas boiler/heat pump hybrids could result in the quantity of residual emissions to be abated using Allowable Solutions reducing as the grid decarbonises. This too would also depend on any adjustment to the onsite carbon compliance level and any future decision on the use of a fuel factor. So the impact of decarbonisation on residual emissions varies substantially according to the technology used.
- 21.6 Given that most homes are likely to be on the gas grid and the impact of decarbonisation is uncertain, we have assumed a constant Allowable Solutions requirement for homes over the appraisal period for this early exploratory work and will undertake further analysis for future impact assessments.
- 21.7 For offsite abatement projects, the approach in this impact assessment is designed to be flexible, be technology neutral and allow providers to adjust their technology mix over time as the grid emission factor falls. This will enable an adjustment to more electricity based technology as the decarbonisation of the grid occurs, if the technology is more cost effective. Further work will be needed to consider a more detailed approach to valuing emissions; including the emission factor used to value abatement in off-site Allowable Solutions' projects and how forward looking this should be, given the uncertainty associated with the pace of decarbonisation.
- 21.8 Analysis above on the assumed 30 year lifetime of Allowable Solutions payments also considers the impact if the period was decreased to 20 years in future on the basis of the decarbonisation of the grid. This would be an important change to the policy and the implications of this will also need to be given further consideration in future work.
- 21.9 Further work is needed to analyse all issues in relation to decarbonisation in more detail in future impact assessments.

Direct Costs and Benefits to Business

- 21.10 The above initial preliminary analysis is insufficiently developed at this stage to identify a single firm equivalent annual net cost to business. For this reason no firm equivalent annual net cost to business has yet been calculated. For the £60 cap an upper ceiling estimate of £286m equivalent annual net cost to business cost estimate in 2012 prices is given above assuming that the central cap price is paid for all allowable solutions. This converts to £240m in 2009 prices discounted to 2010. This is clearly an overestimate of the likely cost of Allowable Solutions in practice especially given the approach to Allowable Solutions outlined above.

21.11 The government intends to exempt smaller construction sites and has consulted on this. The percentage of Allowable Solutions payments would accordingly have to be adjusted. The government will be consulting on the threshold to be applied to the exemption. By way of illustration, if the government applied a threshold of 10 units and if the 21.4% figure for the number of planning applications for sites of 10 units or less referred to in table 13 below were assumed to all have 10 units (which will not be the case in practice), the impacts on the total net present cost and benefits figures would be as follows:

Table 12: Illustrative impact of small sites exemption and revised costs and benefits

	Low price (£bn)	Central Price (£bn)	High Price (£bn)
Total net present costs	1.15	1.92	2.89
Total net present benefits (100% additionality)	1.18	2.36	3.54
Total net present benefits (75% additionality)	0.88	1.77	2.65

21.12 If 21.4% of all units were exempted, this would mean that carbon savings would reduce to 0.06 MtCO₂ in 2017 rising to 1.45 MtCO₂ from 2016.

21.13. More detailed analysis on the costs to business will be needed. More analysis on benefits to business will also be needed, especially the cost to business to undertake carbon abatement which would be required in the absence of this policy. However, this initial analysis clearly identifies that the main affected groups for this policy are potentially house builders who will incur the costs of Allowable Solutions, and energy users who could potentially save energy from Allowable Solutions projects. Others affected include those who could be required to undertake abatement in the absence of this policy and energy companies. The analysis also suggests that the overall potential impact on business will be a substantial 'IN' if the policy is considered in scope for 'One In, Two Out' purposes.

