A review of 'Merton Rule' policies in four local planning authorities in Cambridgeshire

Final report

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This project has been developed as part of the Climate Change Skills Fund. The fund is managed by Sustainability East on behalf of Improvement East.

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Executive summary

Introduction

This report sets out the findings of research into the impact of Merton Rule-style policies in four Local Planning Authorities in Cambridgeshire. These policies require reduction in carbon emissions from new developments through the installation of on-site renewable energy generation. First developed by the London Borough of Merton in 2003, 'Merton Rule' policies have been adopted by the majority of councils in England.

The purpose of the study was to investigate the degree to which these policies are meeting their primary objectives of reducing carbon emissions and raising the profile of renewable energy, as well as their secondary objectives of benefitting building occupants through reduced fuel bills and providing local economic opportunities. It also investigated how policies have impacted council officers (in terms of administration and monitoring) and developers (in terms of meeting the policies' requirements).

Methodology

The study aimed to draw together a broad evidence base from a variety of sources to develop a composite picture of the efficacy and impact of Merton policies in the four LPA areas. This involved:

- A literature review relating to the national policy and regulatory context;
- Gathering data on all relevant planning applications within the 4 LPAs;
- Face to face and telephone interviews with LPA officers, developers, housing associations, estate managers, residents and tenants and supply side companies; and
- Running a stakeholder workshop to discuss initial findings.

Application of 'Merton' policies across the county

The research found that there are differences in understanding both between and within LPAs about the primary objectives of these policies (e.g. carbon reduction or profile raising). Implementation of these policies tends to be reliant on a few key individuals in each LPA, leading to inconsistency in the application of the policy. There is also a great deal of variation in the way developers provide LPAs with energy statements regarding intended compliance with these policies, making assessment time-consuming for officers. In addition, the lack of an automatic system for tracking Merton Rule planning applications through the planning system, or determining when construction has been completed, makes monitoring of the policy very difficult.

Are the policies meeting their objectives?

These policies are certainly resulting in renewable energy installation in private housing and non domestic developments. (In social housing, the renewable energy installations are being driven by the national

requirement for new social housing to comply with Code for Sustainable Homes Level 3.) However, developers have not fully embraced these technologies and see them as being off-putting to prospective purchasers.

It is difficult to accurately assess whether the policies are delivering the intended 10% of renewable energy, but our research indicates that it is unlikely. There are reported cases of biomass boilers sitting idle whilst the gas back-up system is used instead and at least one case of air source heat pumps remaining switched off due to noise issues.

In terms of the occupants' experiences, two prevailing views were identified. Where measures have been installed correctly, are free of maintenance issues, do not require high levels of user intervention to operate them efficiently and where explanatory information has been provided, we found high levels of satisfaction and, in some cases, considerable enthusiasm in support of renewables. By contrast we found that problems with the installation of renewables, lack of information about how to operate them effectively, and a need for greater than expected levels of user intervention can rapidly lead to dissatisfaction amongst occupants and concerns about running costs and the risk of households being pushed into fuel poverty. Gas condensing boilers are frequently used as the benchmark for evaluating the ease of use and performance of renewables by occupants and developers alike.

The policies are creating economic opportunities through the manufacture, supply and installation of renewable technologies. One manufacturer (based in Papworth, Cambridgeshire) estimates that one person year of employment in its manufacturing operation is created for approximately every 70 dwellings that have solar thermal panels installed. Installation and servicing of the products would further support employment. However, whilst there is considerable supply side capacity within Cambridgeshire, only one of the developers interviewed had sourced renewable technologies locally.

National drivers for Merton Rule policies

In terms of the national policy context, there is a strong case to be made for retaining Merton Rule-style policies in the run up to the zero carbon standard (currently 2016/2019 for domestic/commercial developments). National policies regarding building-integrated renewables have been diluted, whilst reasons for encouraging renewable energy capacity have, if anything, increased. These include contributing to national renewable targets, energy security, fuel poverty (with domestic energy prices having roughly doubled in the past five years) and reduction in carbon emissions. Developers will almost certainly be able to meet the 2013 Building Regulations (which have not yet been finalized) without needing to install renewables.

Parameters for a revised policy

As well as reducing carbon emissions, a revised policy should:

- Be good for occupiers (offering financial savings, protection against future energy price rises and a dependable, low maintenance technology);
- Provide the LPA with confidence that it has provided a dependable technology to occupiers;
- Be good for the local renewables sector;
- Be easy to apply and monitor; and

- Offer a clear standard for developers, providing them with certainty and reducing their feasibility/installation costs.

Suggested revisions to the policy

To meet these objectives, it is suggested that a technology-specific policy be adopted. Considering a wide range of variables including upfront cost, savings, carbon emissions reduction, ease of monitoring, level of occupant engagement required, avoiding overlap with the Building Regulations, end user acceptability and potential local economic impact, it is suggested that a revised policy requires 10% of total carbon emissions to be met through:

- PV and/or solar thermal in the domestic sector (with the policy applying to all new developments), with a requirement that a solar energy display or readout is provided for each property;
- PV in the non domestic sector (applying to all developments over 1000m^2), with a requirement for there to be prominent signage, stating that the building is meeting part of its regulated energy demand from renewable energy, with a readout or display.

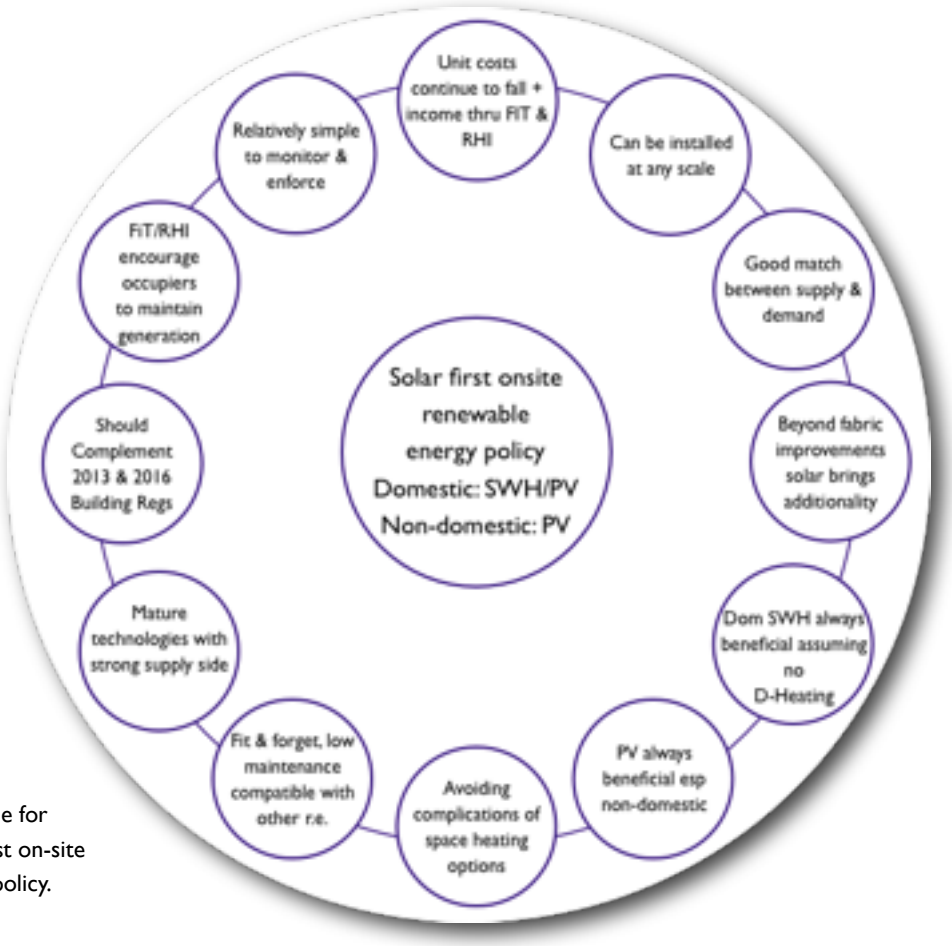
Options for maximizing the effectiveness of a revised policy

To maximize the effectiveness and minimize the bureaucracy of this policy, it is suggested that:

- All four LPAs use the template provided by Cambridge City Council for collecting information from developers on their applications, with councils providing applicants with some typical baseline figures to illustrate the estimated size and coverage of installations.
- For landlord estates such as universities, a more flexible, site-wide approach is adopted to take account of the different nature of these developments and the long-term relationship that the developer has with new buildings.
- Where heating is provided by a gas boiler, the heat should be distributed using a low temperature system to allow connection to a heat pump at a later date.
- Councils provide occupants (initial and future) with information about the operation and maintenance of renewable technology and how to get best value from it.
- Developers be strongly encouraged to use local companies for the supply, installation and maintenance contracts for renewable energy systems.
- There is an ongoing programme of stakeholder dialogue, involving developers and supply-side companies in the development and application of these policies. This will help ensure that developers fully understand the policy and with maximum benefit to the local economy.
- To facilitate monitoring, we suggest that building control officers are asked to report back on technologies installed. LPAs could also consider requiring submission of FiT and RHI certificates.

Rationale for a solar-first renewable energy planning policy

There is no single argument coming out of this research which solely makes the case for amending existing Merton Rule policies in Cambridgeshire. There are however, a number of relevant issues which together provide a composite argument or rationale for amending the current policies and which are illustrated below.



Composite rationale for adopting a solar-first on-site renewable energy policy.

Section 1 - Introduction, background & methodology

Introduction

This report sets out the findings of a study to review Merton Rule policies as implemented in four Local Planning Authorities (LPAs) in Cambridgeshire; South Cambridgeshire District Council, Huntingdonshire District Council, East Cambridgeshire District Council and Cambridge City Council. ,

It describes the methodology, findings, and conclusions of the research and presents options and guidance for local planning authorities seeking to develop Merton Rule policies.

The study has been undertaken by Climate Works Ltd in partnership with Impetus Consulting Ltd. The project has been developed as part of the Climate Change Skills Fund. The fund is managed by Sustainability East[1] on behalf of Improvement East.

Objectives

The broad objectives of this study were to review the implementation of Merton Rule policies within four local planning authorities, to evaluate the value and impact of these policies on the evidence of primary research, and from this to propose options for the further development of these policies.

The specific objectives of the study were:

- To provide evidence of the effectiveness or otherwise of Merton Rule policies as implemented 'on the ground';
- To provide a technical and socio-economic appraisal of the renewable energy technologies installed as a consequence of these policies;
- To provide evidence of the influence of Merton Rule policies on the supply-side locally;
- To conduct a thorough review of Merton Rule policies as currently applied within the LPAs;
- To recommend practical and achievable options for improving delivery outcomes in this policy area;
- To provide a substantiated view on the future of this type of policy in the context of current national policy and regulation.

[1] http://www.sustainabilityeast.org.uk/ http://www.improvementeast.gov.uk/

Background

Scope and limitations of this research

This research has confined itself to the implementation of Merton Rule policies in the four LPA areas of South Cambridgeshire, Cambridge City, Huntingdonshire and East Cambridgeshire. Options for the future development of these policies are based on the evidence collected for this study with linkages where relevant to national policy frameworks and tools. The study has not sought to address the application of Merton Rule policies in other parts of the UK or to assess the impact or performance of these policies nationally.

The 'Merton Rule'

The 'Merton Rule' refers to a planning policy first developed by the London Borough of Merton in 2003. The rule requires the use of on-site renewable energy generation to reduce the annual emissions of carbon dioxide in the built environment.

In 2008 the Planning and Energy Act enabled all councils in England and Wales to adopt a Merton Rule and specify energy efficiency standards for new buildings which exceed those defined by the Building Regulations. The Merton Rule has been adopted by the majority of councils[2] in England including the Mayor of London, with local authorities in Scotland and Wales implementing their own versions of the policy.

The rule is commonly adopted within local planning policy as a requirement for a percentage reduction in the predicted emissions of carbon dioxide, or the predicted energy demand, in new buildings, through the use of on-site renewables. It is usually specified for new developments over a certain threshold size. Ten percent is commonly set as the emissions reduction required for new domestic developments of 10 units or more, and new commercial developments over 1000m^2.

Councils have adopted many variants of this basic policy for example by raising or lowering the percentage CO_2 reduction target to be met and the threshold size of developments to which the policy applies. In some cases the Merton Rule has been combined with a requirement to meet a level or levels of the Code for Sustainable Homes or BREEAM[3].

In addition to the goal of reducing CO_2 emissions from new developments, when first introduced it was envisaged that the Merton Rule would promote the use of renewable technologies in the UK more generally whilst increasing their visibility and acceptability in the built environment.

Though Merton Rule policies have been widely adopted by councils, it is unclear whether they have been an effective tool for cutting emissions from new buildings and the degree to which they have increased on-site renewable energy capacity. And whether the renewable systems installed as a result of the policy consistently generate sufficient energy to meet the energy or CO_2 reduction target specified.

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[2] In 2008 the Improvement and Development Agency for Local Government (IDeA) reported that 325 of the 390 councils in England had taken up the Merton Rule while all councils in Scotland and Wales followed their own version of it. Source: Review of the Merton Rule Conference, http://www.merton.gov.uk/environment/planning/planningpolicy/mertonrule/building_a_zero_carbon_future.htm

[3] BREEAM: Building Research Establishment Environmental Assessment Method.

Though a number of studies have considered aspects of the implementation of Merton Rule policies, as far as the authors of this report are aware none have replicated the scope or objectives of this research.

In terms of planning policy much has altered since the London Borough of Merton introduced what became known as the 'Merton Rule' in 2003. Changes include the timetable zero carbon buildings, the introduction of the Clean Energy Cash-back scheme (Feed-in Tariffs) in April 2010, and more recently the launch of the National Planning Policy Framework (2012) and the Localism Bill (2011).

Locally, the Cambridgeshire Renewables Infrastructure Framework (CRIF)[4] published in 2012, has examined the potential opportunities to generate renewable energy in Cambridgeshire, mapping where energy is used in the county and where it could be generated using renewables such as solar panels, wind turbines, and biomass combined heat and power plants.

Due in part to the introduction of Feed-in Tariffs renewable energy technologies (especially solar PV) are now much more commonplace and visible than they were in 2003. Over the same period the cost of energy for both non-domestic and domestic customers has also risen substantially with domestic prices more than doubling. There is a consensus that energy prices will continue to rise over the next decade. Drivers for the inclusion of renewables within the UK's energy mix such as energy security, resilience to price rises and the need to cut pollution from fossil fuels have if anything strengthened over this period.

As Merton Rule policies cannot exist in a vacuum and need to reflect the broader context in which they operate the changes outlined above and those which are now in-train provide the backdrop and context to this research.

Merton Rule policies in Cambridgeshire

Merton Rule policies were introduced by the four local planning authority partners in this project between 2006 and 2010. The full wording of the policies may be found in Appendix 1.

In South Cambridgeshire, Cambridge City and East Cambridge District Council, policies have been specified in terms of achieving a 10% reduction in the predicted energy requirements for new developments. In Huntingdonshire District Council the policy is worded in terms of a 10% reduction in predicted CO_2 emissions.

Each of the four local planning authorities involved in this project is either reviewing their Local Development Framework at present or will shortly commence doing so, hence the timing of this study.

Methodology

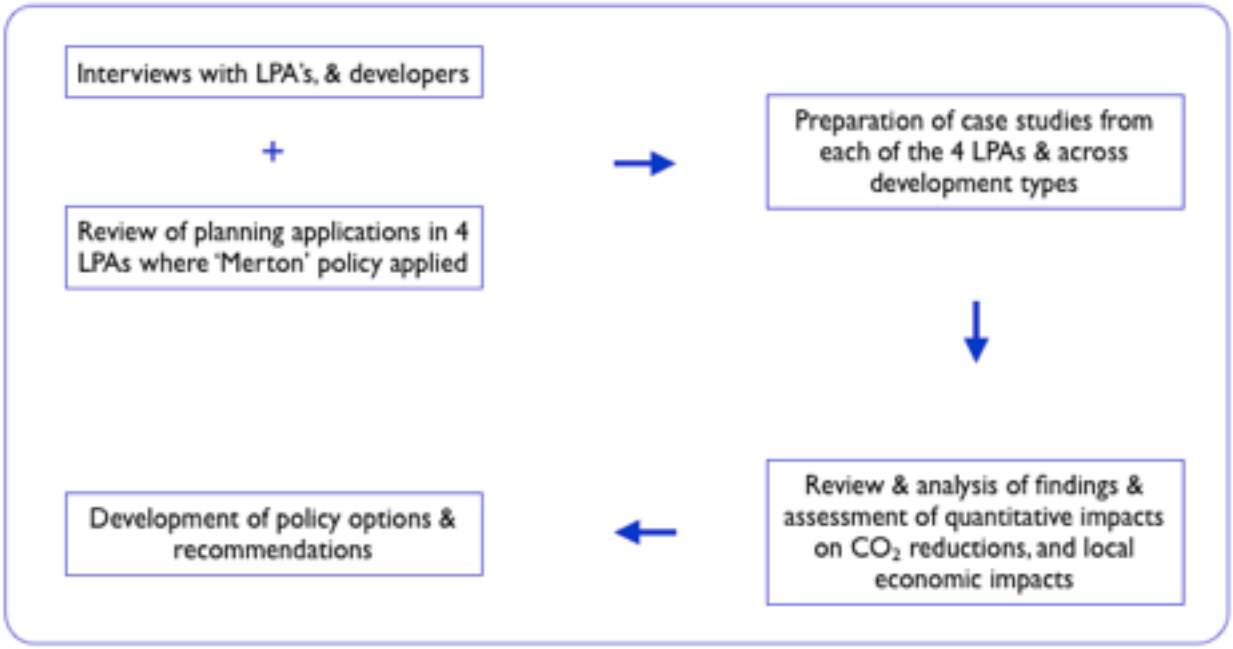
Overview

The intention at the start of this project was to produce a series of case studies of completed domestic and non-domestic developments for which Merton policies had applied. These were to be combined with the findings of interviews with council officers and developers to assess the value and impact of the policies including the energy, and CO_2 savings and the economic benefits within Cambridgeshire.

