

Category	Key Policy Question	What external factors influence this key policy question (including linkages to other questions)?	What opportunities and implications does this key policy question have on setting different levels of Carbon Compliance?	What level of impact does this key policy question have on the Task Group's decision of where to set the level of Carbon Compliance?	What recommendations can we therefore offer to the Task Group?
Localism Workshop ¹	What opportunities and constraints may the localism agenda present with respect to setting different levels of Carbon Compliance?	<ul style="list-style-type: none"> Regional geographic characteristics (e.g. weather/climate, land values, other costs associated with delivery of new housing) Local priorities such as: social and affordable housing requirements, needs for new housing, permitted density requirements, local infrastructure needs Development type Costs per tonne of carbon dioxide Availability of community wide energy infrastructure that could assist attainment of higher carbon compliance (i.e. community heating) 	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> Localism encourages negotiation/trade-offs Localism could enable national standards to be met whilst enabling some variation to be applied to reflect local priorities, preferences and geography provided that there is a supporting evidence base (e.g. negotiation over proportion of social housing, S106 etc...) Localism could offer flexibility but it is critical that the metrics applied are consistent Localism could facilitate the deployment of community wide energy infrastructure that could assist attainment of higher carbon compliance (i.e. Plug & Play Carbon Compliance) <p>IMPLICATIONS:</p> <ul style="list-style-type: none"> Localism could have significant impact on the viability of development Localism could create wider diseconomies of scale as varied requirements will lead to more individual design solutions being needed Localism would create additional knowledge and skills requirements for all parties which may not easily be met Localism could slow the pace of development by adding complexity and additional issues to resolve in determining planning applications 	<ul style="list-style-type: none"> Negative viability issues could ensue if local authorities are able to set variable levels of carbon compliance. This risk would increase without a robust assessment of the technical and commercial feasibility underpinning these requirements. Negotiation/trade-off against other cost burdens whilst retaining a fixed national level of CC (within building regulations) could offset the overall impact of policies or potentially positively impact viability Without a national standard of evidence to underpin policy formulation, which should be through tested Development Plan Documents, local policy risks being founded on weak rationales which risk undermining the delivery of new housing. In addition to the kind of wording set out in Draft Supplement PPS1, which should be reiterated in the NPS, this standard of evidence should be set. A set national CC level would put the onus on a local planning authority to justify why it had made a decision that made a development unviable. 	<p>The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as:</p> <p>POSITIVE – where the level of carbon compliance is set nationally within building regulations and negotiation between the local authority and developer results in the trading off of other cost burdens (e.g. affordable housing requirements) in order to deliver the national standard viably.</p> <p>NEGATIVE – where localism means that the level of CC is not set in building regulations and can be varied through planning conditions. Additionally, without clear and unequivocal standards of evidence set at a national level to underpin the technical or economic basis for local standards, the risks of negative outcomes rise to an unacceptable level.</p>

¹ The following key perspectives were captured from the Localism Sub-group held on 11 November 2010 with respect to the implications and opportunities that the 'localism' agenda could presents with respect to setting different levels of Carbon Compliance



