## 3.2 Energy and Carbon Reduction

3.2.1 Buildings are responsible for almost half of the UK's carbon emissions, and as such the way in which we design buildings has an important role to play in supporting the transition to a low, and indeed zero carbon society. Across the Greater Cambridge area, the respective 2018 local plans include specific policies to reduce the energy demand and carbon emissions associated with new, and in the case of Cambridge, existing homes.

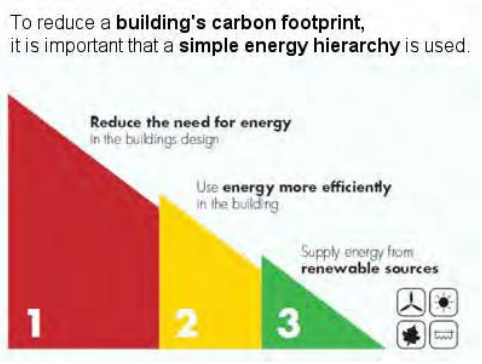
### Carbon reduction in new development - Cambridge

| | |
|---|---|
| LOCATION: | Cambridge |
| POLICY: | Policy 28: Carbon reduction, community energy networks, sustainable design and construction and water use |
| SCALE OF DEVELOPMENT: | All new development |
| TYPE OF DEVELOPMENT: | Residential and non-residential development |
| SUBMISSION REQUIREMENTS: | Carbon Reduction Statement (residential development)<br>BREEAM pre-assessment (non-residential development) |
| LINK TO SUSTAINABILITY CHECKLIST | En.1, En.2, En.3 |

### Policy overview

3.2.2 Policy 28 sets carbon reduction requirements for all new development in Cambridge, with separate requirements for residential and non-residential development. All new residential development is required to reduce emissions by 44% compared to a Building Regulations 2006 baseline (equivalent to a 19% reduction on Part L 2013). For new non-residential development, the requirement is to meet the mandatory credits required for achievement of BREEAM 'excellent' under the Ene 01 credit. What these requirements have in common is that they both require new development to follow the hierarchical approach to reducing energy demand and associated carbon emissions, as illustrated in figure 3 below.

**Figure 3:** The energy hierarchy



3.2.3 Following the energy hierarchy requires a three-pronged approach, often referred to as Be Lean, Be Clean and Be Green. In essence, this approach:

- Minimises the energy demand of new buildings through fabric performance and energy efficiency measures;
- Utilises energy more efficiently in buildings, for example through the use of underfloor heating so only very low return temperatures are needed or through the use of passive design to reduce reliance on mechanical ventilation;
- Supplies energy from new, renewable energy sources.

3.2.4 While policy 28 is focussed on reducing carbon emissions from energy use within buildings themselves, new developments should also strive to reduce carbon emissions from other sources including transport related emissions through the promotion of sustainable modes of transport and low or zero emissions vehicles (see chapter 2), and through utilising construction materials with low embodied energy.

### Submission requirements – residential development

3.2.5 For all new residential development, the requirement is for a 44% reduction in carbon emissions compared to a Building Regulations Part L 2006 compliant baseline. For schemes utilising Building Regulations Part L 2013, this is equivalent to a 19% reduction on a Part L compliant baseline. This is equivalent to meeting the energy requirements of level 4 of the now withdrawn Code for Sustainable Homes, and the implementation of this policy follows the methodology for assessing this requirement.

3.2.6 In order to demonstrate compliance, applicants should submit a **Carbon Reduction Statement**, setting out how the policy requirements will be met. The Statement should be structured around the Be Lean, Be Clean and Be Green hierarchy, with the levels of carbon reduction achieved at each stage of the hierarchy shown. This Statement can either for part of the Sustainability Statement or can be submitted as a standalone document.

3.2.7 Table 3.1 below sets out the information that should be included within the Carbon Reduction Statement, while Appendix 2 contains a carbon reduction template which should be used to provide a summary of the calculations. In some cases, for example at the outline application stage, it may not be possible to provide detailed carbon calculations in line with Building Regulations methodology. In such cases, the Carbon Reduction Statement should outline the general approach using benchmarks where possible, with more detailed carbon calculations being secured through a planning condition requiring the submission of Carbon Reduction Statements at the reserved matters stage.