[4] http://www.crif.citizenscape.net/core/

It was proposed that the case studies would be drawn from the four local planning authority areas and be broadly representative of main development types and scale applicable to these policies.

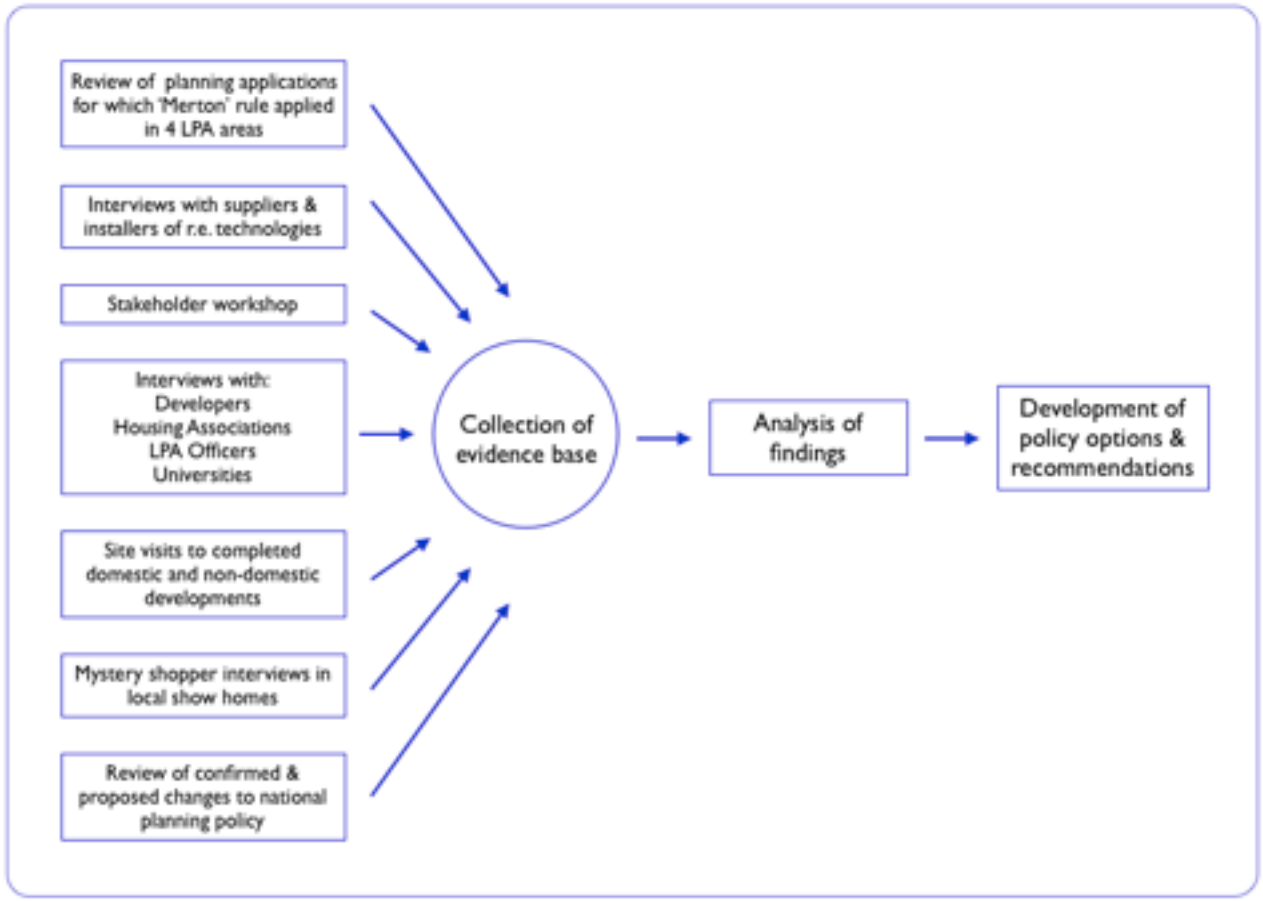
Figure 2 illustrates the proposed methodology.



In the early stages of the study it become clear that for a variety of reasons it was going to be difficult to identify a sufficient number of representative cases studies to make this approach work. These were:

- In Huntingdonshire and East Cambridgeshire there were few planning applications where this policy had applied. This is partly due to the relatively short time the policies had been in place and the low levels of development over the last five years.
- In a significant proportion of the applications made across the four areas, for which these policies apply, construction has yet to start or be completed. This reflects the lower level of development activity since the economic downturn and the fact that developers have 'banked' land for use at a later date.
- There is currently no monitoring of the progress made towards completion of approved developments other than by Building Control officers at completion of the project. A further complication is that developers can opt to use their own independent Development Control inspectors. This meant that for many of the sites considered as potential case studies for this project the only way of determining whether a development had been completed (or started) was by a site visit.

In response to these issues a revised methodology was developed and agreed with the project partners. The intention was to assemble a broad base of evidence from a variety of sources, to build a composite picture of the efficacy and impact of Merton Rule policies in the four LPA areas. This is summarized in Figure 3.



Description of the revised methodology

Collation of data on planning applications

The objective of this task was to collate data on all planning applications, where Merton Rule policies had applied in the four LPA areas between 2008 and 2010.

Details of the applications and the energy statements contained within these were obtained from on-line searches of LPA websites, and by retrieving hard-copy records from LPA offices. Further information was provided by LPA officers themselves.

Twenty eight relevant applications were identified for the period 2008 to 2010. This was reduced to a shortlist of 15 applications by eliminating developments which have yet to be built or completed, where the energy statement was missing or incomplete, and where there was no named contact person connected with the development or in some cases because the contact had left and it was not possible to find a suitable replacement.

Using the shortlist developers were contacted for further information about the development and to arrange a site visit. A list of the developments reviewed for this part of the study may be found in Appendix 2.

Specifications of renewable energy systems reviewed

Technical specifications of the renewable technologies installed in the non-domestic buildings reviewed for this study may be found in Appendix 3.

Interviews with LPA Officers

Semi-structured interviews were conducted with officers from each of the four LPAs at the outset of the project with the objective of:

- Confirming the details of the policies as applied, and further information on the developments influenced by these policies;
- Assessing the process for evaluating applications and working with developers;
- Gathering the views of officers on the objectives, implementation and effectiveness of the policy.

Sustainability, planning policy, development control, building control, environment and urban design officers were all interviewed for this task.

Further details on the content of the interviews and officers who took part may be found in Appendix 3.

Interviews with developers

Developers were invited to be interviewed as part of this study for two reasons. Firstly, to gather their views on the application of Merton Rule-style policies, and their preferred (technical) means of complying with them, and secondly to understand how contracts for the installation and maintenance of renewable technologies are let, and whether local factors come into play when doing so.

Semi-structured interviews were conducted in person, by phone and at the stakeholder workshop with:

- Bedfordia Motor Holdings [5];
- Hills Partnership;
- Leach Homes;
- Cambridge and County Developments;
- Bovis Homes;
- Gallagher Estates;
- Lend Lease Consulting.

Further details of the interviews with developers may be found in Appendix 3.

[5] Bedfordia Motor Holdings own and manage a BMW/Mini Dealership, in Upper Cambourne, South Cambridgeshire. (Planning reference: S/01831/09), for which this policy applies.

Photo 1: Front elevation and biomass boiler, Richard Newcombe Court, Cambridge.

Interviews relating to Housing Associations

Semi-structured interviews were conducted with representatives from Cambridge and County Developments and Circle Anglia Ltd (now known as Circle).

Cambridge and County Developments (CCD) is a limited company and Industrial Provident Society (part of the CHS Group[6]), developing affordable homes for rent and shared ownership, for housing associations and local authority partners. Circle works with 12 partners, to manage 63,500 homes, and provide services for around 300,000 people across the UK.

The purpose of these interviews was firstly to discuss the impact of Merton Rule-style policies in comparison to other requirements such as to the Code for Sustainable Homes, and secondly, in the case of CCD, to discuss the renewable technologies installed at Richard Newcombe Court, a new residential care home in Cambridge. Recently opened this has been developed to Code Level 5, and includes a biomass boiler and PV array.

Further information about these interviews may be found in Appendix 3.

Interviews with domestic residents/tenants

Occupants of homes in which renewable energy technologies had been installed were invited to take part in face to face interviews at home.

[6] http://www.chsgroup.org.uk/page-view.php?

The purpose of the interviews was to:

- Discover their views on living in homes with renewable energy systems (installed as a result either of Merton Rule policies or the Code for Sustainable Homes);
- Gather residents' opinions about the impact of the installed renewable energy systems on their fuel bills;
- Understand with what information and advice they had been provided about their renewable energy systems, and whether this included information on how to get best use from it;
- Whether they would recommend the technology installed in their home to others.

In all twenty householders were contacted by letter, of which six (in Great Shelford and Upper Cambourne) agreed and were available to be interviewed. All but one lived in homes incorporating renewable technologies installed in order to comply with a specified level of the Code for Sustainable Homes rather than a Merton Rule planning policy. One occupant had received a 'free' PV system as part of an installer offer under the Feed-in Tariff whereby the installer retains the Feed-in Tariff payments.

Further details on these interviews may be found in Appendix 3.

PV array on rear elevation of dwelling in Whittlesford, included in the occupant interviews.

Mystery shopper visits

Mystery shopper visits were carried out in three show homes in South Cambridgeshire; two to Taylor Wimpey and one to Bovis Homes. For this exercise a member of the project team made enquiries about the purchase of a new 2-3 bedroom house.

The purpose of the visits was to find out:

- What information about renewable technologies is available 'as standard';
- Whether renewables can be specified as an option for new homes, and if so what technologies are available;
- What information sales representatives could provide about renewables, and the benefits and savings.

The findings of the visits are covered in Section 2.

Interviews with Anglia Ruskin University and the University of Cambridge

Representatives from both Anglia Ruskin University and the University of Cambridge were interviewed for this study. Both have dual roles in that they are responsible for the commissioning and development of new buildings, and managing large estates.

The Alison Richard Building, the University of Cambridge.

Semi-structured interviews[7] were used to gather views on the application of Merton Rule-style policies and discuss issues relating to two buildings, namely the Alison Richard Building (right)[8] (University of Cambridge) and the Wrap - Lord Ashcroft Building[9] (Anglia Ruskin).

The Alison Richard Building is a BREEAM Excellent building which meets with the city's Merton Rule policy with a ground source heat pump in combination with passive heating measures. The Wrap meets the policy requirements with a PV array in combination with passive heating measures.

Stakeholder workshop

A half-day stakeholder workshop was included in the revised methodology to gather the views of stakeholders not interviewed in the earlier part of the project, and to allow further in-depth and facilitated discussion with key players.

Delegates were asked to consider how Merton policies work in practice now and how they might be developed in the future.

The event took place at the Smart Life Centre in Cambridge and was attended by sixteen delegates representing developers, consultancies, architects, renewable manufacturers and LPAs. Further information about the workshop and outputs from the discussions may be found in Appendix 3.

Assessment of economic impacts of Merton Rule-style policies in Cambridgeshire and the impact on renewable energy suppliers and installers

The purpose of this element of the study was to assess if Merton Rule policies have had a measurable impact on supply-side within the local economy in Cambridgeshire.

Details of renewable energy supply side businesses located in Cambridgeshire, were compiled into a spreadsheet which included those involved in the manufacture, supply, installation and servicing of renewable systems.

[7] As used for the other developers.

[8] Reference: 09/0699/FUL Cambridge.

[9] Reference: 08/1575/FUL Cambridge.

The spreadsheet was populated through an online search of MCS (Microgeneration Certification Scheme) accredited companies in the county and companies listed on Yell.com, as well as from the findings of the interviews with developers.

Supply side companies were then interviewed to establish the impact of Merton Rule policies on their turnover/ business, numbers of staff etc. A number of developers and housing associations were also interviewed to establish how they procure the renewable technologies, how many are coming from within the area, and which companies undertake any servicing or repair work required.

Thirty-nine renewable energy supply side businesses were identified, of which eight appeared to be serving this new-build market in Cambridgeshire, and six of which agreed to be interviewed. The vast majority of listed renewable energy companies in Cambridgeshire have been set-up to retrofit measures into existing buildings in response to the Clean Energy Cash-back Scheme (Feed-in Tariffs).

The full list of companies and those interviewed may be found in Appendix 3.

The intention was to conduct at least ten interviews with companies in Cambridgeshire. In fact, we were only able to identify eight companies that appeared to be serving this market and to secure interviews with six of these, as follows:

Company	Technologies	Services
Viridian Solar – Stuart Elmes, Chief Executive	Solar PV and solar thermal panels	Manufacture and supply
Cambridge Eco-Living, Simon Wickham	SWH, ASHP	Supply, install, service
Cambridge Solar, Owen Morgan	SWH, PV, wind	Supply, install, service
Beechdale, Sunair Shahid	PV	Supply, install, service
Kershaw Contractors, Keith Oakes	SWH, PV, Heatpumps	Supply and install
Bowller Roofing, Tom Bowller	SWH, PV	Install (= roofing contractors)

(The vast majority of renewable energy companies in Cambridgeshire have been set up to retrofit measures onto buildings, mostly driven by Feed-in Tariffs).

The following developers, Housing Associations and contacts were interviewed:

- **Leach Homes** - John Newell;
- **Wherry Housing Association** (part of Circle 33) - Fiona Coulson;
- **Bedfordia Motor Holdings** - Adam Dolby at architects Taylor Design;
- **Cambridge University** - Mr John Neve;
- **Cambridge and County Developments** - Alison Turnbull;
- **Anglia Ruskin University** - Jerry Shoolbred;
- **Hills Partnership** - Ted Layton;
- **Bovis Homes**- Peter Lawrence (information provided at workshop);
- **Gallagher Estates** - Andy Lawson (information provided at workshop);
- **Lend Lease Consulting** - Paul Nicholson (information provided at workshop).

It proved difficult to make contact with private sector developers, and we were unable to contact Bellway Homes and Barrett Easter Counties despite identifying appropriate contacts.

Section 2 - Findings

Current implementation of Merton Rule policies by LPAs

Though the wording of the policies in the four LPA areas is broadly similar (see Appendix 1), this research has identified differences in understanding, both between and within the LPAs, about the objectives of these policies.

Whilst some view the primary objective to be carbon reduction, others see it to be increasing the total number of on-site renewable energy measures installed (and as a consequence raising the profile of renewable energy within the county). This discrepancy and, in some cases, a lack of clarity and consistency was raised as a concern by developers including the University of Cambridge and is discussed further below.

There is wide variation in the way in which developers provide LPAs with Energy Statements setting out how they intend to comply with the requirements of these policies. Energy Statements reviewed for this project varied from short, concise submissions to reports of 100 pages or more with substantial amounts of unnecessary padding.

This lack of consistency and the inclusion of irrelevant information increases the time and effort needed by officers to process applications. Developers were most consistent in their approach when using the template provided by Cambridge City Council.

The evidence from the four LPAs is that monitoring the progress of Merton Rule planning applications from the point at which approval is given, to completion of a new building/development is not straight-forward, and it is very difficult to assess what measures have been installed as a consequence of these policies. What is often a considerable time lag between approval and completion adds to this problem as does the absence of any requirement or system for Building Control officers to report back to officers with responsibilities for these policies on progress towards completion.

A further complication is that developers can and do opt to employ their own private Building Control inspectors putting the onus on LPA officers to track applications to the point of completion.

In South Cambridgeshire, Cambridge City, and Huntingdonshire, implementation of these policies is particularly dependent on key individuals. Usually this is Development Control officers working with officers with the lead responsibility for Merton Rule policies.

The advantage of this approach is that lead officers have built up considerable expertise and experience in this area. However, it risks inconsistency in the implementation of the policy and means that the departure of key officers could leave the LPA with a gap in expertise and less able to implement and enforce these policies effectively.