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<p>Localism & Planning</p>	<p>(CCQ16) Might any of the Carbon Compliance levels modelled require any changes to local planning policy due to the technical requirements for onsite LZCs</p>	<p>Any Government target or policy has to be translated into local plan-making, and then, even if there is a policy encouraging the use of onsite renewables, the weight to be accorded to that policy is a matter of local judgement balanced against a number of other material considerations, including resident amenity, noise, pollution, design aesthetics, health and safety, visual appearance and the harm this may have to heritage and local character</p>	<p><u>IMPLICATIONS:</u></p> <p>In terms of health and safety impacts (including noise and pollution) the approach of most planning departments, in line with national policy, is to apply the ‘precautionary principle’. Anything novel, therefore, has the potential to meet resistance. Any media item citing a possible health threat will generate resistance, and prompt the local planning authority to require the developer to spend money to demonstrate that the potential for any adverse health impacts can be mitigated. Higher levels of Carbon Compliance might increase such risks. Therefore, there could be some specific implications for setting different levels of carbon compliance and there may be impacts on overall viability of development as a result of additional technical requirements.</p>	<p>Under current planning policy arrangements the obstacles could be very significant indeed. Although most local authorities in the country have either set Merton style policies (10% or more renewables onsite) or are in the process of doing so through plan preparation (usually through the use of Sustainable Design and Construction SPDs), and national planning policy encourages the use of renewables, it should also be remembered that our planning system gives scope for a degree of discretion and interpretation.</p> <p>A lower national standard of CC would give greater scope for local discretion before viability and technical constraints intervened. This may be considered to undermine a suitably robust national benchmark.</p> <p>Irrespective of this, local planning policy-related additional requirements need to be grounded in robust evidence, the standards for which need to be agreed and set out nationally.</p>	<p>The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as broadly NEUTRAL with a modest downside risk– this is because the impact is difficult to determine and the impact is likely to vary across local authorities given the discretionary nature of our planning system.</p>
<p>Localism & Planning</p>	<p>(CCQ17) Are there any Carbon Compliance measures that could be taken which would be facilitated or constrained by a particular interpretation of the localism agenda?</p>	<p>Government has placed a strong emphasis on bottom up involvement of communities and neighbourhoods in planning and development. This is something that councils strongly support and have a long history of doing. Some emerging proposals, for example on Community Right to Buy (CRTB), suggest a more proactive role for councils in supporting communities in developing proposals and holding referenda.</p>	<p><u>IMPLICATIONS:</u></p> <ul style="list-style-type: none"> • High National Level of CC. Setting the national carbon compliance too high risks undermining the government’s commitment to high proportions of brownfield land development and the ability to deliver new housing projects in the future. • High Local Level of CC. Unlikely that local carbon compliance standard could be set across the whole of a local area. , If that happened, it is likely to be technically impossible for a substantial proportion of housing development to take place in a local authority area. This seems like a rather heroic assumption. It has not stopped local authorities in the past from seeking unrealistic standards. (I absolutely agree, and can give myriads of examples.) • Low National Level Setting the national [carbon compliance] standard too low risks sending a message to industry that “this is all that you have to do” and the mass-market tends to do just enough to achieve compliance with the minimum regulations. This is an unsupported value judgement which we 	<ul style="list-style-type: none"> • If Local carbon standard setting is a realistic policy outcome of this localism drive, it would require some type of robust viability testing. • Localism may encourage local authorities, developers and communities to work together to help each other look for opportunities, exchange information and create a more certain environment for development. There could be an increased role for pre-application discussions or for outline planning consent approaches. • The level of impact posed by this policy question will vary depending on whether a locally variable or 	<p>The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as:</p> <p>POSITIVE – where the level of carbon compliance is set nationally (or geographically) within building regulations and negotiation between the local authority and developer results in the trading off of other cost burdens (e.g. affordable housing requirements) in order to deliver the national standard viably.</p> <p>NEGATIVE – where localism means that the level of CC is not set in building regulations and can be varied through planning conditions</p>

			<p>cannot accept. There is nothing wrong with complying with national regulations!</p> <ul style="list-style-type: none"> Low Local Level Setting the local [carbon compliance] standard too low risks sending a message to industry that “this is all that you have to do” and the mass-market tends to do just enough to achieve compliance with the minimum regulations. This is an unsupported value judgement which we cannot accept. 	<p>fixed level of CC is set. Under either scenario the impact will focus around viability, deliverability, design and impact on product offer to consumers.</p>	
Deliverability of new homes	<p>(CCQ5) How far will the Carbon Compliance levels modelled result in reduced housing supply in England (and its parts) by adding to the cumulative cost of regulation through reducing viability?</p>	<p>External factors which will impact upon the viability of development will include:</p> <ul style="list-style-type: none"> Land take S106 costs Community Infrastructure Levy costs Requirements for affordable/social housing Other local planning conditions Other regulations 	<p><u>IMPLICATIONS</u></p> <p>Any level of Carbon Compliance will add to developer costs. Meeting higher levels of Carbon Compliance (i.e. close to 0kg/CO2/m2) will progressively increase costs to the developer, although this may occur differently in different parts of the country due to climatic differences.</p> <p>In simple terms where costs associated with delivering the development cannot be absorbed by land values (plus developer margin) delivering the development will not be viable.</p>	<p>This policy question will have a fundamental impact on the Task Group’s decision as to where to set the level of Carbon Compliance. However, the magnitude of the impact of different levels of carbon compliance on the viability of delivering various dwelling types is not possible to qualify without undertaking viability modelling.</p>	<p>It is recommended that an adapted Three Dragons model is utilised harnessing real data, in order to analyse the impact of different levels of carbon compliance in combination with other key regulatory impacts, such as affordable housing, CfSH, S.106 and CIL, in terms of development viability. The data should also be referenced by the actual area / local authority to which it relates.</p>
Deliverability of new homes	<p>(CCQ6) Will we have the necessary national professional and trade skill base required to deliver homes at the carbon compliance levels modelled?</p>	<ul style="list-style-type: none"> The extent to which FiTs, RHI and the Green Deal are able to successfully stimulate the uptake of low/zero carbon technologies in the retro-fit market The extent to which the MCS is accessible to potential installers wishing to enter the accredited installer market in cost terms Design vs. actual debate – potential for new skill sets within building control industry 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> The skills required to deliver higher or lower quantities of PV’s will not vary and therefore will not impact on whether the CC level is set at a lower (14kg/CO2/m2/yr) or higher level (0kg/CO2/m2/yr) The deliverability of community scale technologies such as gas CHP and biomass is not a new concept. For example plumbing into homes, welding pipes and digging trenches form part of an existing skill set. The main issue lies around the design aspects of such systems which is essentially an engineering based skill which can be adapted 	<p>Higher CC level will require some degree of up skilling, increased training to increase numbers of available skilled workforce and improved/robust training courses.</p> <p>Higher levels of Carbon Compliance will typically require greater amounts of microgeneration technologies to be installed which would present suppliers in the retro-fit marketplace with an additional demand to meet, presented by new build. Higher levels of Carbon Compliance might lead to additional challenges for designers, architects etc.</p>	<p>NEUTRAL impact as industry typically will respond where skills are required. Therefore, skills issue will be a temporal one. The current situation is that the skills exist on a small scale to meet current demand. Where policy drivers are put in place, to increase demand, the market will typically respond. In the interim, a large skill base exists in mainland Europe and would plug any gaps required to support the current skilled workforce.</p>
Deliverability of new homes	<p>(CCQ8) What impact might the level of carbon compliance set have on technically achievable development density and related issues?</p>	<ul style="list-style-type: none"> Density requirements set by the Local Planning Authority Market preferences with respect to density Other urban design requirements Localism agenda – in relation to local communities potentially having a greater say in the density 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> Technical Work Group output shows that it is generally true that the scope to mitigate on-site, for a given level of carbon compliance, actually rapidly declines as development density rises² Setting the Carbon Compliance Level even at a technically achievable one, but which precludes the offer of dwelling styles and typologies that the marketplace aspires to, will act 	<p>The impact that this policy question poses for setting levels of CC is that density is typically driven by what the market wants and what planners will allow. Technical modelling demonstrates there is a NEUTRAL impact up until around 70% Carbon Compliance for houses, but not for flats. This implies an effective</p>	<p>The Policy Work Group would recommend that the Task Group adopts the assumption that the level of Carbon Compliance should not be driving density (i.e. housebuilders should not be changing their densities in order to meet a carbon compliance level. In order to obtain planning permission and sell the units a</p>