22. Wider impacts

Sectors and Groups

HOUSE BUILDERS AND LANDOWNERS

- 22.1 The costs in this impact assessment reflect the extent that the zero carbon homes policy will place additional costs on builders. These costs can be split into two categories:
- the abatement cost of dealing with residual net emissions through Allowable Solution payments
 - increased administrative costs associated with the funding mechanism employed to deliver Allowable Solutions.
- 22.2 The government considers that by announcement of the policy in advance of its introduction, some of these increased costs can be reduced and mitigated. In particular:
- industry can work to come up with new designs for Allowable Solutions projects and influence supply chains so that the costs of preparing for and meeting the new requirements are minimised. Industry can focus on research and development in bringing forward innovation and exploit economies of scale
 - the costs of the policy can be passed back to landowners in the form of reduced land prices.
- 22.3 Larger builders are looking to replenish their land banks with strategic sites that will be built out over the period to 2016 and beyond. For development to be commercially viable, the costs of development need to be factored into the price that builders pay for the land. This will include the costs of Allowable Solutions. It is anticipated that additional costs of zero carbon homes will largely be passed back to landowners in reduced land value uplift (the difference between the value of their land with and without planning permission for housing development), although the recent research referenced in Section 4 on the price premium attached to an energy efficient home should be noted. This risks eroding the value of land for housing and potentially reduces the amount of land that will come forward for housing, especially in areas of lower house prices, higher existing/alternative use values and remediation costs. Impacts could be proportionately higher in areas where land values are low.
- 22.4 In considering these impacts, account will need to be taken of both the costs of Allowable Solutions and 2016 requirements for fabric energy efficiency and carbon compliance, which are not yet set. The consultation asked respondents to provide data on the impact of viability of house building in different parts of the country. Lots of anecdotal comments were provided in the responses but very little, if any, solid evidence was provided to support any claims for or against assuming a different build rate. House-builders suggested that there could be an adverse impact on building of houses outside of the south east. However several responses indicated that there would be no impact on the viability of the building of houses, since the cost of Allowable Solutions would be low in comparison to the selling price of houses.

22.5 In practice, however, the scale of any such impact will depend on a variety of factors such as:

- the scale of the starting land values and uplift – sites and areas with high starting land values will be able to absorb more of the increase in costs without an impact on land being brought forward
- the impact of other claims on land value uplift (whether through Building Regulations eg. water efficiency or other policies such as Section 106 agreements) that may be passed back to land-owners and reflected in land values
- any reduction in negotiable costs and planning obligations
- the substitution of development which can support higher costs
- housing market conditions – house prices ultimately drive the value of the land on which the housing will be built, reflecting the fact that the demand for land is a ‘derived demand’
- the extent to which home builders are able to pass back (to landowners) or pass forwards (to house buyers) the net increase in costs of meeting zero carbon homes standards
- the availability to home builders of incentives for installation of renewable electricity in the form of Feed In Tariffs, either directly or (via an uplift in the sale price of the home) from home buyers
- any change in landowner expectations (as to land values).

SUPPLY CHAIN

22.6 The need to provide Allowable Solutions projects is an opportunity for suppliers and installers of such projects to expand their sales and to develop new projects which would be eligible as Allowable Solutions. This may also produce new opportunities for manufacturers to invest in research and development and in new or expanded production facilities.

22.7 The early announcement of the principles being considered for Allowable Solutions should give the supply chain an important insight into the types of projects that may be eligible for Allowable Solutions funding. This should in turn give supply chains greater confidence to invest in production facilities for the necessary materials and equipment.

IMPACTS ON JOBS

22.8 The jobs impact of zero carbon homes is highly uncertain due to displacement, deadweight and substitution effects which limit any genuinely additional impact. Projects supported by Allowable Solutions may generate extra direct or indirect jobs. On the other hand any reduction in housing supply may impact on construction sector jobs. Given these uncertainties, our best estimate is that Allowable Solutions might be slightly positive or neutral in terms of employment effects.

HOME BUYERS

- 22.9 Buyers of new lower or zero carbon homes could bear some proportion of the cost of meeting the zero carbon standard through Allowable Solutions in the form of a premium to the market price of a new home, to take account of lower energy bills. However, as noted above, since the price of new homes is determined mainly by the market for existing homes, any such premium should depend on the willingness and ability of consumers to pay extra for these.
- 22.10 The May 2011 impact assessment assumed that there is not a lack of desire for low or zero carbon homes, but rather a reluctance to pay a higher price. It is possible that growing consumer awareness of energy costs and environmental issues, and the introduction of Feed-In Tariffs and the Renewable Heat Incentive will mean that consumers will be prepared to pay a premium for zero carbon homes. Recently published research referenced in Section 4 above suggests the emergence of such a premium for energy efficient new homes.