Developers

Impact of Merton Rule policies

Though there is insufficient evidence to quantify the impact of Merton policies in Cambridgeshire, it is clear from this study that they are resulting in on-site renewable technologies being installed in new developments, both domestic and commercial which might not otherwise have happened.

One of the development companies interviewed was clear that without these policies (or a requirement to build to a minimum level of the Code for Sustainable Homes/BREEAM), they would not be installing renewable technologies in new buildings constructed for the private sector market.

However, evidence from the interviews and the stakeholder workshop is that developers have yet to fully embrace the need for (and benefits of) renewable energy in new buildings. Renewable technologies are considered by at least one of the developers interviewed to be 'off-putting' to prospective purchasers, and to have a negative impact on the salability of new homes. In reaction to this, where possible, solar water heating and PV systems are installed on the rear of properties to reduce the negative impact on 'curb appeal'. This needs to be viewed in the context that solar water heating is a 'mature' technology that has been in use in UK for over 40 years, and delivers well defined (if modest) savings and benefits and domestic PV systems are now relatively common following the introduction of the Feed In Tariff.

Newly completed homes in Upper Cambourne incorporating solar hot water systems.

These comments by developers were borne out by the Mystery Shopper exercises in the three showrooms visited. Renewables were not a feature or an option in any of the homes on sale. Though helpful, the sales staff had no real knowledge of renewable technologies, other ways of improving the environmental performance of the homes, or the Code for Sustainable Homes. One representative from Taylor Wimpey explained that they had been thinking about compiling an energy leaflet explaining the benefits of the homes, but that most prospective buyers were interested in other features such as the number of bedrooms, garage etc.

A further observation is that in certain areas of Cambridgeshire such as Upper Cambourne, a substantial proportion of new social housing built to CSH Level 3 incorporates solar water heating, where as new private sector housing (pre-dating the Merton Rule) is without any form of renewable energy.

Maintenance

A key concern for developers is the on-going maintenance of renewable systems once installed. Maintenance will normally be covered under warranty by the manufacturers and in the case of housing, by the guarantee provided with the property. Once this period has expired the developers interviewed for this project provide details of companies which occupiers can contact for servicing and maintenance queries.

This raises a number of issues. For developers the concern is that occupiers will require maintenance advice and support after their responsibility for the maintenance of the property comes to an end. There is also a concern that 'bad news' linked to renewables will damage developers' reputations (an issue which is discussed further below).

For LPAs seeking effective Merton Rule policies the issue is that installed measures may not be achieving their full output due to maintenance problems and faults.

For occupants maintenance issues create a problem that has to be addressed as well as reducing the financial savings/income generated by the system. Users with a poor understanding of the system may be unaware that it is failing to meet its full potential.

Developers were less concerned about maintenance of renewables in non-domestic buildings because these will tend to be bundled together with other building management/maintenance services.

Cost

The cost of installing renewable energy measures to meet Merton Rule policies is a concern for developers which was raised at the stakeholder workshop, with particular reference to housing. Developers perceive there it be no marketing or sales benefits from renewables, and consequently find it difficult to pass the capital costs on to purchasers.

Where there is flexibility over land valuation, it may be possible to offset a proportion of the additional costs. However, where planning applications are made on land already purchased or 'banked' this may not be an option.

This perceived lack of value for renewables can lead to a vicious circle. Renewables are not promoted to customers, consequently customers are unaware of the benefits they bring and so are reluctant to pay for them.

(As a result of the stakeholder workshop on 26th March 2012, during which this problem was discussed, the sole manufacturer of solar systems based in Cambridgeshire is now actively working with developers to help them market the benefits of installed renewable technologies to prospective customers and to offer customers options to install further, complementary technologies).

Acceptability of building integrated renewables in non-domestic buildings

Whilst many of the findings of this project related to domestic dwellings also apply to non-domestic buildings one difference is that within the commercial sector there appears to be greater acceptance of and flexibility towards the use of building integrated renewable technologies in non-domestic buildings.

This may be due to a greater emphasis on reducing building running costs (of which energy can be the most significant part) particularly in areas and at times when the supply of rented space exceeds demand.

In addition because there may be fewer issues to do with space (for measure installation) and user acceptability (such as visual impact), this may make it easier for developers to 'sell' building integrated renewables to commercial customers.

Modelling and assessing projected energy demand in non-domestic buildings

A further issue for LPAs and developers regarding non-domestic buildings is the design stage assessment of the total (end use) energy demand and CO_2 emissions. Where Merton Rule targets are specified as a percentage reduction in CO_2 emissions, total energy demand will determine the size of the installed system. Energy demand will be related to building type (office, warehouse etc) and the nature of the end use.

It is clear from this study that in many cases the end use energy demand may be unknown at the design/ planning stage. The University of Cambridge for example reported that when developing new research facilities, there is considerable variation in the actual energy demand depending on the size and nature of equipment installed.

The implications of this for LPA officers are discussed below under Technical Issues.

Housing Associations

Drivers for on-site renewables

For Housing Associations, the key driver for integrating renewable energy into new dwellings is compliance with the Code for Sustainable Homes. Under the Government's timetable for zero carbon buildings, Housing Associations have been required, since 2008, to achieve CSH Level 3 in order to receive a grant from the Homes and Communities Agency[10].

Whilst Code 3 can technically be achieved through energy efficiency measures alone, to date the most cost effective route (and therefore the one generally adopted) has involved inclusion of some renewable technology, typically solar water heating, PV and heat pumps (air and ground source). In the examples considered for this project these renewable technologies would (if used correctly) result in CO_2 reductions that exceed the requirement of Merton Rule-style policies.

Maintenance

The Housing Associations interviewed proposed to deal with on-going maintenance of renewable energy systems by training their own maintenance staff or sub-contracting to a third party.

Maintenance was raised as a concern by one of the tenants interviewed for this project and is discussed below.

Universities

Anglia Ruskin

The University described complying with the 10% Merton Rule requirement as being 'fairly difficult'. Where compliance has been achieved through the installation of a PV system this has been registered under the Clean Energy Cash-back scheme.

The University aspires to achieve BREEAM excellent in new developments, though this is subject to cost.

[10] The original plans were to increase this to Code level 4 by 2011, but early in 2011 it was announced that homes with HCA funding in 2011-2015 would continue to have to meet Code level 3. The Government has indicated that its objective is for standards in the private and public sector to be the same (as quoted in the Guardian - http://www.guardian.co.uk/sustainable-business/scrap-house-building-core-standards)[10] .

University of Cambridge

The University of Cambridge has a strong focus on reducing the energy use, costs, and carbon emissions arising from new buildings and from its entire estate. It is working to make these cuts by combining technical measures (e.g. energy efficiency measures, building energy management systems etc) in new and existing buildings with behavioural interventions. The latter include energy usage displays in the public access areas, training for staff, the provision of advice and information, as well as an extended handover period for new buildings.

The University argued strongly in favour of more flexibility in the implementation of Merton style policies, which they believe will lead to greater reductions in emissions. They would like the option of being able to locate new renewable technologies off-site at alternative locations and believe that overall this will result in a higher energy yield.

Where renewables may not be the most appropriate means of reducing emissions, they wish to be able to install equivalent carbon reduction measures in either new or existing buildings. (The Wellcome Trust made a similar case for flexibility at the Stakeholder Workshop).

Our research found that there will be instances where renewable technologies could be sited away from new buildings, but this will need to be determined on a case by case basis. There could also be significant opportunities for the council to work in partnership with the University, for example to share the generation of renewable heat between new and existing buildings or housing stock[11].

Occupants of homes with renewable technologies

This research has identified two prevailing views amongst the occupants of homes with renewable energy technologies installed.

Where measures have been installed correctly, are free of maintenance issues, require low levels of user intervention to operate efficiently, and where explanatory information has been provided, there were high levels of satisfaction and in some cases considerable enthusiasm in support of renewables.

All six of the occupants interviewed for this project described themselves as being very happy with their solar system (4 homes had solar water heating, and 2 had PV systems). All said they would recommend the technology to others and it would be factor if moving home in the future. The solar water heating system was a deciding factor for two residents when choosing their current home.

Five of the six had been supplied with a booklet explaining their system on moving in (or when it was installed) but had received no further advice (which all thought would have been helpful) subsequently. None of the tenants interviewed knew the output of their systems or what energy or financial savings they should expect.

All but one person stated that the solar system had lowered their fuel bills. Savings were described as being ‘significant’ though only one person (with a solar water heating system) was able to provide financial information;

[11] One of the technical difficulties of making use of heat from renewable sources is that heat (and cooling demand) from new buildings can be relatively small making it less financially viable, whereas the heat demand in existing buildings can by comparison be large. Generally, it is more costly to move heat from one location to another than to transmit electricity.

that over a 9 week period during the previous summer (2011) their gas bill was £16. Overall the response from the occupants surveyed was very positive.

Though we were unable to interview occupants or tenants living in homes with forms of renewable generation other than solar, in the course of the research it become apparent that problems arising from poor specification or installation of measures, insufficient information about how to use a technology correctly, or the need for higher than anticipated levels of user intervention can lead to dissatisfaction and even hostility amongst users. When assessing the ease of use, running costs and overall satisfaction of renewables, developers and users often take gas condensing boilers as the benchmark.

Whilst this project was underway concerns were raised about the installation and use of Air Source Heat Pumps by one social housing provider in the county. Minutes of a BHPA (formerly Bedfordshire Pilgrims Housing Association) Board Meeting[12] (March 2012) highlight disquiet about high electricity bills, poor control over room temperature, unsuitable ducting (of warm air systems), and about servicing and training of service engineers. In February 2012 dissatisfaction amongst residents was reported in the local press[13].

Specific issues to do with heat pumps fall outside the scope of this study[14]. However, it is clear that certain types of renewable energy generation require a higher level of input and resource to ensure they are correctly specified, installed, and operated than others e.g. PV systems. Without this they may fail to meet the requirements or expectations of the end user, in this case the building occupants. This puts a greater onus on LPAs to check that the renewable systems proposed by developers are appropriate. In the case of renewable heating ensuring that the user understands and accepts that the system cannot be operated in the same way as a gas condensing boiler is crucial.

Where the specification and installation are correct and users understand how to get the best from their systems the evidence is that overall satisfaction for technologies such as heat pumps can be very good. South Cambridgeshire District Council report success in retrofitting Air Source Heat Pumps into 85 council owned dwellings in off-gas areas[15] with an on-going installation programme.

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[12] http://www.bpha.org.uk/repairsandmaintenance/Documents/Minutes%20from%20NIBE%20meeting%2022.03.12.pdf

[13] In February 2012 the Hunts Post reported, 'St Neots families in BPHA boiler battle'. 'Families in St Neots say they are being forced into fuel poverty by inefficient heating systems in their homes. Residents of Love's Farm, who live in homes built by Kier, say they are paying between £200 and £300 per month in electricity, and some now have debts of as much as £1,000 as a result. The NIBE system – which comprises an electric boiler and a heat pump – collects energy from warm inside air as it leaves the home via a ventilation system, and re-uses it to heat fresh incoming air and tap water. It has been promoted by its Swedish manufacturer as both cost-effective and environmentally friendly'. http://www.huntspost.co.uk/news/business-news/st_neots_families_in_bpha_boiler_battle_1_1197499

[14] Refer to 'Detailed analysis from the first phase of the Energy Saving Trust's heat pump field trail', March 2012 for further information about the use of heat pumps in the UK.
http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/microgeneration/5045-heat-pump-field-trials.pdf

[15] The council has installed 85 air source heat pumps in their own dwellings all located in off-gas areas. Key factors in the installations being successful are ensuring that the dwellings have sufficient thermal insulation, and that residents understand how to get the best use and efficiency from the system. The design of the systems and instructions provided to the user are critical in this respect. The council anticipates a further 40 installations per year in off-gas areas up to 700 in total.

A further issue reported by occupants was to do with maintenance. A resident of a housing association property in Upper Cambourne (predating the introduction of the Merton policy), was anxious to highlight problems and frustration caused by a faulty PV system which had not functioned correctly since installation, and which despite being raised with the landlord on several occasions and one visit from a contractor had yet to be resolved.

Economic impacts and benefits - suppliers and installers

Manufacturers/suppliers/installers

There are numerous companies in Cambridgeshire offering services related to renewable energy technologies; 39 were identified in total (many, but not all of which are MCS accredited). Of these, only one is a manufacturer (of solar PV and solar hot water panels), the others being suppliers, installers or both. Some companies specialize in one technology (PV being the most common) while others offer services across a wider range of technologies.

The vast majority of these 39 companies do not appear to work on new developments (many have been set up in response to FITs to install PVs on existing buildings). Eight companies were identified whose websites included information on the services they can provide for new developments, six of which were contacted for this study. Of these six, only one has won business to supply/install renewable technologies in Cambridgeshire. This appears to be Cambridgeshire's only manufacturer of renewable technologies. The company is growing rapidly; turnover is currently £4 million with 40 employees, mostly based in Papworth. The company sells its panels throughout the UK and also supplies panels to other European countries.

Three other companies have aspirations to supply the new build market but, despite responding to several tenders, have been unsuccessful at winning any work in the county. The others contacted hope to develop this area in future but up until now have been fully occupied with retrofit installations driven by the Feed in Tariff.

Developers

Information was gathered from ten developers that are active within Cambridgeshire to find out how they procure renewable technologies. Only one, Wherry Housing Association, has procured from a Cambridgeshire-based organization. It sourced solar panels for its Cambourne development from a local manufacturer based in Papworth. The others have sourced technologies manufactured outside of the county (often abroad) and have used suppliers and installers from outside the county too (sometimes from neighbouring counties, sometimes from further afield such as Salford).

Existing contractors are sometimes used to undertake the installations and/or to supply the technologies. For example, Hills Partnerships reported tendering for a roofing contractor which is then responsible for sourcing the solar thermal units; Hills Partnership does not influence the sourcing of these units.

Most organizations tender for contracts without any consideration of appointing a local contractor. For example, Cambridge University will procure via the OJEU process. One of the commercial housing developers contacted, Bovis Homes, stated that, for a particular renewable technology, they tend to use the same supplier/ manufacturer for all their developments, UK wide, since this achieves economies of scale. They will usually look to obtain a group deal at a regional level.

Merton Rule policies - technical issues

Defining energy use and carbon emission base-lines

As discussed above, there is an on-going question about how the total energy use and carbon emissions of new buildings are estimated by developers and checked by LPAs as part of the design/planning process. The main discrepancy is the methodology used to estimate Unregulated energy use and emissions in both domestic and non-domestic buildings.

It is apparent from the energy statements reviewed for this study that developers adopt a variety of methodologies to estimate end use energy demand and emissions. This creates a number of practical difficulties for LPA officers given the the task of checking submissions:

- How to determine if the methodology used by developers is sound;
- How to assess if projected energy demand for the proposed end use (where known) is correct - has the specified methodology been applied correctly?
- How to deal with applications where the end use of the building is not known (as may be the case for example with research laboratories/facilities).

The feedback from the LPA officers interviewed was that they have no set way of making these checks and that this may boil down to whether the developers' figures 'feel right' for the specified building type.

In the past reference documents such as the London Renewables Toolkit have been useful in providing typical energy demand figures for different building types, as have benchmark figures published by CIBSE (Chartered Institute of Building Services Engineers). The London Renewables Toolkit is now in urgent need of revision and updating and consequently is now of limited use in this respect.

Making an informed assessment of calculations produced by developers requires LPA officers to have a high level of technical understanding and expertise which often exceeds that needed for the other parts of their jobs, and which they may not have. This is particularly relevant given forthcoming changes to the Building Regulations, the range of technologies deployed and building types developed, and the different uses for given building types/designs.

Development of building design to incorporate on-site renewable technologies

The findings of this study support those of previous studies, that domestic dwellings are not being designed with the inclusion or renewable technologies in mind. For example, roof design is not being modified to increase the area of the south facing elevation and reduce shading from design features such as dormer windows.

Renewable technologies are still regarded as 'bolt-ons' to standard house designs. Nor it appears from this research is layout, orientation and built form of domestic dwellings being used to maximize the benefits of passive solar gain.

There was more evidence to suggest that non-domestic buildings are being designed to account for renewables. Richard Newcombe Court for example, a residential care home in Cambridge has been designed around the use of a biomass boiler with appropriate storage and delivery facilities. (A detailed discussion about

the reasons why house design is not evolving more rapidly can be found in the previous report produced by Climate Works Ltd for Bristol City Council[16]).

The use of modular solar water heating systems

The evidence from developers for this study is that solar water heating systems for use in domestic dwellings, are increasingly being supplied and fitted as modular units. The installation of the collectors is let as part of the roofing installation contract and the provision of the storage and distribution systems is let separately as part of the heating and water system. This appears to be the preferred means of installation (and manufacturers have developed modular systems to facilitate this).

Though we found no evidence of this causing maintenance problems (due in part to the short amount of time that systems have been operational), the issue of how 'split' systems of this type are maintained once the warranty has expired is something which will need to be addressed in due course.