² If micro-generation technology is the basis for compliance

		of new housing in their local area	<ul style="list-style-type: none"> as a huge choke on the allocation of capital to housing delivery It is assumed that the Localism agenda is less likely to favour or support the delivery of large-scale, master-planned new communities that planning orthodoxy gravitated towards till very recently, or radical experiments in high-density built form. 	development density cap of 40-42 dpHa at 70%. It is becoming clear from Technical WG outputs that flats between 3-5 storeys will not generally achieve that level without development scale solutions which may be impractical; and that as such development rises in elevation above that level, even a level equivalent to 44% is effectively unachievable.	housebuilder will need to ensure that they meet market preferences and planning requirements with respect to density). A higher level of CC can be broadly expected to drive development densities downwards, with negative implications for the delivery of smaller and more affordable typologies.
Deliverability of new homes	(CCQ9) How will the rush for minerals and other components impact supply chains in 2016 and thus the deliverability of Zero Carbon Homes?	<ul style="list-style-type: none"> Availability of Rare Earth Magnets Global competition for silicon, Gallium and Tellurium UK's 15% 2020 Renewable Energy target If thin film PV production grows significantly then pressure may be put on the recycling supply chain which will need careful management to ensure this does not affect supply 	<p><u>IMPLICATIONS:</u></p> <ul style="list-style-type: none"> With regard to PV, the following should be noted: Anticipated efficiency improvements from silicon based modules will mean that it is unlikely Thin-Film PV will be a viable option for house builders. Greater efficiency will make it easier to attain higher levels of abatement for a building, Silicon PV does not suffer from the availability of rare earths in the same way as thin-film PV does. It is unlikely that the demand for from the house building industry is going to significantly impact on the availability of supply as the retrofit market will be significantly bigger. 	<p>Clearly there is concern about the availability of certain raw materials, but considerable effort is going into resolving these both at European and National levels.</p> <p>Therefore following assessment of the risks the impact on setting levels of Carbon Compliance has been determined as being NEUTRAL.</p>	The Policy Work Group recommends that the Task Group should assume a NEUTRAL given that the PV industry is acutely aware of the impacts of raw material availability and EPIA (European Photovoltaic Industry Association) is currently developing policy in this area
Desirable Homes on a mass scale	(CCQ4) Are there certain market and occupier impacts for both market sale and/or rental sectors that would arise from the setting of carbon compliance at certain levels, arising from the energy supply solutions required	<ul style="list-style-type: none"> Consumer perception of place Local preferences Local planning requirements 	<p><u>IMPLICATIONS:</u></p> <ul style="list-style-type: none"> Consumers put a premium on place and the quality of design and public realm. Where CC levels were to be set which allow for an individual technology led approach (i.e. drawing from core technologies modelled by the Task Group) then it can be assumed that there will not be a significant effect on market/occupier perceptions. 	Given lack of evidence base available the impact on levels of Carbon Compliance posed by this policy question is assumed to be NEUTRAL	The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as: NEUTRAL
Householder Health & Wellbeing	(CCQ3) What impact will the levels and measures of carbon compliance set have on fuel poverty?	<ul style="list-style-type: none"> Level of income Cost of imported electricity (i.e. electricity not self generated) Cost of primary fuel for heating (gas or biomass) However, maintenance and replacement of costly onsite energy and ventilation technology may be prohibitively expensive for some future occupants, leading to non-optimal supply of heat and power 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> Main issue that has emerged is that costs faced by some consumers in case studies presented to the Work Group where district heating schemes were deployed led to a higher heat price compared to conventional heating systems. The FEES backstop will further reduce heat load. Fabric Energy Efficiency Standard (FEES) will provide an energy efficiency back stop which will mean that dwellings delivered from 2016 will benefit from very low space heating demand – this may help (and it may not given that schemes need to be funded before this time and approvals from 2006 Part L are 	It was assumed that community energy solutions would not represent the 'conventional' way of meeting carbon compliance levels given that individual technologies are being modelled in order to test technical and commercial feasibility. Furthermore, in light of some evidence obtained around some consumers facing higher bills from District Heating, it was agreed that this may not represent the norm across all schemes delivered in	Therefore the Policy Work Group recommends that the impact posed by this policy question is NEUTRAL . This is due to the fact that the FEES backstop which will reduce the dwelling's space heat demand and that given the dependency many dwelling types are likely to have on PV installations to meet higher levels of CC, the consumers exposure to changes in energy prices will be