**Table 3.1:** Carbon Reduction Statement and Calculation requirements

| CALCULATION BASIS | NOTES |
|---|---|
| As the policy requirement is derived from the energy requirements of Level 4 of the now withdrawn Code | Where a building contains multiple dwellings (e.g. |

| CALCULATION BASIS | NOTES |
|---|---|
| for Sustainable Homes, the carbon reduction requirement should be applied to each unit or residential building envelope proposed as part of a development. | apartment blocks or terraced housing), it is acceptable to assess this issue based on the average energy performance of all dwellings within the building. The area weighted average DER and TER must be calculated in accordance with the block averaging methodology defined in clauses 2.7 and 2.16 of Approved Document L1A |
| The Target Emission Rate (TER) and Dwelling Emission Rate (DER) should be derived from the calculations carried out for Building Regulations compliance (Part L). | |
| Sample SAP calculations should be appended to the Carbon Reduction Statement as evidence of compliance in addition to submission of the carbon reduction template. | Applicants will need to be mindful of Government's intention to ban gas boilers in new homes from 2025 in a bid to tackle climate change[11]. Coupled with the proposed changes to the carbon intensity of electricity in SAP 10, which takes into account the decarbonisation of electricity, a long terms view of the carbon emissions associated with gas forms of heating should be taken into consideration. Where possible we would recommend that SAP 10 carbon intensity figures be utilised. |
| Alongside the carbon reduction template, the main body of the Statement should include a summary of the measures proposed to reduce carbon emissions following the energy hierarchy (be lean, be clean and be green). | See Appendix 2 for the carbon reduction template |
| Where renewable energy technologies are proposed to meet some of the carbon reduction requirement | See emissions standards for gas CHP set out in Appendix 3 |

[11] HM Treasury (2019). Spring Statement 2019. Available online at: https://www.gov.uk/government/topical-events/spring-statement-2019

| CALCULATION BASIS | NOTES |
|---|---|
| they should be an integral part of the design, and the location and indicative layout of those technologies should be shown on relevant drawings (for example, roof plans should show the layout of any proposed photovoltaic panels). Final layouts will be secured by way of a planning condition as appropriate. Applicants wishing to use Combined Heat and power (CHP) are advised to adhere to the emissions standards set out in Appendix 3 as well as giving consideration to the guidance contained within paragraphs 3.2.28 – 3.2.32 of this SPD on best practice for the specification and use of gas CHP. | Policy 31 of the Cambridge Local Plan (2018) requires all flat roofs to be green or brown roofs. Solar panels can be combined with green or brown roofs, and there are benefits from doing so. Where solar panels are proposed, biosolar roofs should be incorporated under and in-between the panels. An array layout will be required incorporating a minimum of 0.75m between rows of panels for access and to ensure establishment of vegetation. |
| Where required, mitigation measures have been proposed to maintain amenity and prevent nuisance | Consideration should be given to whether the proposed technologies will give rise to issues such as noise or air quality impacts as part of relevant assessments, with mitigation measures proposed where required. |
| Where SAP calculations are yet to be completed, for example at the outline planning application stage, the Carbon Reduction Statement should set out the general approach to meeting policy requirements, with a planning condition used to secure submission of carbon calculations once SAP calculations have been carried out. | |

### Submission requirements – non-residential development

3.2.8 For non-residential development, the carbon reduction requirements set out in policy 28 are linked to the requirement for achievement of BREEAM 'excellent'. BREEAM 'excellent' includes mandatory requirements related to carbon reduction and energy efficiency (under Ene 01), which will need to be met for the requirements of policy 28 to be complied with. Compliance with the policy should be demonstrated by submission of a **BREEAM pre-assessment**, completed by an accredited BREEAM Assessor, which clearly demonstrates achievement of the BREEAM 'excellent' standard.