Selection of renewable technologies

Developers participating in this project expressed a clear preference for Merton Rule policies which are not technology specific, giving them a free hand to select what they consider to be the most appropriate technology. The implications and limitations of this approach are discussed below.

Feed-in Tariffs

Only two of the developers participating in this research Cambridge and County Developments, and Anglia Ruskin University had opted to retain payments of the Feed-in Tariff for renewable electricity systems such as PV as a way of offsetting the installation cost. Cambridge and County Developments reported long delays in registered their PV system for payments.

There appeared to be no real interest from developers in using Feed-in Tariffs (or the Renewable Heat Incentive) to off-set the capital cost of measures.

Increasing the opportunities for renewable technologies in new buildings

A question raised by LPAs during this study was whether new buildings could be designed and constructed now to facilitate the installation of additional renewable technologies/capacity at a later date. An example is designing homes with low temperature heat distribution systems (i.e. low temperature radiators, or underfloor heating) for use with gas condensing boilers. This gives the option of replacing the gas system with an Air Source, or possibly Ground Source, Heat Pump when the gas the boiler reaches the end of its operational life. Correctly specified, installed and operated heat pumps offer the potential for a step change in heating efficiency[17]. The provision of low temperature distribution systems provides flexibility for occupants to opt for a lower carbon and potentially lower cost alternative to gas or oil heating and builds resilience to further above

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16 http://www.climate-works.co.uk/newsletter/autumn2011/BCC%20Building%20Standards%20Evidence%20Base%20-%20Final%2015-04-2011.pdf

17 Heat pumps extract solar energy from the air, ground or water. Seasonal efficiencies can be in the order of 200 to 400% meaning that for each unit if electricity used to run the system 2 to 4 units of heat can be extracted. Heat pumps require a well insulated building and a low temperature distribution heat system to operate efficiently. They favour operation of long periods of time to produce low temperature heat, rather than the intermittent output of high temperature heat normally produced by a gas condensing boiler.

inflation price increases in fossil fuels. Doing this has cost implications for developers as distributing heat in this way is likely to be more expensive than using standard emitters (radiators). However, some developers are now opting for underfloor heating anyway as it is popular with home buyers and viewed as a positive selling feature in new dwellings.

Monitoring and enforcement of Merton Rule policies

Amongst public and private sector participants in this study there was a broad consensus that Merton Rule policies can only be enforced fully if some form of on-going performance monitoring is present.

There are two principal means of achieving this; either through the use of technical systems to log output, and provide data for analysis and manual or automated checking, or by requiring users to report regularly on energy generation and savings. In the workshop discussions with developers there was no appetite for either approach.

A key finding of this study is that though a site visit by LPA officers can confirm if a measure has been installed, without detailed and on-going monitoring of system output it is not possible to practically assess the contribution that is being made to energy demand and carbon savings. This applies to renewables installed in both domestic and non-domestic dwellings. The difficulties encountered in obtaining data for this study are an indication of the problem of monitoring Merton Rule policies.

In non-domestic buildings it is common for heat only technologies to be installed with back-up systems such as a gas boiler. Two of the examples reviewed for this study had such an arrangement with gas condensing boilers installed as the back-up to a heat pump and biomass boiler. Without monitoring it is not possible to say what proportion of the energy demand is being met by the lead renewable technology and what is being met by the back-up gas boiler.

Amongst some of the developers participating in the workshop there was a suggestion that Merton Rule policies are little more than a 'tick box' exercise, and that what counts is the installation of the technology rather than the energy generated over the lifetime of the measure(s). It was also suggested that where biomass boilers have been installed operators are not using them and defaulting back to gas boiler(s) installed as backup systems. Clearly, managing, maintaining and fueling the biomass boiler will entail considerably more time and effort and potentially more expensive (at least in the short term) than operating and maintaining a gas boiler.

For LPAs to be confident that renewables specified by developers meet not only the technical requirements of Merton policies (i.e. emission reductions) but also the non-technical requirements such as ease of use, some technologies, particularly heat only technologies such as biomass and heat pumps, will require a greater degree of input and checking by officers than others, to ensure the full aspirations of the policy are met.

A clear advantage of renewable electricity technologies such as PV systems, which are registered under the Clean Energy Cash-back Scheme, is that the scheme itself provides a degree of quality assurance and monitoring. Systems have to be installed by an MCS [18] registered installer and fitted with a total generation meter[19]. Surplus energy generated by the system is 'exported' to the distribution network (grid) and will either be

[18] Microgeneration Certification Scheme.

[19] The total generation meter measures that total amount of electricity generated by the renewable system.

metered or deemed. Feed-in tariff payments should in most cases create the incentive needed to monitor systems performance (if not to report this to the LPA).

A simple means of checking the installation of renewables qualifying for payments under the Clean Energy Cash-back Scheme would be for developers to provide LPAs with copies of the MCS Registration certificate prior to the building being occupied.

Links to national and local planning policies

Full details about the complex changes to national planning policies are provided in Appendix 4. The key points that are relevant to this study are detailed below.

National Planning Policy Framework

The National Planning Policy Framework (NPPF) published in April 2012, sets out the Government's planning policies for England and how it expects these to be applied. It marks a significant shift in how planning policy is shaped and defined and the priorities which the Government expect LPAs to adopt.

Under 'Building a strong, competitive economy' the NPPF places strong emphasis on using the planning system to support economic growth:

'The Government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Planning should operate to encourage and not act as an impediment to sustainable growth. Therefore significant weight should be placed on the need to support economic growth through the planning system[20]'.

Of relevance to Merton Rule policies, the NPPF states that local authorities should:

- When setting local requirement for buildings' sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards;
- Have a positive strategy to promote energy from renewable and low carbon sources.

At present the degree to which local authorities will be able to specify environmental performance criteria which exceed Building Regulations is unclear. The Government may provide further clarification, or as was the case when the requirement for on-site renewable energy in new developments was first proposed by the London Borough of Merton, it may be necessary for LPAs to bring forward policy amendments in order to establish and test what is allowable.

'Zero carbon' buildings and the Building Regulations

Domestic buildings

In July 2007 the Government announced that from 2016 all new homes will be 'zero carbon'. The policy announcement set out a timetable for progressive tightening of the Building Regulations in 2010, 2013 and 2016 to deliver a 'zero carbon' policy. Some of the carbon emissions reduction would be met through 'Allowable Solutions'. (Details of what is meant by Allowable Solutions may be found in Appendix 4).

[20] Paragraph 19, page 6 National Planning Policy Framework, April 2012. 'Sustainable economic growth' is not defined.

Since the policy was first announced, the definition of zero carbon has been watered down; it now excludes unregulated emissions arising from the use of appliances (which typically account for 40-50% of a dwelling's electricity consumption). In addition, ideas about what proportion can be met through Allowable Solutions are changing; initial plans were for this to be 30% whereas now figures of 40–56% are proposed (varying according to property type).

The 2010 building regulations delivered a 25% reduction in carbon emissions over the 2006 Building Regulations. The Government is currently consulting on the 2013 revision. Initial plans were for this to have delivered a 44% reduction over 2006 (equivalent in terms of energy to the Code for Sustainable Homes level 4). Experts in the field believe the actual figure will be in the region of 33-35%.

The cheapest means of complying with this for most new developments will involve some level of renewable energy. However, technically it is feasible for properties to be built to Code Level 4 (delivering a 44% carbon reduction) and above without incorporating renewables. (Some of the larger developers are involved in the 'AimC4' project which is looking at achieving Code 4 through fabric measures alone[21]. It is likely that the 2013 standard will issue guidance on this).

By 2016, assuming the zero carbon standard comes into play, then all new domestic developments will need to include some form of renewable energy generation to meet Building Regulations.

Non-domestic buildings

In parallel with developments related to domestic dwellings, the 2008 Budget set out a timetable for the adoption of zero carbon standards for new non domestic buildings. Targets were set for new schools to be 'zero carbon' by 2016, public sector buildings by 2018 and all other new non-domestic buildings by 2019. However, a definition on zero carbon in non-domestic buildings has yet to be reached[22].

Analysis feeding into the consultation document considered four options for 2013 standards of which two are included for further consultation: an 11% or 20% improvement on Part L 2010. The consultation document makes it clear that the Government's preference is for the 20% uplift. However, it also states that more work is needed to examine the effects of both the 11% and 20% uplifts and on the renewables potential for different buildings.

Local policies

Any continuation of or amendments to existing Merton Rule policies will need to account for other relevant LPA policies. In its Decarbonising Cambridge study[23], Cambridge City Council has examined options for cutting pollution from the use of fossil fuels and specifically emissions from new residential development in the city. The study forms part of programme of activities and work to become *'A city in the forefront of low carbon living and minimising its impact on the environment from waste and pollution'*.

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[21] http://www.aimc4.com/pagew.jsp?id=14

[22] 'An overall aggregate target for 2019 zero carbon on-site standards has not been set', paragraph 70, New non-domestic buildings.

[23] Decarbonising Cambridge: A renewable and low carbon energy study. Final Report August 2010. Element Energy Ltd. www.cambridge.gov.uk/democracy/mgConvert2PDF.aspx?ID=2315

The consultants Element Energy Ltd have proposed four policy options for achieving this objective including a reduction of 70% in Regulated Emissions [24] (from a Part L 2006 baseline) in new residential developments from 2013 onwards. This policy option allows for the use of on-site renewable energy technologies and directly connected low carbon heat such as district heating or Combined Heat and Power (CHP).

The council is now consulting on the proposals as well as the option of continuing with a Merton Rule type approach. Should this (70%) policy be adopted the council will need to decide if it supersedes a Merton Rule approach or operates in parallel with it (for situations where a 70% reduction is not achievable).

[24] Specified as Carbon Compliance Level of 70%, defined as the reduction of Regulated Emissions from a Part L 2006 baseline (TER) via onsite measures (including directly connected low carbon heat).

Section 3 - Analysis, policy options and guidance for LPAs

Analysis of findings

Context and linkages with other policies

- The Coalition Government has said that it remains committed to the introduction of 'zero carbon' homes by 2016 and non-domestic buildings by 2019. However, since taking office the definition of 'zero carbon' has been diluted. In the 2011 Budget unregulated emissions were taken out of the calculation for and definition of a zero carbon home. Taken together this is likely to result in less renewable energy capacity being installed in new buildings.
- To guarantee that new housing developments incorporate renewables after the next revision to Building Regulations takes effect in 2013, and before the 'zero carbon' standard in 2016, councils will need to have their own policies on renewable energy in new buildings in place. By 2016, assuming the zero carbon standard comes into play, then all new domestic developments will need to include renewables to meet Building Regulations. (The timeframe for achieving zero carbon in the non domestic sector is longer).
- Reasons for increasing the capacity of building integrated renewable energy, such as contributing to national renewable targets, energy security, rises in the cost of energy, the need to cut pollution from fossil fuels remain strong, and there is a case for retaining these policies, albeit in an amended format.

Policy objectives, application and monitoring

- There is variation between and within LPAs about whether the primary objective of Merton Rule policies is increasing installed renewable energy capacity or carbon reduction.
- Implementation of these policies tends to be reliant on a few key individuals in each LPA. This leads to inconsistency in the application of the policy, and is likely to result in patchy or inconsistent implementation should key individuals leave the LPA or change roles.
- There is wide variation in the way information related to these policies (energy statements) is presented by developers to LPAs. This is creates unnecessary bureaucracy for officers. The use of a template (as in Cambridge City Council) significantly reduced the variation and amount of superfluous information presented by developers.
- There is no automatic system for tracking Merton Rule planning applications through the planning system or determining when construction of an approved application has been completed. This is compounded by what can be long time delays between approval and construction and the fact that Building Control officers do not routinely report back to Development Control officers or others with responsibility for these policies.

Moreover, developers can and do engage their own Building Control inspectors which limits the flow of information back to LPAs.

- The problems obtaining information about completed Merton Rule developments for this study illustrate how difficult it is at present to monitor the implementation of this policy and the level of resource that would be needed to provide full monitoring of the policy in its current form.
- Due to the difficulty of tracking applications through the planning system, the relatively short period of time these policies have been active and the relatively small number of applications which have fallen under the remit of these policies, it has not been possible to determine how many measures have been installed as a result of these policies or the total amount of energy generated/displace or carbon emissions abated as a result.

Policy impact

The impact of the current Merton Rule policies at meeting their objectives is summarized below.

Objective	Achieved?	Comments
Primary		
To ensure installation of on-site renewable technologies on new developments that meet 10% of the building's energy needs	Yes	Merton Rule-style policies have led to the installation of renewable energy technologies which would not otherwise have been installed. However: • There is no way to ensure that the 10% target is being met – see comments under monitoring, below. • Housing Associations are installing renewable in response to the requirements to build to Code for Sustainable Homes level 3. (But n.b. there is evidence that developers are now able to meet Code for Sustainable Homes Level 3 without the inclusion building integrated renewables.)
Raise awareness of the benefits of renewable energy with developers and help renewable energy become a standard feature of new buildings.	No	Developers have not yet bought into the idea of renewable energy being a standard and routine aspect of the design of new buildings. This particularly applies to domestic dwellings where there was little evidence of designs being modified to make better use of renewable technologies.

Objective	Achieved?	Comments
To reduce fuel bill costs of occupants and thus raise awareness of benefits of renewable energy	Partially	Interviews with occupants found there was generally a good level of satisfaction with solar hot water and PV systems and an unspecified reduction in fuel bills. However, problems with specification, installation of technologies, together with higher than anticipated levels of user intervention needed to operate the system can rapidly lead to dissatisfaction amongst users. Information provided by developers on the use of systems varied, though normally this was confined to an information booklet/advice sheets.
Local economic benefit	Minimal	Only one company has benefited from the Merton Rule policy. None of the developers we spoke to seeks to use local companies when procuring their renewable technologies.
Other requirements of the policy		
Minimal workload for LPA officers	No	High workload to assess applications. Large variation in energy statements. Very difficult for LPA officers to assess whether methodology for assessing energy demand is sound and has been applied correctly.
Ease of monitoring / confidence that technologies are working and being used effectively	No	Virtually impossible to assess; any attempts at monitoring would be very resource intensive. Key issue in non-domestic developments is that renewable heat measures will usually be accompanied by some form of back-up such as a gas boiler. Anecdotal evidence from the stakeholder workshop was that installed systems such as biomass boilers are not be used as specified and managers are defaulting back to the use of gas boilers.

Passive design

- The evidence from this study is that developers are increasingly looking to include elements of passive heating and cooling into the design for new domestic and non-domestic buildings. This is partly in response to changes in the 2010 increment to the Building Regulations which favour a 'fabric first' approach.

- Whilst this is to be welcomed in terms of reducing energy demand and emissions in practice it is likely to be very difficult for Development Control officers to the judge the effectiveness of the passive aspects of a design (all buildings are to some degree 'passive').
- It also presents a broader problem that if passive design is poorly implemented it can create significant new problems such as summer overheating. Again it is not practical for Development Control officers to assess the risk of problems of this nature occurring.

Flexibility

Universities and bodies such as the Wellcome Trust are both developers and landlords of new domestic and non-domestic buildings. In response to this study they have presented a strong case for being allowed more flexibility in the implementation of Merton Rule policies, notably greater freedom in choosing where to site additional renewable energy capacity and to consider the use of equivalent carbon reduction measures. Further guidance on how greater flexibility in this area could be achieved whilst balancing the requirements of LPAs is provided below.

Improving implementation of renewable policies through partnership working

- The implementation of any Merton Rule policy is likely to be improved through close collaboration between Local Planning Authorities within a given region, and specifically:
  - Through the use of common wording of policies across local authorities;
  - By consistent use of the same template for processing energy statements.
- The strongest advocates of Merton Rule policies could be developers themselves if they can be encouraged to 'buy into' and support these policies. Achieving this will require a partnership approach between developers and local planning authorities. Examples of how this might be achieved include:
  - Creating shared incentives such as council tax reductions/rebates;
  - The LPA working with developers to provide occupants with advice and information on how to get the best from their renewable systems;
  - Working with developers to use show homes to demonstrate renewable technologies which can be bought 'off-plan'[25];
  - Facilitating collaboration between developers and local suppliers of renewable measures to assist with the marketing and promotion of measures;
  - Establishing networks of local contractors to maintain installed systems;
  - Supporting community advocates to promote the benefits of renewables.
- There is also potential to build on work already underway (in Cambridge and South Cambridgeshire) to work strategically with the two Universities large estates such as the Wellcome Trust on the shared use of district heating, CHP and renewable heat.

[25] This idea has been proposed by South Cambridgeshire District Council and is in-train.

Proposals for amending Merton Rule policies

The findings of this study suggest that there is a strong case to be made for retention of Merton Rule type policies in the run up to the zero carbon standard (currently 2016/2019 for domestic/commercial developments). National policies regarding building-integrated renewables have been diluted, whilst reasons for encouraging the creation of new renewable energy capacity have, if anything, increased. These include contributing to national renewable targets, energy security, fuel poverty (with energy prices having roughly doubled in the past five-six years) and the need to cut greenhouse gas pollution from fossil fuels.