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		and a rise in carbon emissions, and health issues.	<p>being constructed +4 years later, the backstop will arguably kick-in later and after 2016+) to mitigate against fuel poverty risks</p> <ul style="list-style-type: none"> The deployment of Community or District-scale solutions at the highest levels of CC is at the same time likely to require the use of high standing charges to amortise the high costs of heat distribution infrastructure. The implications on ESCo economic and household budgets may therefore be less clear than raw heat demand would imply. 	<p>future and that there are many reputable providers. Additionally the District Heating industry is aware of issues relating to uneconomic and sub-optimal scheme design and is working to overcome them. Therefore, sub-optimally engineered schemes should not unduly colour the Task Group's judgement.</p> <p>However, maintenance and replacement of costly onsite energy and ventilation technology may be prohibitively expensive for some future occupants, leading to non-optimal outcomes.</p>	<p>reduced. Therefore a NEUTRAL impact is assumed.</p> <p>However, maintenance and replacement of costly onsite energy and ventilation technology may be prohibitively expensive for some future occupants, leading to non-optimal outcomes.</p>
Householder Health & Wellbeing	(CCQ1) How do the Carbon Compliance levels and measures impact on key health, well-being and safety requirements?	<ul style="list-style-type: none"> Underlying health and wellbeing issues Householder and constructions site safety are critical considerations which must have adequate solutions. One technological response to low carbon compliance levels is for a more energy efficient home (beyond the FEES standard). This typically involves increased air tightness. 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> The mass scale use of biomass boilers is likely to be deleterious to external air quality. However if the biomass is used in district heating the necessary equipment could be provided to clean smoke emissions. The use of low and zero carbon technologies will increase and there are associated health and safety concerns. At higher CC levels more technologies will be used and it will be necessary for safe construction site practices to be developed and adopted to mitigate these concerns. 	<p>There is no direct fixed relationship between a particular level of carbon compliance and health and well-being as the house builder will select from a range of measures and technologies.</p> <p>It is, therefore, likely that regardless of the CC level, homes will be built to higher airtightness standards. The effect on indoor air quality and its impact on health remain uncertain but has been of sufficient concern for the ZCH VIAQ task group to be set up.</p> <p>It is likely that homes will in future be at a higher risk of overheating, but again this is the case regardless of the CC level.</p>	<p>It is recommended that the Task Group assumes that the impact of this policy question on setting levels of carbon compliance is NEUTRAL on the basis of competent design.</p> <p>However, The selection of a CC level that necessitates the widespread use of biomass boilers would be undesirable and the Task Group can assume a NEGATIVE impact from Carbon Compliance at these levels.</p>
Householder Health & Wellbeing	(CCQ2) Will the level of carbon compliance set lead to undesirable health and wellbeing effects in relation to the way in which the consumer uses the property?	The potential health and well-being effects and the way in which the consumer uses the home will depend on the house builder's specific selection of measures and technologies, the design of the home and its location.	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> If consumers perceive a lack of ventilation and/or inadequate indoor air quality they will open windows, which will increase CO₂ emissions. Evidence suggests that many consumers switch systems off due to nuisance, misunderstanding or perceived increased use of energy. A first response to homes overheating is to open windows, which may be detrimental to security or be unacceptable if the external environment is noisy. A subsequent response may be to use air conditioning, which would increase CO₂ emissions. To maximise the benefits of solar water heating, consumers may wish to change their hot water consumption patterns to match the availability of solar-heated water, e.g. bathing at 	Homes built to higher energy efficiency standards are likely to have a range of equipment that will need to be operated properly in order to maintain good standards of health and well-being and deliver the intended CO ₂ performance. The more equipment that is installed, the greater the challenge for the user will be, particularly if systems are not well integrated.	<p>The Task Group can assume a NEUTRAL impact on the Carbon Compliance level set.</p> <p>The effect on health and well-being relates to the construction and technology solutions the house builder selects, rather than a particular CC level.</p> <p>There may be an issue here if the CC level chosen pushed developers towards technology solutions that made negative health and wellbeing effects more rather than less likely..</p>