### Energy efficiency in existing homes in Cambridge

| | |
|---|---|
| LOCATION: | Cambridge |
| POLICY: | Policy 30: Energy Efficiency Improvements in Existing Dwellings |
| SCALE OF DEVELOPMENT: | Householder applications |
| TYPE OF DEVELOPMENT: | Works to existing homes that require planning permission |
| SUBMISSION REQUIREMENTS: | Home Energy Questionnaire (see Appendix 4) |

### Policy overview

3.2.9 Policy 30 requires applications for extensions to existing dwellings and/or the conversion of ancillary residential floorspace to living accommodation to be accompanied by cost-effective improvements to the energy efficiency of the existing dwelling. The requirements of this policy will apply where the following measures have not already been implemented:

a. cavity wall insulation;
b. loft insulation of 150mm or more (in non-converted roof spaces);
c. the replacement of F and G rated boilers with an A-rated condensing boiler;
d. heating controls upgrade; and
e. draught stripping of doors, windows and letter boxes.

3.2.10 In order for Cambridge to contribute to meeting national carbon reduction targets, there is a need to reduce energy demand and associated carbon emissions in existing homes as well as new ones. The Council's 2009 Housing Stock Survey found that of a total stock of 41,500 dwellings, there was scope for energy efficiency improvements in 95% of properties, including measures such as loft insulation, cavity wall insulation and cylinder insulation. Energy efficiency improvements typically provide relatively cost-effective carbon reduction, but can also help reduce energy bills for residents, which will become increasingly important in the face of rising energy costs.

3.2.11 An ideal time in which to carry out improvements to the energy efficiency of existing homes is when building works such as extensions and loft conversions are being carried out. Policy 30 seeks to take advantage of the opportunity that such works presents for the implementation of cost effective energy efficiency improvements. The measures included within the policy have a simple payback of seven years or less, and are relatively simple to install with limited disruption, as outlined in table 3.2 below. Where the measures listed in the policy have already been undertaken, then no further measures will be required, although we would encourage home owners to consider whether further improvements could be made as part of proposed building works.

**Table 3.2:** Measures for implementation under Policy 30 (Figures based on information from the Energy Savings Trust)

| **Loft Insulation** | | |
|---|---|---|
| | **Loft Insulation (0 to 270mm)** | **Loft insulation (100 to 270mm)** |
| Approximate saving per year | Up to £180 | £25 |
| Installation cost | Around £300* | Up to £300* |
| Time taken to pay for itself | Up to two years | Up to twelve years |
| DIY cost | From £250** | From £150** |
| Time taken to pay for itself | From two years | From five years |
| Carbon dioxide saving per year | Around 730 kg | Around 110 kg |
| These are estimates based on insulating a gas-heated, semi-detached home with three bedrooms, showing savings when you insulate an uninsulated loft, and when you top up 100mm of insulation to 270mm. (The recommended depth for mineral wool insulation is 270mm but other materials need different depths).<br><br>*Average unsubsidised professional installation costs, loft top up assumed to be up to £300 although these may vary.<br><br>**DIY costs are based on average retailer costs for insulation up to 270mm or more, based on a 44m$^2$ loft. | | |

| **Cavity Wall Insulation** | | | | |
|---|---|---|---|---|
| **Measure** | **Annual saving** | **Installation cost** | **Payback time** | **Carbon dioxide saving per year** |
| Cavity wall insulation | Up to £140 | £450 to £500 | Under 4 years | Around 560kg |
| These are estimated figures based on insulating a gas-heated, semi-detached home with three bedrooms. The average installed cost is unsubsidised. | | | | |
| **Replacement Boilers** | | | | |