Furthermore, there are economic benefits linked to the manufacture, supply, installation and maintenance of renewable energy measures and there is potential to increase these further for the local economy. A local manufacturer of solar systems (based in Papworth, Cambridgeshire) estimate that one person year of employment in its manufacturing operation is created for approximately every 70 dwellings that have solar thermal panels installed. Installation and servicing of the products would further support local employment.

Within the PV sector, early indications suggest that the reduction in Feed-in Tariffs is leading to a loss of jobs linked to the supply and installation of PV systems.

We have shown that at present the Merton Rule-style policies are not fully meeting their objectives. Whilst the policies have undoubtedly resulted in the installation of renewable energy technologies, they are onerous to administer and almost impossible to monitor effectively. It is questionable whether they have delivered the 10% of renewable energy that they are intended to.

As well as reducing carbon emissions, a revised policy should:

- Be good for occupiers (offering financial savings, protection against future energy price rises and a dependable, low maintenance technology);
- Provide the LPA with confidence that it has provided a dependable technology to occupiers;
- Be good for the local renewables sector;
- Be easy to apply and monitor;
- Remain relevant and applicable during the transition to ‘zero carbon’ standards in domestic and non-domestic buildings.
- Offer a clear standard for developers, providing them with certainty and reducing their feasibility/installation costs.

We propose that a technology-specific policy be adopted as, depending on the technology chosen, it can meet these objectives better than the current policy.

In determining which technology to choose we have considered a wide range of variables including upfront cost, savings, carbon emissions reduction, ease of monitoring, level of occupant engagement required, avoiding overlap with the Building Regulations (i.e. focusing on domestic hot water and Unregulated Emissions) end user acceptability and potential local economic impact.

Technology specific policy, which technology best meets the policy objectives?

The table below summarizes the key features of five renewable technologies and passive design.

Policy objective	Technology					
	Solar water heating (SWH)	Photo-voltaic panels (PV)	Air source heat pump (ASHP)	Ground source heat pump (GSHP)	Biomass (wood)	Passive design
Cost effectiveness of carbon savings	✓ £4,800 for 6 tonnes CO_2 (25 yr lifetime) =£800/ tonne CO_2	✓✓ £10,000 (including replacement inverter) for 25 tonnes CO_2 (25 yr lifetime) = £400/ tonne CO_2. Approaching grid parity.	✓✓ £8,000 for 16 tonnes CO_2 (20 year lifetime) = £500/tonne CO_2.	✓ £13,000 for 16 tonnes CO_2 (20 yr lifetime) = £815/ tonne CO_2.	✓✓✓ £11,500 for 45 tonnes CO_2 (15 yr boiler lifetime) = £260/tonne CO_2	✓ But difficult to quantify savings
Cost effectiveness of financial savings	×× Saves around £55 a year; lifetime financial savings £1375. Cost = 3.5 x savings.	× Saves around £250 a year; lifetime savings without FITs = £6,250. Cost = almost 2x savings.	×× Saves around £130 a year. Lifetime financial savings of £2,600 (if performing at high efficiency; can potentially make a loss). Cost = 3x savings.	××× Saves around £130 a year. Lifetime financial savings of £2,600 (if performing at high efficiency; can potentially make a loss). Cost = 5x savings.	× Lifetime financial saving £4,500 plus RHI. Does not pay for itself. Cost = 2.6x savings.	??
Upfront cost to developer	✓✓	×	✓	×	×	✓✓✓
Ease of monitoring / consistency of carbon savings	✓ Amount of heat delivered varies dependent on how much hot water demand there is and how the heating controls are used.	✓✓✓ Fairly standard performance assuming correct orientation and shading. Performance of PV systems will degrade gradually over the lifetime of the system.	× Very variable performance at present depending on efficiency, correct installation, appropriate controls and distribution system & good understanding by users.	× Variable performance though a more mature technology so fewer installation issues. Still requires good level of understanding by users.	✓✓ Should be fairly consistent IF the biomass boiler is used and fuel is of a high quality and consistent standard.	× Very hard to assess.

Policy objective	Technology					
	Solar water heating (SWH)	Photo-voltaic panels (PV)	Air source heat pump (ASHP)	Ground source heat pump (GSHP)	Biomass (wood)	Passive design
Suitable for most buildings	✓✓ Orientation and shading key issues. In flats, only usually suitable for top floor units.	✓✓ Orientation & shading key - shading more critical than solar thermal. In flats may be insufficient roof area to meet the target percentage requirement of all units.	✓✓ Requires well insulated building and low temperature heat distribution system, and thermal mass.	× Requires outside space to accommodate ground loops (horizontal), or appropriate ground structure for bore holes.	× Requires space for fuel storage, and access for delivery.	✓✓✓ But requires understanding of orientation, built form, use of thermal mass and control of infiltration and ventilation.
Low level of user engagement required (a 'fit & forget' technology	✓✓ Doesn't need to be turned on or off. Needs to be checked every few years by accredited installer and antifreeze replaced (every 5 years).	✓✓✓ Doesn't need to be turned on or off. Requires no separate back-up system to be installed as this is effectively provided by the grid. Needs to be kept clean (& avoid trees over-shading). Inverter will need to be replaced during lifetime of the system.	× Requires high level of engagement and understanding by the user to get optimal performance.	× Requires high level of engagement and understanding by the user to get optimal performance.	× Annual servicing and maintenance and organization of fuel deliveries	✓✓✓ Some intervention required, and good level of understanding in passively heated and cooled buildings to get optimal performance.
Confidence that technology will be used	✓✓✓	✓✓✓	× Units may not be used due to noise and concern about fuel bills.	✓ Good understanding by users needed if use of secondary heating to be minimised.	× Where gas backup provided, anecdotal evidence that biomass boilers are not being used.	✓✓✓

Policy objective	Technology					
	Solar water heating (SWH)	Photo-voltaic panels (PV)	Air source heat pump (ASHP)	Ground source heat pump (GSHP)	Biomass (wood)	Passive design
Acceptability to user	✓✓ Plenty of designs available including options that blend well with roof.	✓✓ Designs can be chosen that blend well with the roof, including roof integrated sytems	× Low levels & temperature of heat provided can be issue for householders used to gas central heating. Noise can be issue.	✓ Low levels & temperature of heat provided can be issue for householders used to gas central heating.	✓ User needs to be committed otherwise fuel purchase and delivery can be perceived as inconvenient.	✓✓✓ Users need to understand comfort and 'response' of the building particularly when compared to gas central heating.
Local economic benefits	✓✓✓ Local manufacturer.	✓✓✓ Local manufacturer.	×	×	×	×
Complements 2013 and 2016 Building Regulations	✓✓ Requirement for domestic hot water may reduce (as water use per head is tightened) but will not be eliminated.	✓✓✓ Plug loads not covered by zero carbon definition.	× Reduced requirement for space heating as fabric improves and ventilation losses controlled.	× Reduced requirement for space heating as fabric improves and ventilation losses controlled.	× Reduced requirement for space heating as fabric improves and ventilation losses controlled.	✓✓

Sources and notes on comparison table

- Energy, CO_2, and financial data from the Energy Saving Trust: www.energysavingtrust.org.uk/generate-your-own-energy based renewables installed in domestic dwellings.
- Installation costs are for one-off installations and do not allow for 'bulk' orders.
- Costs for PV system assume installed cost of between £3000 to £3,500 per kWpeak, and that the cost shown is for a 3kWp system, and includes VAT at 5%. (Note, installation costs for PV systems continue to fall at the time of publication).
- Installation and saving figures are for domestic systems.
- Domestic heat pumps may be eligible for payments under the Renewable Heat Incentive due to be launched in 2013.
- Installation costs for heat only measures exclude payments under the Renewable Heat Premium Payment scheme.

Two technologies emerge as clear favorites – PV and solar thermal. PV is the best option in terms of lifetime savings and carbon emissions, whilst solar thermal can be delivered at a lower cost to the developer.

This research has shown that developers do not like technology-specific policies. However, monitoring renewable energy systems to ensure that they are achieving their specified output is difficult, costly, open to abuse, and in most cases impractical. Combined with the offer of greater flexibility for non-domestic estates, we believe this offers a practical compromise.

Proposed wording for an amended Merton Rule policy

Proposal - Introduce a revised Merton Rule policy. Ideally this should be worded identically across all four LPAs, to reduce confusion and make implementation easier.

Our proposed wording for this policy is:

Domestic dwellings

i) New domestic dwellings will be required to meet 10% of total emissions (regulated and unregulated) using either solar thermal, or PV, or a combination of these technologies.

- Where the installation of either of these technologies is not possible the developer must achieve a 10% reduction in emissions of carbon dioxide (in relation to the baseline for the property as defined by the Building Regulations and an assessment of unregulated emissions) through the installation of an alternative form of renewable energy.

ii) This policy should apply to all new developments from one unit upwards. The installations should be per property (not an average across the development) where possible.

iii) Systems should include a solar energy display or readout (for PV systems, this should be separate to the inverter) which should be fitted in a prominent location such as the kitchen, living room or hall[26].

Non-domestic buildings

i) Commercial developments with a floor area of 1000m^2 or greater will be required to reduce emissions of carbon dioxide (over the requirements set by Building Regulations) by 10% through the installation of a building integrated PV system.

- Where the installation of either of these technologies is not possible the developer must achieve a 10% reduction in emissions of carbon dioxide (in relation to the baseline for the property as defined by the Building Regulations) through the installation of an alternative form of renewable energy but preference should be given to PV.

ii) For all installations there should be prominent signage stating that the building meets part of its energy requirement from renewable energy and a readout/display showing when the system is operational and current and cumulative energy generation.

[26] 11 For solar thermal, there are now wireless displays available such as the 'Clearline Aura' display - http://www.viridiansolar.co.uk/Products_Clearline_Aura.htm

Estates

For landlord estates such as the Universities and the Wellcome Trust we propose that a more flexible approach is adopted to take account of the different nature of these developments and long-term relationship that the developer has with new buildings.

We propose the following:

i) The developer should have the option of installing a site-wide renewable energy solution that could include the full range of technologies including district heating or CHP.

ii) The developer should have the option of installing a renewable energy system on another part of the estate which will deliver equivalent carbon reductions, provided they can provide evidence that:

- The installation is technically feasible and is capable of being installed (e.g. obtaining planning permission);
- The installation will provide additional capacity and would not have been installed anyway (in order to avoid multiple counting of single installations);
- That prominent signage and a readout of the energy generated (as above) is displayed in the new building for all measures even when installed off-site.

iii) Where developers can make a case that some alternative form of carbon abatement measure is preferable to additional renewable energy capacity this should be allowable provided:

- They can provide robust evidence to show an equivalent carbon reduction over the full lifetime of the measure (that could have been installed in its place).
- Appropriate and prominent signage is displayed in the building to explain what measures have been installed.

Further requirements for amended domestic and non-domestic policies

We suggest that following requirements should be specified as part of the amended policies:

i) Where space heating (and supplementary hot water heating) is provided by a gas boiler, developers should be strongly encouraged to fit a low temperature distribution system (such as underfloor heating, or low temperature radiators) to allow for connection to an air, or ground source heat pump at a later date (e.g. when the existing boiler is due for replacement);

ii) The calculation of Unregulated emissions in domestic dwellings by developers should be done using a single, approved methodology. We suggest using the methodology specified for this purpose within the Code for Sustainable Homes Technical Guidance;

iii) Occupants should be provided with comprehensive information about the operation of renewable technology and how to get best value from it, and about maintenance. To ensure this applies both to the first occupants of the dwelling and future occupants, we suggest that the councils take on responsibility for providing this information;

iv) Developers should be strongly encouraged to use local companies for the supply, installation and maintenance contracts for renewable energy systems.

Defining policies in terms of regulated and unregulated emissions

At present the Merton Rule policies adopted in the four LPA's are specified in terms of total energy use and emissions, that is Regulated and Unregulated emissions. There are arguments for and against retaining this definition (as set out in Appendix 5).

On balance it is our view that:

- For domestic dwellings emission reductions should be defined in terms of total emissions (regulated and unregulated), but that;
  - Developers should be required to use a single, approved methodology for calculating Unregulated emissions. We suggest using the methodology published in the technical guidance for the Code for Sustainable Homes.
- For non-domestic dwellings the policy is defined in terms of regulated emissions only. Whilst this reduces the total estimated energy demand and emissions for a new building, it also creates a more workable policy. In many cases the unregulated component of the energy demand will not be known at the point when planning approval is sought, and estimating and checking calculations for unregulated emissions is technically involved and in many cases it will be impractical for council officers to check these without specialist knowledge.

Accounting for proposed changes to Building Regulations

We suggest that any revisions to Merton Rule policies in Cambridgeshire should be designed to withstand the next planned revision to Building Regulations due to come into effect in 2013 such that designers are still required to specify solar technologies as part of their design specifications, but not required to include any additional measures.

This acknowledges that as Part L is tightened towards the 'zero carbon' standard in 2016/2019, the inclusion of some renewable energy within designs becomes more and more likely.

At present it is unclear exactly what form the next revision to the Building Regulations will take. Whatever changes take effect in the run up to 2016 (including any further shift towards a 'fabric first' approach), a requirement for domestic hot water and power will remain. By focusing a technological approach on these two areas the intention is to formulate a policy which can operate in parallel with the progressive development of the Building Regulations.

Aligning a solar-first policy with the National Planning Policy Framework

As discussed in the previous section of this report since the introduction of the National Planning Policy Framework (NPPF) there is uncertainty about the degree to which LPAs may now specify energy performance criteria for new buildings which exceed the Building Regulations. A solar-first approach is a departure from previous Merton Rule policies which have left technology selection in the hands of developers.

The NPPF states that when setting local requirement for the sustainability of buildings, local authorities should do so in a way which is:

- Consistent with the Government's zero carbon buildings policy and adopt nationally described standards;
- Have a positive strategy to promote energy from renewable and low carbon sources.

Based on the findings of this study and reasons set out in this report it is our view that there is a strong case for adopting a revised solar-first approach and that this will enable local authorities to meet both these objectives more effectively than current Merton Rule policies. However, in the absence of further guidance from the Government local authorities may need to bring forward policy proposals to test what is allowable under the NPPF.

Aligning a solar-first approach with district heating and CHP

Prior to the introduction of the National Planning Policy Framework, guidance set out in Planning Policy Statements, (particularly PPS1) put strong emphasis on the use of district heating and Combined Heat and Power (CHP) as part of coherent local strategies to reduce emissions from new building developments.

Appropriate use of district heating and CHP in new buildings presents a number of technical difficulties for developers which were not fully addressed in previous (PPS) guidance[27]. In the absence of a demand for process heat or cooling (e.g. heat for industrial processes, industrial chilling, swimming pools etc), the need for heat in new buildings is often small, intermittent and may be insufficient to justify the capital expenditure and management costs of district heating/CHP systems. The requirement for heat in existing buildings will normally be far larger due to poorer fabric efficiency and greater ventilation losses.

For these reasons there may be instances where by combining heat loads from new and existing buildings and mixing domestic and non-domestic heat demand district heating/CHP is a viable option. One of the features of district heating/CHP is that it can be implemented in phases as new heat requirements become available.

District heating and CHP systems may be designed for use in combination with other forms of renewable energy such as domestic solar water heating[28] or may be designed to meet the year round requirement for heat replacing other options. District heating and CHP systems can also utilize renewable fuels such as biomass (wood chip) in place of natural gas, significantly increasing their carbon reduction potential.