			<p>the end of the day.</p> <ul style="list-style-type: none"> It is widely accepted that many consumers experience difficulty in using conventional heating controls properly and understanding how controls such as trickle ventilation should be operated. The inability to control systems properly could have adverse health and well-being consequences and influence the CO₂ performance achieved in practice. 		
Consumer Behaviour & Perception	<p>(CCQ26) Do the levels of carbon compliance differently influence a householder's connection with their energy use and therefore encourage positive or negative energy behaviour?</p>	<ul style="list-style-type: none"> Rebound effects in response to installation of energy efficiency technologies Energy prices Level of consumer awareness of energy consumption (potentially influenced by the presence of in-home energy displays/smart meters) 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> Many householders are unfamiliar with low and zero carbon technologies. This leads to a lack of trust with regards to their performance and incorrect operation of such technologies leading to underperformance. Householders purchasing a zero carbon home may assume because it is zero carbon then they can be prolific with their energy use causing the installed technologies not to perform as planned. Lower levels of carbon compliance will mean that householders are more susceptible to fuel bill rises. Higher levels of carbon compliance have the potential to improve consumer acceptability through making the required technologies more commonplace and familiar to householders, but may increase the rebound effect. 	<p>This policy question appears to be an important consideration in determining the level of carbon compliance as it has the potential to impact on the actual performance of the final built product. If homes do not perform as intended then there is a risk to the reputation of Government regarding the policy, house builders regarding the product they are selling and the overall delivery of the carbon budgets under the UK's Climate Change Act (2008). However we can assume a neutral impact as issues are the same regardless of where you set the level.</p>	<p>The Task Group can assume a NEUTRAL impact on the Carbon Compliance level set.</p> <p>This is due to the fact that issues are the same regardless of where you set the level</p>
Consumer Behaviour & Perception	<p>(CCQ27) How might householders perceive zero carbon homes at different levels of carbon compliance?</p>	<ul style="list-style-type: none"> Consumer preference Energy prices Influence on consumer from referent groups (friends, family, work colleagues) 	<p><u>IMPLICATIONS</u></p> <p>House buyers who are purchasing a zero carbon home in 2016 would expect to see some tangible evidence that their house is contributing towards reducing its carbon impacts. If it is a standard house with no links to some form of renewable technology it would be very difficult to justify how that home is zero carbon.</p>	<p>Consumers are multifaceted in nature and difficult to assess generically with respect to their perceptions of value, as this tends to be subjected to external influences. Subject to incentives being made available to the end consumer (e.g. FiTs and RHI) there is the potential for consumers to perceive a zero carbon dwelling which employs a larger amount of qualifying microgeneration technologies as a more attractive value proposition.</p> <p>However, given the uncertainty that exists around the probable value of FiTs and indeed RHI moving forwards it is difficult to assess the impact of availability of incentives on consumer perception.</p> <p>Therefore with respect to how might householders perceive zero carbon homes at different levels of carbon compliance, the impact could be assumed as moderately positive on</p>	<p>The Task Group can assume a POSITIVE (although potentially weak) impact on the Carbon Compliance level set.</p>