| Savings will be dependent on how old and inefficient your existing boiler is: | | |
|---|---|---|
| **Old boiler rating** | **Annual saving** | **Carbon dioxide saving per year** |
| G ( < 70%) | £310 | 1,200kg |
| F (70–74%) | £205 | 810kg |
| These are estimated figures based on installing a new A-rated condensing boiler and full set of heating controls in a gas-heated, semi-detached gas heated home with three bedrooms.<br><br>The costs for replacing a boiler will vary, but a straightforward gas boiler replacement will typically cost around £2,300. | | |
| **Heating Controls** | | |
| Whatever the age of your boiler, the right controls will let you set your heating and hot water to come on and off when you need them, heat just the areas of your home you want, and decide how warm you want each area to be. Here are the average savings you could make in a typical three-bedroom semi-detached home, heated by gas:<br><br>• Install a room thermostat if you didn't have one before: £70 and 280kg carbon dioxide a year.<br>• Fit a hot water tank thermostat: £30 and 130kg carbon dioxide a year.<br>• Fit a hot water tank insulation jacket: £45 and 170kg carbon dioxide a year. | | |
| **DRAUGHT PROOFING** | | |
| DIY draught proofing typically costs around £100 for materials, while professional draught proofing may cost around £200. Full draught proofing could save an average of £55 per year, although the focus for this policy will be draught proofing of doors and letter boxes. | | |

### Submission requirements

3.2.12 Where planning permission is required to undertake works to existing homes, applicants will be required to submit a **home energy questionnaire**, set out in Appendix 4, which will identify suitable measures that will be implemented. Where a property has recently had an Energy Performance Certificate (EPC) prepared, this could also be submitted alongside the questionnaire, and the Council would count measures identified within the EPC towards meeting the requirements of policy 30. A planning condition will then be used to secure the implementation of the identified energy efficiency measure(s).

### Further guidance

3.2.13 Cambridge City Council. Greening your home booklet. Available online at: https://www.cambridge.gov.uk/media/3242/greening-your-home.pdf
The Energy Savings Trust website contains lots of information on saving money at home, including renewable energy, home insulation and energy efficiency. Their home improvements guide includes information on how to combine energy efficiency improvements while undertaking major works to you home such as loft conversions and extensions. For further information go to: https://www.energysavingtrust.org.uk/home-energy-efficiency/home-improvements

### Renewable and low carbon energy in new developments in South Cambridgeshire

| | |
|---|---|
| LOCATION: | South Cambridgeshire |
| POLICY: | Policy CC/3: Renewable and Low Carbon Energy in New Developments |
| SCALE OF DEVELOPMENT: | All scales of residential development and new non-residential buildings of 1,000m$^2$ or more[12] |
| TYPE OF DEVELOPMENT: | New Residential and non-residential development |
| SUBMISSION REQUIREMENTS: | Energy Statement |
| LINK TO THE SUSTAINABILITY CHECKLIST: | En.1, En.2, En.3, En.4, En.5, En.6, En.7 |

### Policy overview

3.2.14 Criterion 1 of policy CC/3 is a Merton rule style policy that seeks at least a 10% reduction in carbon emissions associated with regulated energy use from a development. This is calculated using the baseline for the building as defined by Building Regulations. The reduction in emissions should be provided through the installation of on-site renewable or low carbon technologies, which provide some of the energy needs of the development. The choice of technology should respond to the specific characteristics of the development proposed, and further guidance on the types of technologies that will be considered by the local planning authority is provided in paragraphs 3.2.26 to 3.2.27 below.

3.2.15 To meet criterion 1 of the policy a development should be designed to meet Part L of Building Regulations and, once this has been established, the anticipated carbon emissions of the development can be identified. Using this carbon emissions figure as the baseline, a developer should then calculate the amount of carbon emissions that should be met through the provision of renewable or low carbon technologies to deliver at least a 10% reduction calculated by reference to that baseline.

3.2.16 Criterion 3 of the policy applies to new settlements and growth areas and seeks to promote site wide approaches to renewable and low carbon energy. An example of this in practice is the district heating network at the University of Cambridge's Eddington

[12] Note that for mixed use schemes that include residential development but where the non-residential elements fall below the 1,000m$^2$ threshold, the policy requirement will apply to the residential units only.

development. For this scale of technology to be realised it is important that the feasibility and viability of such systems is considered as part masterplanning and the outline application stage.