ENERGY COMPANIES AND CONSUMERS

- 22.11 In the absence of the policy, new homes every year would add to the total demand for energy in the economy. All things being equal, such increases would be met primarily from large scale centrally generated sources (ie grid electricity and natural gas). Hence Allowable Solutions which reduce energy consumption or replace electricity generation may save the energy sector from needing to invest in additional large scale electricity generating plant and upstream gas infrastructure as well as purchasing larger amounts of fossil fuel resources to meet this demand.
- 22.12 Some Allowable Solutions projects would reduce energy demand (for instance, hard-to-treat solid wall insulation and energy efficiency for existing community buildings). Other projects would add to the UK's renewable energy generation capacity (eg community anaerobic digestion or combined heat and power plants). By conserving energy and providing renewable energy supply, there is an avoided cost of renewables and energy infrastructure for the energy sectors. At this stage it is uncertain exactly how much Allowable Solutions might save since they could be provided using a number of different projects.

LOCAL AUTHORITIES

- 22.13 Allowable Solutions offer local authorities the opportunity to work with developers to support local low carbon projects through bilateral arrangements. It would be open also for local authorities to seek support for projects from any fund used to disburse Allowable Solutions' monies.

Enforcement and implementation

22.14 The delivery model is designed to enable final compliance to be checked by building control. The proposed approach is for information to be received by the building control processes. Estimates of the administration costs for building control (which are recoverable through charges) have been included for the options, see section 18 above.

Equalities impact test

22.15 The policy would affect all parties the same regardless of race, gender or disabilities. There is already a level of accessibility required by the current Building Regulations so any future homes would still need to meet these requirements. Responses to previous consultations did not raise any issue of potential unequal impact on gender, ethnic/racial or disabled groups.⁵⁰

Small and Micro Business Assessment (SMBA)

22.16 The small and micro business assessment is a new requirement for all regulation which came into effect in April 2014 and is intended to ensure that all new regulatory proposals are designed and implemented so as to mitigate disproportionate burdens on such businesses. It aims to either exempt all companies with fewer than 50 employees from new regulatory measures, or to mitigate as far as possible the burden on micro and small businesses while delivering the intended benefits.

22.17 The issues relevant to small firms will in general be similar to those faced by micro businesses. Due to the small sample size, it was not possible to ascertain from the consultation responses whether micro businesses would be affected differentially from small businesses, hence the analysis here evaluates the two together. In the following text small relates to both small and micro firms.

22.18 The UK construction industry is dominated by small and micro firms. The Department for Business Innovation and Skills publishes its Construction Statistics Annual every year. According to these figures, there were 247,105 private contractors throughout the UK in 2012; over 95 per cent of which had less than 14 employees and over 99 per cent had less than 60 employees.

22.19 The number of small builders has been steadily declining in recent years, however. Research recently published by the National House Building Council showed that there had been a significant decline in the number of small firms active in house building in recent years – halving between 2007 and 2013, with only 2,710 estimated to have been building in 2013. It also concluded that despite encouraging signs of house building growth, the early stages of the recovery do not appear to have improved prospects for smaller builders (defined as companies building less than 100 homes annually)⁵¹.

⁵⁰ <http://www.communities.gov.uk/publications/planningandbuilding/summaryresponsezero>

⁵¹ www.nhbcfoundation.org/improvingthepropects.