				balance (although potentially weak depending on the size of the incentive) at Carbon Compliance levels set closer to 0kg/CO ₂ /m ² .	
Consumer Behaviour & Perception	(CCQ28) What are the likely financial benefits or costs to the householder of different levels of carbon compliance, assuming that allowable solutions don't provide householders with a return?	<ul style="list-style-type: none"> • Availability and size of FiT and RHI incentives • Energy prices • Price of Allowable Solutions 	<p><u>IMPLICATIONS</u></p> <p>Where larger amounts of microgeneration technologies are installed as a result of a higher level of Carbon Compliance being set, subject to availability of incentives the prospective zero carbon homeowner may be in a position to not only benefit from lower heating costs (courtesy of FEES) but also lower electricity bills where electricity generating microgeneration technologies are deployed. Therefore, the homeowner may be in a position to save on their energy costs and obtain an additional income through FiTs.</p>	Therefore the level of impact that this policy question poses for setting levels of carbon compliance can be assumed to be positive, as where higher levels of carbon compliance are requiring proportionately more microgeneration technologies to be installed, subject to availability, the homeowner would stand to benefit from FiT and/or RHI income. In addition to this, where the homeowner is 'self generating' energy their exposure to energy price rises will be reduced. Therefore, coupled with FEES a higher level of carbon compliance could mean lower running costs (courtesy of potentially lower fuel bills).	The Task Group can assume a POSITIVE (subject to availability and size of available incentive and energy prices) impact on the Carbon Compliance level set.
Consumer Behaviour & Perception	(CCQ29) Does onsite mitigation of carbon (carbon compliance) offer greater confidence of actual CO ₂ reductions (ensuring additionality) compared with Allowable Solutions?	<ul style="list-style-type: none"> • Cost of Allowable Solutions • Outcomes funded by Allowable Solutions • Extent to which Zero Carbon homeowners directly access the benefits of measures funded by Allowable Solutions • The rebound effect • Behaviour 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> • Design of the allowable solutions buy-out fund has the potential to lead to time lags in the delivery of zero carbon energy solutions • Choice of solutions allowed within the basket of options can impact upon delivery of carbon emissions reductions. 	<p>While much is still unclear regarding the allowable solutions element of the zero carbon homes policy it is important that in setting the carbon compliance level we ensure we have regard to this element. This is not to say we should let it be an over-riding factor in our final decision making however, it will be vital to make key recommendations within our report to the Minister on this topic as his decision on this will also be influenced by the bigger picture on climate and energy policies.</p> <p>However given the current lack of information relating to Allowable Solutions a NEUTRAL impact should be assumed.</p>	<p>The Task Group can assume a NEUTRAL impact on the Carbon Compliance level set.</p> <p>We do not currently know enough about the price and structure of Allowable Solutions.</p>
Consumer Behaviour & Perception	(CCQ30) What effect will different levels of carbon compliance have with regards to the rebound effect?	<ul style="list-style-type: none"> • Technology installed • Energy prices • Influence of consumers referent group (attitudes of friends/family to energy saving) 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> • Householders will "take back" the savings made through the inclusion of low and zero carbon technologies in the home. These savings can be taken back via different means. • There will be differing levels rebound associated with different technologies. 	The implication of this for different levels of carbon compliance is that there is potential for the carbon savings made through higher levels of carbon compliance to be seriously undermined through consumer behaviour specifically via the taking	The Task Group can assume a NEUTRAL impact on the Carbon Compliance level set. Could be negative as surely the rebound effect is likely to be greater the higher the CC level.

			<ul style="list-style-type: none"> In order to minimise the rebound effect there is a need for Government to ensure that innovations in technology such as zero carbon homes are combined with policies that drive sustainable lifestyles. 	<p>back of these savings. However, to a certain degree this could be considered out of scope because many of the rebound behaviours will be via other areas of the economy and they will be expected to decarbonise too. This is an important question not only for homes but for all energy consuming sectors and while it raises some key recommendations for Government and Industry it is felt that this should have little impact on determining the level of carbon compliance. What about the explosion in consumer electronic devices in the home?</p>	
<p>Energy Infrastruct., Security & Targets</p>	<p>(CCQ10) Could any of the Carbon Compliance levels modelled have any unintended consequences on regional / national energy infrastructure?</p>	<ul style="list-style-type: none"> Legacy DNO asset base where development is taking place Number and capacity of distributed energy (DE) technologies delivered Capacity constraints (network related) Smart grid policy Incentives to support uptake of DE 	<p><u>IMPLICATIONS</u></p> <p>The delivery of the overriding objective of RIIO will potentially benefit zero carbon developments which employ microgeneration and/or community scale solutions, as a DNO will be incentivised to connect them in order to maximum revenue and avoid penalties. Therefore, this presents an ‘opportunity’ for carbon compliance levels.</p> <p>Scale of implications vary and so will cost – for large developments early conversation with DNOs can identify ways to manage impact and potentially low cost measures which could be implemented as part of the design of the dwelling</p> <p>Networks are going to need to become smarter with or without new homes given the macro-energy challenges facing national and local networks driven by a range of challenges, vast investment is required, new homes will be delivered into this context</p> <p>An increased scale of local electricity export may impact on the importance of embedded benefits, since they help to support distributed energy systems, but are currently under review</p>	<p>Therefore the assumption that we can form in response to this policy question is that the transformation required to the energy networks in order respond to macro-energy challenges will present an <u>opportunity</u> rather than a constraint on the level of carbon compliance recommended by the Task Group.</p> <p>Therefore the Task Group can assume a NEUTRAL impact on the Carbon Compliance level set</p> <p>A negative review in respect of the value to be attributed to embedded benefits could impact negatively</p>	<p>The Task Group can assume a NEUTRAL impact on the Carbon Compliance level set, subject to the impact of a negative review of embedded benefits.</p>
<p>Energy Infrastruct., Security & Targets</p>	<p>(CCQ11) What impact will different levels of carbon compliance have on opportunities to deploy shared, community-wide sustainable energy infrastructure projects?</p>	<ul style="list-style-type: none"> Availability of support for district heating Local authority spatial plans – whether a community energy infrastructure forms part of it Existing or planned community energy infrastructure 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> In technical terms, communal solutions are available across all levels of carbon compliance modelled (depending on primary fuel source), requiring a low reliance on PV (where natural gas is the primary fuel source used) In commercial terms, communal solutions will only be viable for larger, dense developments and therefore do not represent a broadly applicable solution set for all developments to meet lower levels of kg/CO2/m2 Where shared community energy infrastructure exists, again 	<p>Therefore the assumption that we can form in response to this policy question, is that where carbon compliance levels are set closer to 0kg/CO2/m2 community energy solutions represent a technically feasible means of meeting all levels.</p> <p>However, the commercial attractiveness of deploying such schemes will be contingent on a range</p>	<p>Therefore is recommended that the Task Group can assume that setting a carbon compliance level closer to 0kg/CO2/m2 will have a POSITIVE impact on opportunities to deliver shared community wide infrastructure where this is viable, (particularly when there is an evidence based local plan prescribing a district heating based local energy strategy) but community /</p>