3.2.17 Applicants are encouraged to consider how they are going to meet this policy as early as possible in the design process. This is to ensure that the proposed renewable or low carbon energy systems are successfully integrated into the layout and design or the development and that costs are kept to a minimum. Early consideration also enables the applicant to weigh up the potential advantages of increasing the energy efficiency, or be lean stage of the design of their development in order to reduce the size of the 10% requirement. Improving energy efficiency as much as possible should be the aim of all submissions.

3.2.18 The policy also allows for passive solar design measures that reduce the overall energy consumption of the development to be used towards meeting the 10% renewables requirement. Details of what these measures are and how they are treated are dealt in paragraphs 3.2.33 to 3.2.36.

### Submission requirements

3.2.19 The information required is generally known as an **Energy Statement**. The information that will need to be submitted will depend on whether an outline, reserved matters or full planning application is being made. The requirements for each are set out in table 3.3 below. Applicants are advised that all on-site energy requirements need to be included. This includes street lights, car park lighting, heating ad lighting of communal areas and lifts.

3.2.20 Applicants should use the appropriate Energy Statement form provided in Appendix 5 to provide the information regarding their calculation, along with the other information required set out in tables 3.3 and 3.4 below.

### Your calculations

3.2.21 In order to ensure consistency across all submissions, the information in your Energy Statement and accompanying information will be assessed to ensure that it complies with the information in tables 3.3 and 3.4.

**Table 3.3:** Submission Requirements

| **OUTLINE:** | **FULL:** |
|---|---|
| ▪ Establish the 10% $CO_2$ reduction from energy use on the site that needs to be met using benchmarks (form in Appendix 5) and reasonable estimates for all other on-site energy demands;<br>▪ Provide initial feasibility work into which options are relevant to the development. | 1. Establish the site wide carbon emissions of the proposal, set out in Kg/$CO_2$/annum, based on the Part L Building Regulations compliant scheme, using either the Dwelling Emission Rate (DER) for all residential floorspace |

| OUTLINE: | FULL: |
|---|---|
| | and/or the Building Emission Rate (BER) for all non-residential floorspace. It is by reference to this baseline figure plus an estimate of all other onsite energy requirements that the minimum 10% reduction from renewable and/or low carbon energy should be calculated (form in Appendix 5);<br>2. Provide feasibility work to justify why the option selected has been chosen;<br>3. Indicate which technology or technologies have been selected and demonstrate how they will meet the agreed minimum 10% $CO_2$ emissions reduction (including size and predicted system output);<br>4. Provide visual information to show how the technology(s) has/have been successfully integrated into the development and include technology(s) on relevant drawings (e.g. roof plans). |
| **RESERVED MATTERS:** | |
| 1. Revise the 10% requirement if SAP or SBEM calculations have been carried out, and/or contribution from passive solar design measures have been quantified (optional), including revised estimates for all other energy uses on site;<br>2. Indicate which technology or technologies have been selected and demonstrate how they will meet the agreed minimum 10% $CO_2$ emissions reduction (including size and predicted system output);<br>3. Provide visual information to show how the technology(s) has/have been successfully integrated into the development and include technology(s) on relevant drawings (e.g. roof plans). | |

**Table 3.4**: Calculation requirements

| CALCULATION BASIS | NOTES |
|---|---|
| The 10% requirement has been calculated in kg/$CO_2$ not kWh (please convert all kg/C to Kg/$CO_2$). | This is the common approach of LPAs to this policy, as it is aimed at reducing $CO_2$ emissions, and this varies with fuel type. |
| All on-site energy requirements such | These can be reasonable estimates of these |