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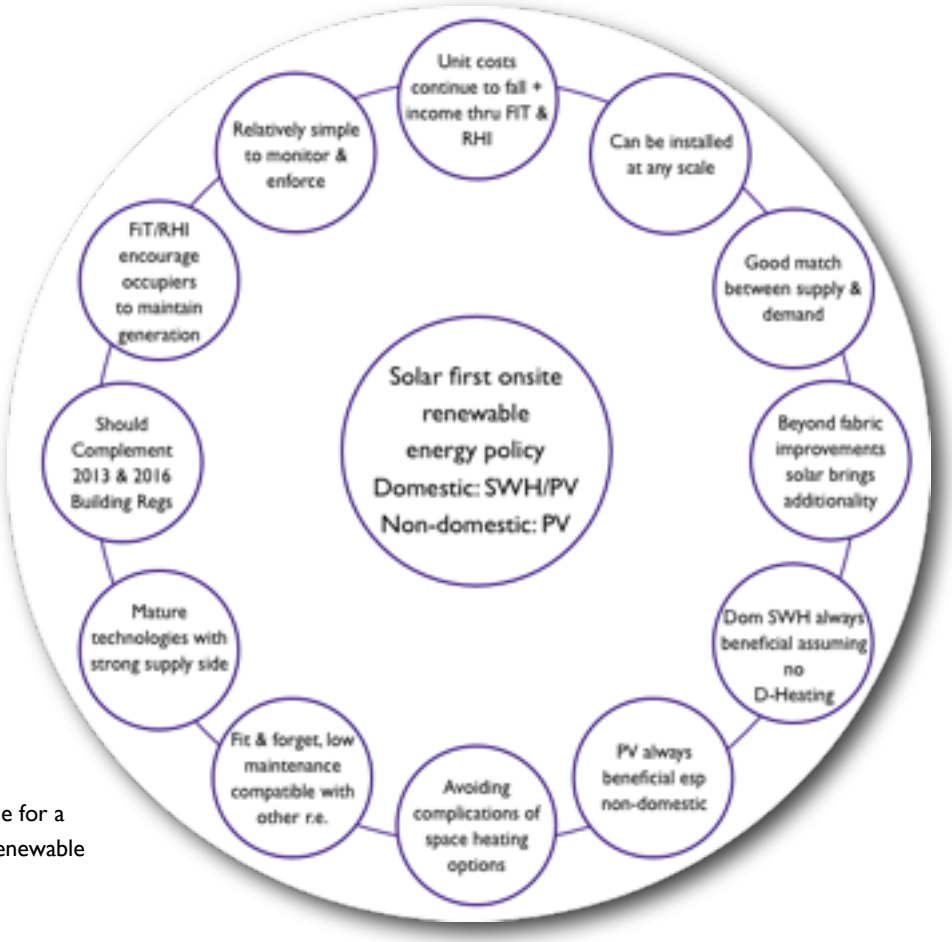
[27] District Heating and CHP networks favour applications where there is a consistent requirement for heat (base load). The space heating demand in domestic dwellings is generally intermittent and seasonal. In new buildings space heating demand is reducing as Building Regulations lower fabric and ventilation losses. The requirement for space heating in *existing* dwellings is generally much greater, but is still intermittent and seasonal. In non-domestic buildings space heating demand tends to be small and is often outstripped by a requirement for space cooling (which through a process of absorption chilling can also be delivered as part of a district heating/CHP system). For district heating and CHP to be technically viable it will often necessitate a significant, year round requirement for heat, or the combination of different heat loads and modular heat inputs to match supply and demand. Other variables include building density, financial incentives for the heat and electricity generated (e.g. Feed-in Tariffs, Renewable Heat Incentive, Renewable Obligation Certificates, tax incentives) and the cost of constructing the heat distribution network which may be the single largest capital cost.

[28] In some instances district heating/CHP networks are designed to be shut down or partially shut down in the summer when the requirement for hot water can be met using solar hot water systems.

Of the four LPAs involved in this study Cambridge City Council is actively seeking ways of developing district heating and CHP to deliver heat and power to new and existing buildings and processes in the city. For this reason we suggest that in considering the revised policy options above, LPAs adopt a flexible approach which leaves scope for developing district heating and CHP in cases where developers bring forward robust evidence of technical feasibility, emission reductions, and financial viability to support the use of district heating/CHP in conjunction with or in place of a solar-first approach.

Rationale for proposed amendments

There is no single argument, which alone carries the case for amending existing Merton Rule policies. However, there are, in our view a series of factors which when considered together weigh in favour of amending the current approach. This composite rationale is presented diagrammatically below.



Composite rationale for a solar-first on-site renewable energy policy.

Guidance on maximizing the effectiveness of revised policies

The following proposals are designed to maximize the effectiveness of on-site renewable energy policies in meeting their objectives.

i. To facilitate the application of an amended policy, we suggest that the councils provide some typical baseline figures to illustrate the estimated size and coverage of installations.

ii. We suggest that all four LPAs use the template provided by Cambridge City Council for collecting information from developers on their applications (including an Energy Statement). This will make applications more consistent and easier to check.

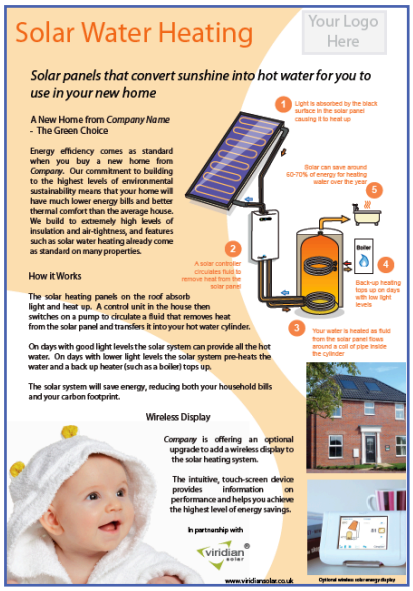
iii. To facilitate monitoring of the policy, we suggest that:

- Building control officers are asked to report back on technologies installed and, for solar technologies, report on their orientation and whether there are any shading issues. This can be a simple tick-box form that would only take a couple of minutes to complete.
- To supplement this, the LPAs could consider requiring submission of FiT and RHI certificates (assuming the latter comes into force) before new buildings are occupied as a straight-forward means of checking compliance with the policy.

iv. To ensure that occupants are getting the most out of their renewable technologies, we suggest that the councils take on responsibility for providing information to occupants about the renewable technologies installed on the property, the reasons for their installation, how to ensure they get the most out of their technologies and where to get further advice on reducing carbon emissions. Having a technology-specific policy will make this relatively easy. As well as this information being provided to the initial occupant, it should also be provided to subsequent occupants (e.g. alongside the set up of their council tax or business rates account), for the expected lifespan of the technology.

v. We suggest an ongoing programme of stakeholder dialogue is undertaken, involving developers and supply-side companies in the development and application of these policies:

- The former to ensure developers fully understand the policy, rationale behind it, and how the technologies work/what the benefits are.
- The latter to help ensure the local economy benefits as much as possible from these policies and to build on linkages already made to help the supply side support developers in terms of selling the benefits of renewable technologies to their prospective customers. This would include:
  - Building on the work recently begun in South Cambridgeshire District Council for show homes on new developments which showcase a range of renewable energy technologies so that customers can select what measures they wish to include 'off plan'.
  - Engaging with a programme of work initiated by a local manufacturer of solar systems as a direct result of this project's stakeholder workshop.



Template leaflets for use by developers

The company has produced a template leaflet for use by developers' sales staff to assist with selling the benefits of renewable energy to their potential customers (see leaflets, above). They have also started promoting the idea to developers that house builders should offer customers an upgrade option to increase the energy efficiency of their new home above that required by regulation (see leaflet).

- Looking at the options for a Council Tax rebate (or equivalent) for the first three years following installation for new homes incorporating renewable energy systems.
- Investigating the potential to require developers to provide twice yearly energy consumption data for new buildings incorporating renewable for the first three years following installation.
- Reviewing opportunities for developing joint schemes for the delivery of renewable heat and power in new and existing buildings.

Section 4 - Appendices

Appendix 1 - wording of current Merton Rule policies

Details of Merton Rule policies in the four local planning authorities.

South Cambridge District Council

Policy brought forward in Local Development Framework – Development Control Policies DPD (2007).

Policy NE/3 - Renewable Energy Technologies in New Development

All development proposals greater than 1,000m^2 or 10 dwellings will include technology for renewable energy to provide at least 10% of their predicted energy requirements, in accordance with Policy NE/2.

Policy NE/2 - Renewable Energy

The District Council will grant planning permission for proposals to generate energy from renewable sources, subject to proposals according with the development principles set out in Policies DP/1 to DP/3 and complying with the following criteria:

- *The proposal can be connected efficiently to existing national grid infrastructure unless it can be demonstrated that energy generation would be used on-site to meet the needs of a specific end user;*
- *The proposal makes provision for the removal of the facilities and reinstatement of the site, should the facilities cease to be operational (page 69).*

Cambridge City District Council

Policy included in the Cambridge Local Plan (2006).

Policy 8/16 – Renewable Energy in Major New Developments

Developers of major proposals above a threshold of 1,000 square meters or 10 dwellings will be required to provide at least 10% of the development's total predicted energy requirements on-site, from renewable energy sources. These requirements may be relaxed if it can be clearly demonstrated that to require full compliance would not be viable.

For the purposes of this policy renewable energy could include those technologies set out in the supporting text to Policy 8/17, and also passive solar design (page 94).

Policy 8/17 – Renewable Energy

The types of renewable energy technologies which may be suitable include:

- *Active solar thermal;*
- *Photovoltaic cells (PV);*
- *Wind Turbines;*

- *Biomass for community heating or Combined Heat and Power (CHP);*
- *Ground Source Heat Pumps (page 95).*

Huntingdonshire District Council

Policy brought forward in the Huntingdonshire Local Development Framework - Development Management DPD, submission in 2010.

Policy C2 - Carbon Dioxide Reductions

Proposals for major development will include renewable or low carbon energy generating technologies. These should have energy generating capacity equivalent to 10% of the predicted total CO_2 emissions of the proposal. This should be achieved on-site wherever possible, although off-site systems will be considered favorably where on-site provision is not feasible or viable or CO_2 emissions can be reduced by a greater percentage.

Site specific factors including viability, remediation of contaminated land and other exceptional development costs will be taken into account where appropriate. In cases where a reduction of at least 10% of CO_2 emissions cannot be achieved through incorporation of renewable or low carbon energy generating technologies, delivery of an equivalent reduction in CO_2 emissions may be acceptable through integration of energy efficiency measures over and above current building regulation requirements or policy requirements in relation to the Code for Sustainable Homes, whichever is higher. Alternatively 'allowable solutions' will be considered.

Where the proposal involves more than one building a consistent level of reduction across the development will be sought. Where an alternative approach is likely to be proposed, discussions should be undertaken with the Council before submission of a planning application.

For non-residential developments where the end user (and consequently the predicted total CO_2 emissions) is not known, an approach that assumes the most likely use should be taken. Where several different end users (in terms of their effect on total CO_2 emissions) are likely or an alternative approach is likely to be proposed, discussions should be undertaken with the Council before submission of a planning application (pages 3-4).

East Cambridge District Council

Policy brought forward in the Core Strategy Submission Development Plan Document (2008).

Policy EN 4 - Renewable energy

Development comprising 10 or more dwellings or 500m² of gross floorspace or more, is required to provide for at least 10% of the total predicted energy requirements on site from renewable energy sources. Proposals for renewable energy and associated infrastructure will be supported provided that individually, or cumulatively, there are no significant adverse effects on:

- *The environment and amenity (impacts can be minimised through careful siting, design and use of landscaping);*
- *The character of the countryside;*
- *The character of the townscape. Proposals should be sympathetic to the height and fabric of the building in the locality;*

- *Key views, in particular those of Ely Cathedral;*
- *Protected species; and*
- *Residential amenity (noise, fumes, odour, shadow flicker, traffic, broadcast interference).*

Sites of international nature conservation importance should not be adversely affected unless there are no alternative sites and there are imperative reasons of overriding public interest. Sites of national or local nature conservation importance and Green Belt areas should not be adversely affected unless any significant adverse effects are outweighed by wider social, economic and environmental benefits. Provision should be made for the removal of facilities and reinstatement of the site, should the facilities cease to operate (pages 95-96).

Appendix 2 - planning applications reviewed for this study

Applications from the four LPA areas reviewed for this study. Those in bold were shortlisted as potential case studies.

District	Ref	Description / Location
Cambridge City District Council	09/0899/ FUL	Coleridge Community College
Cambridge City District Council	**09/0699/ FUL**	**7 West Rd, Cambridge University/ CB3 9DT**
Cambridge City District Council	09/0179/ FUL	Former Cambridge Regional College/ CB5 8EG
Cambridge City District Council	09/1103/ FUL	Red House, 27-29 Station Road
Cambridge City District Council	08/0048/ OUT	Former Monsanto Site, Hauxton Rd
Cambridge City District Council	**09/0494/ FUL**	**Richard Newcombe Court, formerly Simons House, Histon Road/ CB4 3HY**
Cambridge City District Council	**08/1575/ FUL**	**ARU, East Rd, CB1 1PT**
Cambridge City District Council	09/0181/ FUL	Brunswick House, 61-69 Newmarket Road
Cambridge City District Council	09/0292/ FUL	Land adj 7 Severn Place
Cambridge City District Council	09/0931/ FUL	Old Maltings, Prospect Row
Cambridge City District Council	09/1179/ FUL	Rosie Maternity Hospital
Cambridge City District Council	09/0133/ FUL	Kings Hedges Primary School
Cambridge City District Council	09/0403/ REM	Neath Farm Business Park
Cambridge City District Council	09/0819/ FUL	Land adj 5 Wellington Court
South Cambridgeshire District Council	**S/01831/09**	**Land East of Sheepfold Lane Roundabout, SHEEPFOLD LANE, CAMBOURNE**
South Cambridgeshire District Council	S/01862/08	42 Red Lion Hotel, STATION ROAD EAST, DUXFORD
South Cambridgeshire District Council	S/01204/09	Land to the South of Wellcome Trust Genome Campus, In the Parishes of Ickleton and Hinxton/ CB10 1RQ
South Cambridgeshire District Council	S/01435/09	Cottenham Village College, HIGH STREET, COTTENHAM, CAMBRIDGESHIRE, CB4 8UA

District	Ref	Description / Location
South Cambridgeshire District Council	S/01901/09	Dwelling at 30, NEW ROAD, HASLINGFIELD
South Cambridgeshire District Council	S/01601/08	Former EDF Centre and Training Depot, ELY ROAD, MILTON
South Cambridgeshire District Council	S/00954/09	Kneesworth House Hospital At, OLD NORTH ROAD, BASSINGBOURN CUM KNEESWORTH
South Cambridgeshire District Council	S/00506/09	Land at APC Site, LONDON ROAD OLD A11, BALSHAM
South Cambridgeshire District Council	S/00710/09	Land at Arrington Nursery, ERMINE WAY, ARRINGTON
South Cambridgeshire District Council	S/00031/09	Land at Welcome Trust Campus, CAMBRIDGE ROAD, HINXTON
South Cambridgeshire District Council	S/01702/08	Land rear of, Brooklands, OVER ROAD, WILLINGHAM, CAMBRIDGESHIRE
South Cambridgeshire District Council	**S/00572/09**	**Land to the Rear of 16, STATION ROAD WEST, WHITTLESFORD**
South Cambridgeshire District Council	S/00990/09	Land to the South 8, STATION ROAD WEST, DUXFORD
South Cambridgeshire District Council	S/01465/09	Land to the West of 33, HIGH STREET, HAUXTON
South Cambridgeshire District Council	S/01688/08	Land to the West of, ERMINE STREET SOUTH, PAPWORTH EVERARD
South Cambridgeshire District Council	S/01624/08	Phase 2 Land to the West of, ERMINE STREET SOUTH, PAPWORTH EVERARD
South Cambridgeshire District Council	S/01199/09	Property at 310 Cambridge Science Park, MILTON ROAD, MILTON
South Cambridgeshire District Council	S/00775/09	Plot UC12, BACK LANE, CAMBOURNE
Huntingdonshire District Council	1101193FUL	Primrose Lane Hospital PE29 1WG
Huntingdonshire District Council	0802728FUL	Mayfield Rd

Appendix 3 - further information relating to study methodology

Interviews with LPA officers

The following officers were interviewed for this study:

South Cambridge District Council (20th Feb 2012)

- Richard Hales - Sustainable Communities Leader;
- Jonathon Dixon - Planning Policy Officer;
- Matt Hare - Senior Development Control Officer;
- Nick Kendall – Building Control Officer.

Cambridge City Council (20th Feb 2012)

- Emma Davies - Senior Sustainability Officer.

Huntingdonshire District Council (22nd Feb 2012)

- Chris Jablonski - Environment Officer;
- Mike Huntington - Urban Design Team Leader.

Topics and issues covered during interviews with LPA officers

Current Policy

- As officers do you feel you have a good understanding of what the policy (as currently worded/presented) is trying to achieve? Is the policy still feel relevant given recent policy changes on low carbon buildings and renewable energy?
- How do you think it fits with other policies which have come into effect in the last 2-3 years? E.g. Feed-in Tariffs, and forthcoming policies such as the Renewable Heat Incentive.
- Based on your experience what is the attitude of developers to the current policy?
- How easy do you find it to explain the current policy to developers?
- Have you detected any shift in the attitude of developers since the policy was first introduced?

Implementing Merton Rule Policies

- In general terms (and thinking about other policies) do you regard this as a straightforward policy to implement when working with developers? If not why not?
- Are there changes you would suggest to make it easier, without changing the direction or efficacy of the policy?
- How much consistency is there in terms of the information developers provide to show how they will comply with this policy?

- Do developers tend to provide too much/too little information, or information that is not relevant?
- How easy is it for you to test the assumptions/calculations presented by developers? Is this practical?
- Would there be any benefit in having a consistent approach to presenting energy statements and supporting information across the four LPAs?
- How much negotiation do you have with developers over the policy (whether it should apply or not) and about their method of compliance? Is this an iterative process?
- Do you have any sense (or evidence) that developers are modifying designs/design strategies as a result of this policy, and if so how and to what degree?
- What would be your attitude to a developer that offered to achieve an equivalent improvement in energy efficiency/level of carbon reduction through energy efficiency and passive measures?
- In your contact with developers would you normally discuss or require them to provide information to tenants/occupiers on how to get the greatest benefit from on site renewable technologies?
- And what about monitoring of system performance?
- And procurement? - Do you ask/encourage/expect developers to use local suppliers/installers?