			<p>depending on the primary fuel source used in the system, connecting to the infrastructure would enable the developer to meet all levels of carbon compliance modelled with a low reliance on PV (where natural gas is the primary fuel source used)</p> <ul style="list-style-type: none"> • The commercial viability of community energy schemes will be contingent on range of factors such as site density, number of dwellings to be served, availability of anchor loads local to the development (to name but a few) • Where existing community energy schemes are available, it may be more cost effective for the developer to connect to this infrastructure and therefore bank associated carbon savings, rather than take a microgeneration led approach to meet CC level – however, such a decision would be contingent on the cost of connection (pipework costs) and Heat Interface Unit (HIU) cost 	<p>of site, environmental and spatial factors.</p> <p>However, where additional loads are located in close proximity to a development of suitable density and size, there may be a commercial opportunity to expand the community energy scheme to serve a range of existing buildings and potentially other zero carbon developments.</p>	<p>shared solutions are less / not appropriate for low density developments.</p>
<p>Energy Infrastruct., Security & Targets</p>	<p>(CCQ12) Will the level of carbon compliance set lead to inefficient use of finite energy resources/feed stocks (e.g. Biomass)?</p>	<ul style="list-style-type: none"> • Greenhouse gas emissions from energy generated using biomass are generally, but not always, lower than those from fossil fuels. • How a biofuel (e.g. biomass) is produced has a major impact on emissions • Setting minimum standards for GHG savings could help maximise emissions savings from bioenergy production • Emission reductions of several million tonnes of greenhouse gases per year could be achieved by following good practice 	<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> • Whilst E4Tech’s supply curve analysis for DECC suggests that there will be sufficient global supply of biomass to meet the UK’s needs at a reasonable costs, as a net importer of biomass the UK will be a ‘price taker’ and as such will be exposed to changes in the global market price for biomass in the longer term. However, competition with food crops will be a key issue into the future. • A carbon compliance levels that is only achievable for the majority of dwellings through the use of biomass boilers may reduce the carbon effectiveness of biomass given the carbon footprint that would be associated with transporting the fuel stock to the site / dwelling. Employing minimum standards for energy conversion equipment using biomass could ensure more efficient use of this finite resource • Space heating demand is limited by the FEES backstop. Biomass becomes a highly attractive solution although communal gas CHP remains an option where appropriate. From a use of biomass perspective issues such as: planning, fuel procurement, storage, access and skills are disadvantages. 	<p>Whilst technical modelling suggests that biomass is not necessarily the only option for housebuilders it will represent a highly attractive solution from a carbon abatement point of view at both individual and communal scales implying take up at a mass scale where the efficiency of use may be worse than in larger plant and be impacted by transport considerations.</p> <p>At the lowest levels of carbon compliance biomass use is likely to become highly attractive and widespread and overall likely to be used less efficiently than in efficient larger scale assets which may be more appropriate for use of a finite resource for UK Plc.</p>	<p>The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as:</p> <p>NEUTRAL above circa 6KgCO₂/m²pa (i.e. closer to 44% Carbon Compliance)</p> <p>NEGATIVE below circa 6KgCO₂/m²pa (i.e. closer to 100% Carbon Compliance)</p>