| CALCULATION BASIS | NOTES |
|---|---|
| as lighting of car parks, street lights, heating and lighting of communal areas and lifts are included in the calculations. | loads and associated carbon emissions. |
| If electric heating is going to be specified, SAP 10 carbon intensity figures should be taken into consideration. | At present, SAP calculations include lower carbon intensity figures for gas than electricity, which is not reflective of the real world carbon intensity of gas 'vs' electricity. SAP 10 carbon intensity figures should, therefore, be utilised for schemes proposing to utilise electric heating in order to obtain a more accurate prediction of carbon emissions associated with electrical forms of heating. |
| If gas Combined Heat and Power (CHP) is proposed, a long term view of carbon emissions should be taken into consideration with reference to emissions factors in SAP 10 | At present, SAP calculations include lower carbon intensity figures for gas than electricity, which is not reflective of the real world carbon intensity of gas 'vs' electricity. SAP 10 carbon intensity figures should, therefore, be utilised for schemes proposing to utilise gas CHP in order to obtain a more accurate prediction of carbon emissions associated with gas CHP 'vs' electrical forms of heating. |
| The contribution of passive solar design has been calculated as accurately as possible. | This can be carried out using dynamic thermal modelling. |
| The feasibility work is reasonable and gives evidence that the most appropriate option will be selected. | |
| The technology(s) has/have been successfully integrated into the design | |
| Where required, mitigation measures have been proposed to maintain amenity and prevent nuisance | Consideration should be given to whether the proposed technologies will give rise to issues such as noise or air quality impacts as part of relevant assessments, with mitigation measures proposed where required. |

### Feasibility work

3.2.22 At the outline submission stage, information should be submitted which shows that all options have been considered, including possible measures to improve the energy efficiency of the building.

3.2.23 The primary aim is to provide a hierarchy of likely feasible options, in order to demonstrate that a reasonable approach is being taken to selecting options, rather than finally rule out options, unless this is necessary. For an office development, for example, this may mean having technologies such as heat pumps or photovoltaic panels at the top

of the list. Solar thermal may be nearer the bottom as hot water demands are so low that this technology alone would not make a substantial contribution to reducing carbon emissions. Indicating likely feasible options does not preclude opting for any later in the design process.

3.2.24 However, there may be situations where particular technologies cannot be used on a site. For example, wind access may have been proven to be insufficient to make a wind turbine a feasible option. Likewise, a site may be too small and constrained to permit borehole machinery to install a vertical ground source heat pump. There may not be sufficient car parking, landscape, or other open space on site for a horizontal system to be installed.

3.2.25 If applicants have concerns about a particular technology or fuel, such as the availability or distance biomass fuel will have to travel, they are encouraged to raise this as part of the pre-application process so that discussions can take place prior to formal submission of a planning application. Such concerns should not necessarily preclude the use of the technology, though, in certain areas, it may push it further down the applicants list of preferred options.

### Selection of technologies

3.2.26 In general, the choice of technology will be left to the applicant. However, if there were concerns that the particular option being advocated would not result in the 10% reduction in carbon emissions required, then the applicant would be notified of this at the earliest opportunity. Further information would then be required to demonstrate that it will or if this is not possible, a revised option would need to be submitted.

3.2.27 Renewable and/or low carbon systems that will be considered include:

- Solar thermal hot water systems;
- Photovoltaic panels (pv);
- Wind turbines;
- Heat pumps (ground/air/water source);
- Geothermal;
- Gas fired Combined Heat and Power (CHP);
- Biomass (boilers/stoves/community heating/CHP);
- Anaerobic digestion.

If you wish to use a technology that is not referenced above you should seek early engagement with officers during as part of the pre-application process to discuss your proposals.

### Combined Heat and Power (CHP) and heat networks

3.2.28 CHP is essentially a technology that produces electricity close to the point of use and captures the waste heat that is ordinarily lost to provide heating, hot water and sometimes even cooling for buildings through a district heating system. As the majority of the cost of this system is in the infrastructure, it is particularly important to ensure that it is installed at the new build or large-scale redevelopment stage.

3.2.29 Gas fired CHP is considered a low carbon technology and as such can be counted towards the 10% requirement. Once the infrastructure is installed, the type of fuel used can be altered more easily than the infrastructure being put in later, and therefore has the potential to be changed over to a renewable fuel. However, there are some important considerations that must be factored in to determining whether CHP will be feasible for a particular development. Applicants will also need to be mindful of Government's intention to ban gas boilers in new homes from 2025 in a bid to tackle climate change[13]. Coupled with the proposed changes to the carbon intensity of electricity in SAP 10, which takes into account the decarbonisation of electricity, a long terms view of the carbon emissions associated with gas CHP should be taken into consideration.