Contact with developers

- Can you suggest developers working in this area that would be useful and relevant for us to contact as part of this study?

Developer interviews

Topics and issues addressed during interviews with developers

- What is the remit of your company? What type of properties/developments do you develop?
- Do you have specific energy/environmental policies for new domestic or commercial buildings?
  - Code for Sustainable Homes (CSH), % target for renewables, BREEAM rating etc.
- Thinking about policies for onsite renewables in this area, how many developments have you completed where this policy applied?
- Do you regard the 10% policy (Merton Policy) as difficult/challenging?
- Did/does the policy influence the design of domestic or non-domestic dwellings? If so how?
- In terms of selecting technologies and means of compliance how do you go about this?
- How do you go about selecting suppliers and installers for technologies and what do you do about maintenance contracts?
- Is there a policy about selecting local suppliers/contractors?

- What information on renewable energy technologies do you provide to tenants/occupiers/householders?
- Do you undertake any performance monitoring of systems? Technical or non-technical?
- Can you propose specific buildings/developments that could be appropriate as case studies for this project?
- What technologies were installed in this case?

Interviews with representatives of Housing Associations

Alison Turnbull (Project Manager) at Cambridge and County Developments was interviewed on 6th March 2012 to ascertain her views about the implementation of the policy (using the same issues and topics as those for Developers), and with reference to a residential care home Richard Newcombe Court in Cambridge[29]. This is a Code for Sustainable Homes Level 5 building comprising a biomass heating system and roof mounted PV array.

Fiona Coulson (Assistant Director of Development) at Circle Anglia (known as Circle) was interviewed on 13th March 2012, regarding the impact of Merton policies on their new domestic developments and specifically the impact of Merton policies in comparison to the Code for Sustainable Homes.

Technical specifications of renewable energy systems in non-domestic buildings

Information on the renewable energy systems installed - as made available by developers.

Building/organisation	R.e. system	Specification
Alison Richard Building, University of Cambridge.	Ground source heat pump working in conjunction with gas condensing boiler	Heating output: 80.7kW Cooling output: 73.5kW Heat pump is not used to provide domestic hot water. Two gas boilers, with rated output of 275kW each.
The Wrap, Anglia Ruskin University.	PV array	Peak output of 26.64kW
Richard Newcombe Court	Biomass pellet boiler Roof mounted PV array	Not available.

Interviews with householders with installed renewables

The following issues were covered during interviews with householders.

- Have you been the only resident since the house was constructed?
- Was the renewable technology a factor for moving into this property?

[29] [29] Reference: 09/0494/FUL, Cambridge City.

- Did the developer provide you any information/brief on how the system works/ how to get best value out of the system?
- Have you noticed a reduction in your fuel bills? Do you read your meter or monitor your fuel bills?
- Do you monitor the system/has anyone monitored the system?
- Do you know the output of the system/what is the output of the system?
- What is your opinion of the renewable energy technology in your home in terms of?
  - Overall satisfaction.
  - How easy it is to operate.
  - The impact on your fuel bills.
- Do you know about the Clean Energy Cash-back Scheme, also known as the Feed In Tariff?
- Was this explained to you at the handover (when you moved in)?
- Have you had to do any repairs? Who is responsible for this?
- Would renewable technology installed in a home be a factor in choosing your next home?
- Would you recommend renewable technologies to others?

Occupant interviews - details of locations and technologies

Address	No 71, Upper Cambourne (opp Taylor Wimpey Showroom)	No 23, Upper Cambourne (opp Taylor Wimpey Showroom)	No 74, Upper Cambourne (opp Taylor Wimpey Showroom)	Monk Drive, Upper Cambourne.	Smithy Way, Great Shelford	No 10, The Moraine, Whittlesford
Technology installed	Solar water heating	Solar water heating	Solar water heating	PV (retrofit)	Solar water heating	PV
Resident since house was constructed?	Yes	No	Yes	Yes	No	Yes

Meetings with the University of Cambridge and Anglia Ruskin University

University of Cambridge

A meeting took place on 6th March 2012 with Chris Lawrence, (M & E Services Project Manager), John Clark, (Planning Officer) and John Neve (Project Manager) at the University of Cambridge to discuss the

implementation of the Merton Rule policy from their perspective and specifically the development of the Alison Richard Building[30] in the city.

This building has achieved a BREEAM 'Excellent' rating, and complied with the Merton Rule-style policy through the installation of a ground source heat pump in combination with passive heating measures.

Anglia Ruskin University

Jerry Shoolbred, Clerk of Works at Anglia Ruskin University was interviewed by phone, to ascertain his perspective on the Merton Rule policy and with specific reference to the The Wrap - Lord Ashcroft Building[31]. The building complied with the policy through the installation of a PV array and passive heating measures.

Both discussions addressed the issues and themes described above under Developer interviews.

Stakeholder workshop

A half-day workshop for stakeholders was held on 26th March at the SmartLife Centre in Cambridge.

The outputs of the discussions as recorded on flip charts by groups working at tables and during the plenary discussions are reproduced (directly) below.

Agenda

Time	Item
10.30am	Registration
11.00am	Introduction to the workshop: Richard Hales, South Cambridgeshire District Council and Mark Letcher, Climate Works Ltd
11.15am	Workshop 1 - Experience of Merton policies to date
11.55am	Plenary discussion
12.25pm	Lunch
1.10pm	Engaging with customers about renewable technologies
1.40pm	Workshop 2 - Options for improving the policy
2.00pm	Plenary discussion
2.50pm	Closing remarks and workshop evaluation
3.00pm	End

[30] Reference: 09/0699/FUL Cambridge.

[31] Reference: 08/1575/FUL Cambridge.

Workshop attendees

Name	Department	Job Title
Sarah Leggo	Roger Parker Associates	Sustainable Design
Jenny Nuttycombe	South Cambridgeshire D.C.	Planning Policy Officer
Mike Malina	Renergy Solutions Associates	Director
Stuart Elmes	Viridian Solar	CEO
Chris Jablonski	Huntingdonshire DC	Environment Team
Andy Lawson	Gallagher	Projects Director
Chas Graney	B & ES	Regional Manager
Vanessa Tilling	Sustainability East	
Margaret Reynolds	Architect	Architect
Adam Halford	Bidwells	Principal Planner
David Gilbey	E.On	Account Manager
Chris Lawrence	University Estate Management	M & E Services Project Manager
D Parsley	Wellcome Trust	Head of FM
Stephen Woolverton	Babaraham Institute	Head of Engineering
Peter Lawrence	Bovis Homes	Senior Architect
Richard Hales	South Cambridgeshire D.C.	Sustainable Communities Team Leader
Emma Jones	Impetus Consulting Ltd	Director & workshop facilitator
Sarah Smith	Climate Works Ltd	Associate & workshop facilitator
Mark Letcher	Climate Works Ltd	Director & workshop facilitator

Outputs from the workshop discussions

Workshop 1 - Experience of policies to date

Table 1 - Issues

- Baseline;
  - how is it established?
  - Difficult on non-domestic;
  - Should be % - how far can we go?
- Could be specified in terms of carbon reduction;

- Retrofit – options for carbon reduction;
- Fewest mechanical better;
  - Maintenance/servicing;
  - Problems with ASHPs;
  - Flexibility – helpful at this stage.
- Can't pass on the cost of measures to customer;
- H.A 24 Cert Passivhaus + 12 %;
  - Shared ownership positive feedback.

Constraints

- Customers don't want to pay more;
- Code → flexibility;
- Code → Building regulations;
- Flexibility → prefer not to specify technology;
- Difficult to have policy that is (concise);
- Complete flexibility (advisable);
- Problem with some technologies;
  - Biomass in conjunction with gas;
- Developer not interested in shared ownership of R.E technology;
- Fabric can't get air tightness;
- MHRV – controlled ventilation;
  - NHBC people will want MHVR;
- R.E Economies of scale;
  - Problem with ASHPs – didn't use under floor;
- (Summer overheating);
- Building Regulations → Fabric;
- Water → Big Issue;
- Difficult to base decision on research;

- Lack of research.

- Options are limited;
  - Planning Constraints;
  - Turbine → ASHPs.

Table 2 - Issues

- 10 % mis-specification – tick box exercise;
- Biomass boilers installed but never used e.g. Large storage warehouse – roof covered in PVs = expensive, not the best solution;
- RSS abolition hasn't helped;
- Individual buildings rather than campus – not helpful, e.g. Wellcome Trust– doing job across campus not taken into account;
  - Aiming for 70% self generation in 7 years, concern = security of supply.
- Need some kind of allowable solution;
- Terminology;
- Scattergun approach – systems competing against each other;
- Need planners + engineers talking to each other;
- Planning and building control not joined up;
- Need some kind of follow up = onus back on user to report each year;
- Lost sight of basic principles of energy hierarchy – driven by FITs;
- Lots of technologies not working – embedded carbon out weighing the benefit;
- Life cycle: PVs = huge embodied energy – rare metals, how to recycle;
- Similarly, issues with heat pumps;
- H.A using exhaust air heat pump: very poor;
- Handover – lots of complaints; expectations.

Table 2 - Constraints

- Funding is an issue: Babraham = publicly funded hard to find money for capital works i.e.: sustainably;
- Wellcome: funding not an issue;
- Licensed to be a distributor network;

- University: CHP study – marginal benefits versus new buildings + more so as gas prices increase;
- RE Strategy building by building – is difficult to demonstrate payback/ carbon reduction;
- Passive design = best, but then end up with RE that's very small but expensive to make work, not a good solution in terms of carbon savings;
- Site wide approach would be better.

Customer feedback

- Required under Part L but not enforced;
- Proper handover required;
- Running 9 – 10 years at the university – involves users + maintenance departments – 3 year process;
- Measures have to be demonstrably successful;
- University committees – want info on performance of existing buildings – base future decisions on evidence;
- New technologies – need to be tested;
  - Someone needs to trial these, that's recognised.
- Design of systems has to be appropriate;
  - Joined up thinking.
- University – W.Cam site – looked at wind but needed to be offsite, not allowed; same with Anaerobic Digestion.

Table 3 - Issues

- Education is a big problem. If customers have a negative response to technologies due to lack of education – negative attitude spreads;
- Need training not just for end user but also for planners, H.A's and contractors → Planning supports take up;
- Policy helps to overcome barriers;
- Heating systems with back up is an issue, is there reliance on back up?
- Light touch approach to the policy, not policed;
- Builders can negotiate requirement away – 'bully' planners;
- On paper policy good, not in practice;
- Not always efficient to add renewables to a development just to check a box with policy, could achieve more by fabric first in some cases;

- R.E is usually an afterthought.

- Need a single policy and a single template;
- Code for Sustainable Homes;
  - Can build Code 3 and Code 4 without renewables.
- Vagueness in the policy, wording sometimes used - “where viable”, sometimes 10 % carbon other times 10 % reduction in energy acceptable;
- Policy needs to be secured and then sustained;
  - That way cost issues all end up passed down to the land value and developers can plan.
- 10 % of what?? Clarity needed;
  - SAP;
  - BREEAM;
  - Processes in industrial buildings;
  - SBEM;
  - Does it cover embodied energy also?
- Locally sourced technologies with low transport overheads should be used.

Workshop 1 - Plenary discussion

Issues/Problems/Opportunities

- Series of Policies: Why 10 %? Is there evidence this can be applied in all circumstances?
  - Is it Baseline or aspirations.
- Difficult to establish a baseline;
- Validation of 10 % - Tick box exercise?
- Technologies installed but never used (e.g. wood CHP with backup gas boiler);
- Need for consistency over time and geography → takes away augment that can’t afford the measures;
- Lack of consistency – developers will look at 1 LA vs. another;
- If customer not prepared to pay (and they aren’t) it comes from developers’ profit: need to make profit for shareholders, S106, land for social housing;
- Site- wide / allowable solutions;
- Building by building is too narrow, results in less carbon reduction;

- Positive: Impact on up skilling and awareness is crucial;

Constraints

- Customer won't pick up addition cost of R.E;
- Dev → social housing 106;
- Application by building rather than 'estate';
- Energy hierarchy;
  - Reduce demand;
  - High cost R.E per unit .
- Process looks very difficult;
- Flexibility needed, e.g. university – turbine example;
- South Cams – looking to be more flexible, allowable solutions;
- 'Banking' or selling R.E/carbon capacity.

Client Feedback

- Importance of training users e.g. heat pumps;
- Training installers – no incentive for installers;
- End user engagement critical;
- ASHPs = additional heat;
- EST Solar Thermal Study – 80 % of users satisfied v unsatisfied;
- Non- domestic – Uni handover – called Soft Landing – a 3 year handover process.

Engaging with customers

- Need to create a buzz;
- It needs to be linked to who pays the bills
- Sustainable show homes in South Cambridgeshire, funded by S106. Could be problems with this, e.g. having to retrofit items post-procurement;
- Cambridge University – devolved budgets encourage reduced consumption, and information highlighted via publications;
- Wilmot Dixon – operates a buddy system for new households;
- Potential for Viridian to get involved in training up sales people from commercial developers?

- Viridian has worked to make their instructions simple and easily accessible.
- Could the policy require a visible display meter?
- Bovis are including smart meters in new properties; should help with awareness. But not the same impact as a display meter;
- New homes require a very simple explanation of the sustainability features and the benefits they bring;
- Sustainable show homes. Results in next year;
- Procurement issues – e.g. getting homes heat pump ready;
- Can you compel householders/occupants to provide billing info?
- Could make display units mandatory;
- Should policy put onus on engagement? Requirement for this?

Workshop 2 - developing the policy
Table 1

- Local groups (outside utility) to share information;
- Could be op in – comparison with councils. Hotel food (?) examples;
- British Gas – comparison;
- Awareness – positive psychology of making decisions;
- Solar panels on all new build – developer retains benefits until repaid;
- District heating – ESCO type approach;
- Confident in FITs – clarification on policy;
- Role of LA – should there be a share your experience (can't read word)?
- Soft landings approach;
- Council tax rebate incentive – John Lewis voucher, £ incentive;
- Embodied energy – push;
- Case for dropping minimum requirement to one dwelling. And refurbishment;
- Uttlesford – extensions to existing properties. Expect to improve whole development;
- Monitoring- RE not regulated. Sending in bills. Real time displays;
- Issue – use if being tested – further engagement;

- To be more than planning policy reflects higher level of engagement;
- Wellcome Trust – Energy Days. 5% year on year reduction. Give away real time displays. Mix of educational/technology.

Table 2

- More flexibility to consider off-site (certified) solutions or, e.g. sustainable construction methods;
- Meet the 'visible' requirement by having a sign or display about how its a low carbon building, rather than 'eco-bling';
- Focus on carbon as the overriding consideration → energy hierarchy. Then could use building regulations as a benchmark;
- Change the policy to 10% carbon reduction rather than renewable. This → technologies more likely to be used as 'carbon follows cost';
- NB There are B-Regs requirement for competence; scope to enforce this? (Big issue around lack of B-Regs enforcement);
- Benchmarks – use Carbon Trust figures (produce figures for different kinds of dwellings/occupants);
- Some kind of star rating for contractors based on their carbon achievements?
- If encouraging passive design, ensure mitigation measures included e.g. louvers to prevent over heating.

Table 3

- Two tiered approach:
  - Comply;
  - Pay into community fund.
- Council tax banding based on carbon output;
- Certainty = "You must do xx". Why not 20%?
- Hierarchy of achievement;
- Architect responsibility – after thought?
- System wide communication.

Plenary discussion

- Need to make the policy attractive to developers and the end user;
- Require a realtime display to be installed? Will help with engagement. (NB Difference between real time display and smart meter). Radian example – solar meter = gold when exporting;

- Look at offsite options – e.g. for the University, AD on their farm, or a coastal wind turbine. (May come in with allowable solutions in 2016);
- Switch the policy to 10% carbon reduction rather than renewable;
- BUT - objectives of the policy is NOT just carbon – its about supporting a fledgling industry;
- Plus - Building Regs are becoming more onerous on carbon, so saying 10% more than B-Regs will get harder and harder. By 2016, = zero carbon;
- Use Building Regs as baseline;
- What is the policy actually about? Stimulating the economy and increasing capacity as well as carbon reduction;
- Don't be too prescriptive;
- LPAs should provide evidence on which technologies work in which situations – data. But = a fast moving area;
- Systems integration and controls – potential of these exceeds renewable;
- Council tax rebate in return for providing information?

Companies supplying & installing r.e. technologies in Cambridgeshire.

Search conducted via Yell.com for solar, energy, PV, heat pumps, wind turbines (no-listings) and renewable energy, plus all MCS companies listed within the Cambridgeshire and Peterborough postcodes.