<p>Energy Infrastruct., Security & Targets</p>	<p>(CCQ13) What impact will different levels of carbon compliance have on the policy's overall contribution to the attainment of both the UK's 2020 GHG emission reduction and renewables targets?</p>	<ul style="list-style-type: none"> Economic conditions Rate of zero carbon housing delivery (between 2016 and 2020) Mortgage availability 	<p>IMPLICATIONS</p> <p>The table below indicates the amount of renewable energy that will be required in order for the UK to meet its 15% renewables target in 2020.³</p> <p>Final energy consumption in 2008 and projected for 2020</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">2008</th> <th colspan="2">2020</th> </tr> <tr> <th>All Energy (TWh)</th> <th>Renewable Energy (TWh)</th> <th>All Energy (TWh)</th> <th>Renewable Energy for 'lead scenario' (TWh)</th> </tr> </thead> <tbody> <tr> <td>Electricity</td> <td>387</td> <td>22</td> <td>386</td> <td>117</td> </tr> <tr> <td>Heat</td> <td>711</td> <td>7</td> <td>599</td> <td>72</td> </tr> <tr> <td>Transport</td> <td>598</td> <td>9</td> <td>605</td> <td>49</td> </tr> <tr> <td>Total final energy consumption (EU Definition)</td> <td>1695</td> <td>39</td> <td>1590</td> <td>239</td> </tr> </tbody> </table> <ul style="list-style-type: none"> The 'additional' contribution that the Zero Carbon Homes policy is able to make to this target, from a purely Carbon Compliance perspective, will depend on the type and amount of microgeneration technology installations that can be expected to be deployed across different house types and the volume of their supply from 2016 to 2020. The following represents residential statistics for CO₂ emissions in 2008⁴ which represents a basis for comparing the CO₂ abatement potential of different levels of carbon compliance: <ul style="list-style-type: none"> Direct emissions – 16% of total at 81MtEnd user emissions – 146 Mt CO₂(e) out of UK total of 533 Greenhouse gas emissions (CO₂equivalent) End user emissions – 153 Mt CO₂(e) out of UK total of 628 		2008		2020		All Energy (TWh)	Renewable Energy (TWh)	All Energy (TWh)	Renewable Energy for 'lead scenario' (TWh)	Electricity	387	22	386	117	Heat	711	7	599	72	Transport	598	9	605	49	Total final energy consumption (EU Definition)	1695	39	1590	239	<ul style="list-style-type: none"> The impact that this policy question poses for setting levels of carbon compliance is that with respect to maximising the contribution of this policy to the UK's overall package of legally binding 2020 targets is that, at higher levels of Carbon Compliance there is the potential for a greater contribution (as a consequence of a greater potential reliance on distributed energy technologies) However, the extent of the contribution can only be calculated once a level has been recommended. 	<p>The Task Group can assume a POSITIVE (although potentially weak) impact on the Carbon Compliance level set.</p>
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³ Figures sourced from The UK Renewable Energy Strategy (DECC), 2009

- The heat and transport sectors exclude electricity used in these sectors which is included in the electricity sector.
- Under the provisions of the Renewable Energy Directive, the share of renewables in the transport sector is calculated in relation to total surface transport (road and rail) only, i.e. excluding aviation and shipping, but all forms of transport can count towards the target. Using this definition, the 49 TWh renewable energy from transport represents 10%.
- Total energy and transport consumption figures are in line with the definition agreed in the EU Directive, which caps energy consumed in aviation.
- Totals may not sum owing to rounding.

⁴ DECC greenhouse gas statistical release of March 2010



Carbon Compliance: Policy Considerations Summary Matrix

Monitoring & Enforcement	(CCQ20) How will different levels of carbon compliance affect the level of complexity that will need to be built into monitoring and enforcement regimes?		<p><u>IMPLICATIONS</u></p> <ul style="list-style-type: none"> • Building control enforcement of energy standards is currently very low – too strong a statement • Proving energy performance requires in use monitoring • With different levels of compliance for different buildings types, building type definition will become everything • Carbon compliance needs to be checked at a very early stage. • Actual performance monitoring via SMART energy systems should be able to back check against SAP models to confirm compliance • It is accepted that no building energy performance model can ever be particularly accurate due to the complexities of the physics of dynamic thermal movement, thermal mass, and the randomness of householders lifestyles. 	Different levels of carbon compliance could propagate confusion and misinformation at the construction phase of a project. Enforcement of compliance via post construction monitoring would focus constructors minds on actual compliance. It would then become the constructors responsibility to make sure they have agreed the correct level for their building type, and that they buildings then achieve it.	<p>The Task Group should consider the impact of this policy question on their decisions relating to levels of Carbon Compliance as:</p> <p>NEUTRAL</p> <p>However this is an important issue that would need to be addressed as monitoring Carbon Compliance will be a challenge regardless of where you set the level, and therefore is not volume sensitive</p>
Allowable Solutions	(CCQ15) How will increased or decreased costs of allowable solutions impact the commercial deliverability of different carbon compliance levels?	N/A	Irrespective of terms of reference it is difficult to assess the impact of allowable solutions without a clear understanding of the mechanism that will underpin it	N/A	QUESTION TO BE DEFERED TO THE TASK GROUP FOR ANALYSIS