- 22.20 Carrying forward Allowable Solutions will impact on businesses of all sizes as it will be mandatory for all builders to abate any residual carbon emissions. Small firms could be adversely affected by a lack of available time and skills to carry out the build to the full zero carbon standard on-site, or to do retro-fitting of existing properties. Only one respondent classed themselves as a micro-size builder when they responded to the consultation, and no respondents classed themselves as small builders. This means that no statistically significant differences can be discerned between smaller and larger house-builders, and therefore further work will need to be undertaken when the government takes forward specific proposals for the secondary legislation, prior to Allowable Solutions coming into force.
- 22.21 The government did, however receive responses from the Federation of Master Builders and the National Builders Federation, both of whom are industry bodies representing small and medium sized builders, which responded on behalf of their members. Their response indicated that they would prefer to go for a “two-tier model” of carbon abatement, namely the Fabric Energy Efficiency standard, and then Allowable Solutions to offset the remaining requirements. They said that this would mean that builders had a greater flexibility to carry out carbon mitigation work in a cost-effective manner. Views were expressed that the government should consider working with the energy sector to encourage innovation within the sector.
- 22.22 When it comes to carrying out the available options, it was said that small and medium builders would potentially use all of the different delivery options available to them. However, this would depend on the specific site being developed, and overall the fund would be their most likely option due to its simplicity. This view was shared by the majority of house-builders, and so it does not indicate that there would be any particular disadvantage to small house-builders over larger ones. The response from the Federation of Master Builders also made the point that small and medium size firms had been interested in carrying out retro-fitting work on existing properties.
- 22.23 In its response to the consultations the government stated its intention to exempt small sites, which are most commonly developed by smaller house builders, from the zero carbon homes requirement. The government has consulted on proposals for the operation of the exemption. The impact of the exemption will of course depend on the nature of the exemption designed following the conclusion of the consultation.
- 22.24 In terms of the scope of the exemption, figures from the National House Building Council (April 2014) show that 5% of the total number of registrations of new dwellings in 2013 were by builders who built less than 10 units in 2013; another 3% built between 1-30 units; and another 6% for between 31 – 100 units. There were 131,000 registrations with the National House Building Council in 2013.
- 22.25 The government has also commissioned analysis from the construction data company Barbour ABI of the numbers of planning applications, and units covered by those applications, by different size bands of development in 2013. The results are set out in the following table:

Table 13: Detail Planning Applications Submitted 2013 (England) - New Build Homes

Size Band	Number of Planning Applications	Total Units	Percentage of total number of units	Cumulative Percentage of total number of units
Single Houses	24,567	24,567	10.3%	10.3%
2-5 Units	3,431	12,246	5.1%	15.4%
6-10 Units	1,873	14,418	6.0%	21.4%
11-15 Units	799	10,324	4.3%	25.7%
16-20 Units	338	6,049	2.5%	28.3%
21-25 Units	263	6,064	2.5%	30.8%
26-50 Units	706	25,550	10.7%	41.5%
51-75 Units	344	21,286	8.9%	50.4%
76-100 Units	180	15,771	6.6%	56.9%
101-150 Units	224	27,565	11.5%	68.5%
151-200 Units	117	20,554	8.6%	77.1%
200+ Units	160	54,899	22.9%	100%

22.26 By way of illustration, if the government applied a threshold of 10 units or less then this is likely to effect 21.4% of planning applications for new build homes. The percentage of allowable solutions payments would then need to be adjusted (see paragraphs 21.11 – 12 above). However, there will be no net cost to small and medium term businesses in terms of the enabling power. Further impact assessments for the secondary legislation for the detailed framework for allowable solutions will consider the full cost to small and medium sized businesses, including the impact of the small sites exemption.

Greenhouse gas impact test

22.27 The purpose of the policy is to abate carbon emissions. All options (except for the ‘do nothing’ baseline option) are expected to deliver the remaining carbon abatement represented by the residual emissions of new homes from 2016 onwards.

Wider environmental impact test

22.28 Assisting in mitigating the causes of climate change by reducing carbon emissions from new homes is the primary purpose of this policy. This will be achieved for new homes from 2016 which will have an increasingly positive impact as more new homes are built over time and as zero carbon technologies and learning are transferred to existing homes.

22.29 The government will have regard to other potential environmental impacts, in particular: the implications of the possible large scale adoption of biomass energy and the possible consequences of this for land and water use biodiversity; air quality; and the transportation of biomass fuel.

22.30 The policy may have knock-on effects in terms of air quality impacts. Through the increased use of renewable energy sources, there is a corresponding reduction in electricity demand from fossil fuel generation. These can have a positive impact on air quality and therefore on health.

22.31 However, the use of biomass fuels can have an adverse effect on air quality and health. In the interests of proportionality, this impact assessment does not carry out detailed modelling of these damage costs at this stage. Moreover, these costs would clearly be dependent on the extent to which biomass technologies are employed, the emissions standards of the boilers, and their location.