3.2.30 Key is to ensure that the proposed development has a consistent year round heat demand as CHP operates more efficiently if it is run constantly. As such it is important to ensure that any CHP is sized to the year round base heating demand and not sized to meet the 10% requirement. For more information on sizing a CHP system see CIBSE Applications Manual AIM12 Combined Heat and Power for Buildings (2013).

3.2.31 It is also important to ensure that the use of CHP does not impact on air quality. CHP can lead to a localised worsening of air quality as fuel combustion gives rise to air pollutants if not correctly specified, installed and maintained. Applicants wishing to use CHP are advised to adhere to the guidance set out in Appendix 3 of this SPD. The emissions standards referenced in this guidance will normally be secured through the use of a planning condition.

3.2.32 CHP and heat networks are complex systems to install and operate, and as such it is imperative to ensure that they are designed and installed by specialist contractors following best practice guidance. It is also important to ensure that pricing for customers is fair and does not contribute to fuel poverty. As such, the Council would recommend that any proposals for heat networks, regardless of whether these are powered by CHP or another technology, are designed in line with CIBSE/ADE Guide CP1: Heat Networks: Code of Practice for the UK (2015). By following this Code of Practice this will also help to reduce the risk of heat networks inadvertently contributing to unwanted internal heat gains which can lead to overheating in summer and shoulder months (for further information on overheating see section 3.4).

### Passive solar design

3.2.33 Passive solar design is designing a building to take maximum advantage of the light and heat from the sun and natural ventilation, and can if designed correctly, significantly reduce the overall energy consumption of a building. This can be achieved by the location, grouping, orientation and layout of buildings along with landscape features and the appropriate use of thermal mass and natural ventilation within a building. However, it must be considered early in the design process.

[13] HM Treasury (2019). Spring Statement 2019. Available online at: https://www.gov.uk/government/topical-events/spring-statement-2019

3.2.34 Passive solar design measures should not be confused with energy efficiency measures, which are also intended to reduce the energy requirements of the building in use.

3.2.35 If at the reserved matters stage or full application stage passive solar design features have been incorporated into the design and their contribution to the overall reduction in the development's energy demands can be robustly demonstrated, for example through the use of dynamic thermal modelling, this can be considered as part of the delivery of the 10% requirement. These features will be subject to condition, in the same way that active renewable or low carbon energy systems would be.

3.2.36 If passive solar design features are agreed to meet part of the 10% requirement at outline application stage and it is subsequently proven that some or all of the measures are no longer feasible at the reserved matters stage, then the requirement to meet the 10% requirement using active renewable or low carbon systems will still apply.

### Site wide approaches to energy

3.2.37 Development in growth areas and new settlements offer opportunities to consider site wide approaches to renewable and low carbon energy provision, as recognised by criterion 3 of policy CC/3. For example, in some sites, the mix of uses and densities may enable the use of district heating, or provide opportunities for the development of larger scale renewable energy installations adjacent to new development, such as solar arrays coupled with battery storage and electric vehicle charging provision to create a smart grid approach to energy infrastructure. Such approaches will also assist development in transitioning to a low and zero carbon future as once the infrastructure is in place to support site wide energy approaches, the technologies that sit behind such infrastructure can more easily be upgraded in light of advances in technology.

3.2.38 In light of these opportunities, the Energy Statement and associated energy feasibility assessment should give consideration to the technical feasibility and viability of site wide approaches to energy provision. This should not just consider the energy generation technologies that form part of these site wide approaches but also the infrastructure required to support such systems, such as heat networks and smart energy grids, and the phasing of infrastructure delivery. Where appropriate, provision should be included on relevant plans, such as phasing plans. Where heat networks are being considered, the guidance contained within paragraphs 3.2.28 to 3.2.32 of this SPD should be followed.