Health and wellbeing impact test

22.32 Allowable Solutions may provide additional funds for energy efficiency measures in existing homes and community buildings. Experience from programmes such as Decent Homes and Warm Front suggests that improving the thermal comfort of dwellings has direct health benefits and can improve the quality of life for the occupants of the dwellings.

22.33 Again, the need for proportionality means that this impact assessment does not carry out detailed modelling of these potential benefits at this stage. In addition, these benefits would also depend on the extent to which retrofitting hard-to-treat existing homes forms part of the range of Allowable Solutions projects delivered.

Sustainable development impact test

22.34 In addition to environmental impacts, the zero carbon homes policy will have an influence on wider aspects of sustainable development. The policy will contribute to wider national, regional and local sustainability goals by promoting innovation and by providing opportunities for new 'green' businesses and employment. Social sustainability will also be enhanced by new homes in all sectors with improved levels of thermal comfort and energy efficiency.

Annex A

Responses to Regulatory Policy Committee comments on consultation Impact Assessment

1. Net Present Value: The negative net present value is due to the caution around the policy achieving 100% additionality (see below). If the government is stricter with its requirements for additionality then the net present value could rise to £0.55 bn as explained in paragraph 20.9 of the previous impact assessment with a different on site carbon compliance level. The government sought responses to its consultation that would give new data on the costs of the scheme to the industry in order to carry out the necessary Allowable Solutions, but aside from one-or-two single site case-studies, none were forthcoming. The government will commission further research to monetise the benefits at a later stage.
2. Additionality: The Impact Assessment assumed 75% additionality, and therefore 25% deadweight, in order to stress that that we should not assume that there will be 100% additionality. This is based on a sensitivity analysis undertaken for the Green Investment Bank for investment in non domestic energy efficiency and is referenced accordingly in the impact assessment. The level of additionality of the policy is will largely be determined by the way in which the amount of carbon abatement is verified and how the policy is managed. The government needs to carefully consider its approach to additionality, as being too strict on what counts as “additional” could cause the admin cost of the policy to rise, since the government would, in effect, be forcing the developers to have to search for the Allowable Solutions projects. A more relaxed approach would mean keeping the costs of the policy to house-builders down, but would mean that the policy would be less additional.
3. Familiarisation Costs: The house-builder would have to spend time looking at brochures to decide which choice of Allowable Solutions measures best suits their requirements. The government will seek further information from responses to a subsequent Impact Assessment on the delivery of Allowable Solutions.
4. Decarbonisation: Figures from the Department for Energy and Climate Change¹ show that it can be assumed there will be a reduction in the electricity emissions factor of 40% by 2020. Whilst there is a risk to zero carbon if the grid is not substantially decarbonised, the price of low carbon technologies is reducing all of the time. Figures from the Zero Carbon Hub/Sweet Group report “Cost Analysis, Meeting the Zero Carbon Standard”² suggested that the cost of Solar Photovoltaic Cells (PV) were as low as £1,400-1,600 per kWp, contrasting with typical figures of £3,800 - £4,000 per kWp in 2010. If prices continue to become lower, then the market could drive homeowners towards replacing their low carbon technology with new low carbon technology. This would maintain the energy efficiency of

¹ https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/42918/4835-climate-change-agreements-cca-delivering-simplif.pdf

² http://www.zerocarbonhub.org/sites/default/files/resources/reports/Cost_Analysis-Meeting_the_Zero_Carbon_Standard.pdf

their dwelling. Until we get nearer to 2020, it is not possible to be more specific about the extent to which the grid will be decarbonised.

5. *Build Rates*: At present, the government is assuming the same building rates as for part L 2013. This is because there is a lack of evidence to the contrary. The 2013 consultation into Allowable Solutions asked respondents to provide data on the impact of viability of house building in different parts of the country. Lots of anecdotal comments were provided in the responses but very little, if any, solid evidence was provided to support any claims for or against assuming a different build rate. House-builders suggested that there could be an adverse impact on building of houses outside of the south east. However several responses indicated that there would be no impact on the viability of the building of houses, since the cost of Allowable Solutions would be low in comparison to the selling price of houses.