Company	Address	Address	Postcode
Electrosolar Ltd	51 Manor Lane	Huntingdon	PE28 4EH
Adam Electrics Ltd	21 Davids Close	Peterborough	PE4 5AN
JD Carter Electrical Services	South View Barn, Bungalow Farm, Werrington Bridge Road,	Peterborough	PE6 7PP
Heatwave Services	6, Poplar Way,	Cambridge	CB2 5BS
Peterborough Boiler Services	Unit 5A-5B, Wharf Road Industrial Estate,	Peterborough	PE2 9P
Manor Solar	Old Station Yard, Station Rd,	Peterborough	PE6 8RQ
Rule and Parker	23A West Street,	St Ives	PE27 5PL
Mawgreen Solar & Electrical	30, Windsor Rd,	Peterborough	PE7 3JA

Company	Address	Address	Postcode
Cambridge Eco Living	69, Canterbury St,	Cambridge	CB4 3QG
Sunfox Energy	85, High St,	Cambridge	CB2 9HZ
Solar Panels Cambridge	29, Silver St, ,	St. Neots	PE19 5TS
Beechdale Energy	Kingston Barns, Bourn Road,	Cambridge	CB23 2NP
Stepp Energy	Unit 1, Wareley Rd,	Peterborough	PE2 9PF
Sovereign Solar Power	15, Challenger Way,	Peterborough	PE1 5EX
The Roman Touch	Cambridge Road,	Cambridge	CB22 3GN
Aurora Solar PV Ltd	16a, Stowgate,	Peterborough	PE6 8RW
Cambridge Solar	Ely Rd, Cambridge	Cambridgeshire	CB25 9PG
Viridian Solar	Atlas Building, Stirling Way,	Cambridge	CB23 3GY
Dynamic Solar	13, Barnwell Business Park, Barnwell Drive,	Cambridge	CB23 3GY
Buy PV Direct Ltd	Tindall Mill, Kirkgate,	Wisbech	PE13 5NE
Cambridge Renweable Energy Centre (run by Elliotts)	Unit 44, Viking Way	Bar Hill, Cambridge	CB23 8EL
David Lowe Plumbing and Heating	16, West End,	Ely	CB6 3TE
Midsummer Energy			CB5 8HR
Bowller Solar Energy Limited			CB2 5QP
Green Solar World Ltd			CB4 2RA
Energy My Way (CB) Ltd T/A Ene...	http://www.energymyway.co.uk/		
Solar PV Renewables			CB1 9AX
The Plumbing Company Limited			CB23 7DL
Eastern Solar Co UK Ltd T/A Ea...			CB21 5AB
Kershaw Contracting Services L...	Ian Macklin, Director -	energy.enquiries@kershaw-grp.co.uk	CB24 8SW
Anglia Ecoheat			CB21 5JD

Company	Address	Address	Postcode
Sitec Infrastructure Services ...			CB25 9TL
Playfords Ltd			CB24 8PS
Imtech Aqua Building Services ...			CB24 4RB
SS-Elite Services Lim-ited			CB7 4EG
Intech Products Ltd T/A Classi...			PE19 2JL
Kevin Fisk Plumbing and Heatin...			PE19 8UQ
Celect Services Ltd			PE19 5HQ
TE Ramm & Co	01487 711811		
Elmore Plumbing and Heating Lt...			PE15 0TB

Appendix 4 - changes to planning policy & the definition of 'zero carbon'

National Planning Policy Framework

The National Planning Policy Framework (published in April 2012) sets out the Government's planning policies for England and how it expects these to be applied. It supersedes a set of Planning Policy Statements which taken as a whole, set out what the Government expected from planning policy in England previously.

The three PPSs with most relevance to this area were PPS1 - Climate Change, PPS22 Renewable Energy and PPS 3 Housing, though there was some overlap with other statements.

The National Planning Policy Framework (NPPF) marks a significant shift in terms of how planning policy is shaped and defined and the priorities which the Government expect LPAs to adopt.

Under the NPPF the planning system is intended to reflect three aspects of 'sustainable development' and intended to perform an economic, social and environmental role.

LPAs are expected to produce a Development Plan as the starting point for decision making. The NPPF clearly states that there should be a presumption in favour of sustainable development[32]. Importantly where the development plan is 'absent', 'silent' or 'out of date' the presumption is that permission will be approved unless the adverse impacts of going ahead would significantly outweigh the benefits, or specific policies in the document indicate that development should be restricted.

Under 'Building a strong, competitive economy' the NPPF puts strong emphasis on using the planning system to support economic growth.

'*The Government is committed to ensuring that the planning system does everything it can to support sustainable economic growth. Planning should operate to encourage and not act as an impediment to sustainable growth. Therefore significant weight should be placed on the need to support economic growth through the planning system*'[33].

Under the heading of **Meeting the challenge of climate change, flooding, and coastal change** the NPPF sets out expectations of local authorities:

To support the move to a low carbon future local authorities should:

- Plan new development in locations which reduce greenhouse gas emissions;
- Actively support energy efficiency improvements in existing buildings;
- When setting local requirement for building's sustainability, do so in a way consistent with the governments zero carbon buildings policy and adopt nationally described standards.

[32] The NPPF refers to two definitions of sustainable development; 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' and 'living within the planet's environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly'. National Planning Policy Framework April 2012, Achieving Sustainable Development, page 2.

[33] Paragraph 19, page 6 National Planning Policy Framework, April 2012. What is meant by 'sustainable economic growth' is not defined.

Local authorities should expect new development applications to:

- Comply with the local plan unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable;
- Take account of landform, layout, building orientation, massing and landscaping to minimize energy consumption.

To increase use and supply of Renewable Energy Technology:

- Have a positive strategy to promote energy from renewable and low carbon sources;
- Design policies to maximize renewables while ensuring adverse impacts are addressed satisfactorily, including cumulative landscape and visual impacts;
- Consider identifying suitable areas for renewable sources;
- Support community-led initiatives for RE development;
- Identify opportunities for decentralization.

When determining applications, local authorities should:

- Not require applicants for energy development to demonstrate the overall need for renewable or low carbon energy and also recognize that even small-scale projects provide a valuable contribution to cutting GHG emissions;
- Approve the application if its impacts are acceptable;
- New development applications should be plan to avoid increased vulnerability to the range of impacts arising from climate change.

There is significantly less emphasis on the mitigation of climate change and carbon reduction than in the supplement to PPS1 (Climate Change). Unlike PPS1 there is no-longer a push to adopt district heating and CHP as part of a broader carbon reduction strategy.

The NPPF adopts a very different approach to the development of planning policy to that defined by Planning Policy Statements. It does not provide the level of detail set out for example in PPS1 (Climate Change) or PPS22 (Renewable Energy). Rather it sets framework objectives which local authorities are expected to take account of when producing Development Plans.

It remains to be seen how far local authorities will be able to go in setting environmental performance criteria ahead of the minimum standard defined by requirements such as Building Regulations, under the NPPF.

The timetable for zero carbon buildings

Zero carbon homes

In July 2007 the Government announced that from 2016 all new homes will be 'zero carbon'. The exact definition of 'zero carbon' was not specified at the time, though it was taken to mean that homes would produce net zero carbon emissions over a year.

The policy announcement set out a timetable for progressive tightening of the building regulations in 2010, 2013 and 2016 to deliver a 'zero carbon' policy. In response to this the Green Building Council developed a three strand approach to delivering zero carbon through:

- Fabric energy efficiency;
- Onsite generation of electricity or heat - known as 'carbon compliance'; and,
- Allowable Solutions - allowable forms of off-site generation.

The presumption behind this approach was that the design and construction of net zero emissions homes was not viable on a mass market scale, and therefore the target should be to reduce the carbon emissions of new homes by 70% (from 2006 levels) through improved efficiency and on site solutions. The remaining carbon emissions would be addressed through 'allowable solutions'.

The Zero Carbon Hub was subsequently established as an industry led body to develop the technical definitions needed to enable the house building industry to deliver zero carbon homes. The Hub produced a report on fabric energy efficiency standards for homes in 2009, which set out a pathway to significantly better insulated homes.

The Hub was also asked to produce a clear definition of the Carbon Compliance standard for new homes, that is, to decide what level of emissions reduction will be set as the minimum national standard to be achieved by new homes through a combination of fabric efficiency and on site low carbon or renewable solutions.

Initially it was proposed that carbon compliance would be equivalent to a 70% reduction in emissions. Following a review the Hub proposed the following carbon compliance emissions reductions for new homes (expressed as a percentage improvement over 2006 Building Regulations):

- 60% for detached houses;
- 56% for attached houses;
- 44% for low rise apartment blocks[34].

In the budget in March 2011 the Government made a further significant change what is meant by 'zero carbon' by removing unregulated emissions from the definition. Unregulated emissions refer to emissions not covered by Building Regulations, so-called 'plug loads' arising from the use of appliances.

[34] The percentage reductions shown are only approximate equivalents when expressed as percentage reductions relative to 2006 Building Regulations. A more accurate definition is in terms of the following limits: 10 kg $CO_{2(eq)}$ /m^2/year for detached houses, 11 kg $CO_{2(eq)}$ /m^2/year for attached houses, 14 kg $CO_{2(eq)}$ /m^2/year for low rise apartment blocks (four storeys and below).

In a typical home these will account for 40-50% of the total electricity consumption, and this percentage is currently rising as the number and size of household appliances and gadgets increases[35].

In July 2011 the Zero Carbon Hub published '**Allowable Solutions for Tomorrow's New Homes**' which sets out what constitutes an 'Allowable Solution'.

These are grouped into three categories (refer to page 67):

- On-site solutions;
- Near site solutions;
- Off-site solutions.

Implications for planning policy

In terms of this project and the development of Merton Rule-style policies in the future, policy changes relating to zero carbon buildings are notable for two reasons.

Firstly, there has been a progressive dilution of the definition of zero carbon, since it was first proposed in 2008. Meeting a 'zero carbon' standard as currently defined will be significantly easier that it was when the standard was first announced and was then taken to mean 'net zero (annual) carbon emissions'.

Secondly, by taking unregulated emissions out of the definition of zero carbon, this reduces the need for renewable electricity generation in new homes, either directly as a building integrated system or indirectly as part of an 'allowable solutions' package of measures.

It also means that reductions in emissions arising from plug-load (unregulated energy use) now falls outside the scope of any direct planning policy intervention and will only be achieved through reductions in the carbon intensity of grid electricity.

Non-domestic buildings

In parallel with developments related to domestic dwellings, the 2008 Budget set out a timetable for the adoption of zero carbon standards for new non domestic buildings. Targets were set for new schools to be 'zero carbon' by 2016, public sector buildings by 2018 and all other new non-domestic buildings by 2019.

In June 2010, the European Union published the recast of the Energy Performance of Buildings Directive giving the targets for new public buildings to be 'nearly zero energy' by 2018 and for all new buildings to reach that target by 31 December 2020.

The EU close equivalent of 'zero carbon' - the 'nearly zero-energy building'- is defined as a building that has a very high energy performance, as determined in accordance with Annex I of their Directive. This states that it should reflect the annual energy use for 'typical needs' including heating, cooling and hot water. It further stipulates that the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

[35] Though the energy efficiency of so-called white goods (as well as other appliances) is reducing per unit volume/capacity the size of appliances is also increasing. This together with increases in the number of household appliances and gadgets has lead to a net increase in household electricity consumption.

In January 2012 the Government published a consultation on changes to the Building Regulations in England, in which it sets out the proposed changes to Building Regulations in 2013 which would apply to non-domestic buildings. The document makes it clear that at present a definition of zero carbon in non-domestic buildings has yet to be reached[36], but the Government has previously commissioned Aecom[37] to examine the options for reducing emissions using a combination of improvements in fabric and ventilation and packages of allowable solutions and provide recommendations for further consideration.

Though the detailed route and definitions to achieving a zero carbon standard in non-domestic buildings have yet to be published, the consultation published in January this year makes it clear that the 2013 revision to Building Regulations should be regarded 'as one step on the trajectory towards zero carbon'.

Changes to the Building Regulations are discussed below.

Building Regulations

Part L of the Building Regulations (Conservation of fuel and Power) were last revised in 2010. The Government is consulting now on the next revision to these which will come into effect in October 2013. This is expected to be the last revision prior to 2016 when the zero carbon standard (discussed below) for new domestic dwellings will apply.

Changes to the Building Regulations relating to new domestic dwellings

The next increment to the Building Regulations takes account of two pieces of work by the Zero Carbon Hub, namely;

- Defining an Energy Efficiency Standard for Zero Carbon Homes (November 2009)[38]. This proposes an energy performance target for new buildings measured in terms of total space heating and cooling load. Importantly it is differentiated by building type and expressed as a maximum delivered energy demand by floor area. Apartments and mid terrace houses have a maximum energy demand of 39 kWh/m^2/yr, and semi- detached, end of terrace and detached houses have a maximum energy demand of 46 kWh/m^2/yr. These specific targets are referred to in the consultation document as the Fabric Energy Efficiency Standard (FEES or 'full FEES'). In response to this work, the Government committed to introducing a fabric standard for zero carbon homes, but up until now has not stated when or how such a standard will start to be introduced into the regulations.
- Carbon Compliance for Tomorrow's New Homes[39] (February 2011). This proposes limits on the CO_2 emissions of new homes over and above the fabric energy efficiency standard, expressed again as performance targets in kg CO_2/m^2/year, and differentiated by building type. The assumption behind the Hub's work is that these targets would be met by building-integrated low and zero carbon generation technologies. The 2013 review assumes that these targets would apply from 2016.

[36] 'An overall aggregate target for 2019 zero carbon on-site standards has not been set', paragraph 70, New non-domestic buildings.

[37] Zero Carbon Non-domestic Buildings. Aecom January 2012, Department for Communities and Local Government.

[38] www.zerocarbonhub.org/building.aspx?page=2

[39] http://www.zerocarbonhub.org/definition.aspx?page=8

Implicit within these recommendations from the Zero Carbon Hub is a change in the method for assessing whether or not a new dwelling complies with Building Regulations. At present this is done by comparing the energy performance of the new dwelling with that of a notional building of the same size and type. Performance values (backstops) are set out for individual elements (providing some definition of a minimum standard). The domestic notional building is a 2002 compliant building, and the 2006 and 2010 standards asked designers to achieve a relative improvement on that specification.

A key issue addressed in the consultation is how to move from the current methodology to one based on absolute energy and CO_2 standards for different building types, which will apply from 2016. It has proposed two transitional arrangements:

ii. A 'FEES plus efficient services' option. The Regulations would be amended to include a fabric energy efficiency target alongside the existing CO_2 target. Designers would need to meet both the energy target relevant to their building type (a detached house, for example) and also a CO_2 target. While the energy target would be fixed by dwelling type, the CO_2 target would be bespoke to the building under consideration.

iii. A 'Halfway point' option, which is much closer to the proposed 2016 zero carbon levels. Here energy and CO_2 targets would be fixed by dwelling type.

The consultation states the Government's preferred route is for a hybrid approach to accompany the FEES plus efficient services option.

A further issue is how CO_2 targets are set. The relevance of CO_2 targets to this research is that they will have a bearing on whether designers choose to include renewable energy systems in new dwellings.

Again two options are proposed:

i. 'FEES plus efficient services': This is a target emissions rate which is equivalent to applying the full 39/46 kWh/m^2/year standards to the new home, with efficient services including a condensing boiler and 100% low energy lighting. To meet this target, the designer will have to meet an energy demand target and an overall CO_2 target. The designer would be free to choose how to achieve this extra saving over and above the fabric energy efficiency target.

ii. 'Halfway point': This is a CO_2 target which is (approximately) half way between the Part L 2010 target and the full on site carbon compliance target being proposed by Zero Carbon Hub for 2016 for each dwelling type. Again, the designer would meet an energy target then achieve an extra reduction in emissions. Just as for the option above, the designer would be free to choose how to meet the CO_2 target provided that the energy target had been met. Because the 'halfway point' standards are more demanding, there is a greater difference between the energy demand target and the CO_2 target, giving the designer more options on how to meet the overall standards.

There is a significant difference in the CO_2 reductions resulting from the two approaches as shown in the table below:

	Mid terrace house	End of terrace house	Detached house	4-storey apartment block	4-storey apartment block	Aggregate % reduction CO_2 emissions from 2010	Average cost per dwelling
FEES plus efficient services	4%	7%	15%	0%	12%	8%	£795
Half-way point rounded	26%	28%	29%	19%	28%	26%	£2,866
Fuel assumed	Gas				Electricity	Mix	

Table showing percentage reduction in CO_2 emissions when compared to 2010 Building Regulations. The figures use preliminary CO_2 emission factors. Source: 2012 consultation on changes to the Building Regulations in England, Table 2, and Table 3, pages 25 and 26.

Of the two options the Government has said that its preferred option is the FEES plus efficient services approach.

There are a number of unresolved issues here of which any amendments to existing Merton Style policies will need to take account. These are discussed below.

Changes to the Building Regulations relating to new non-domestic buildings

For new non-domestic buildings no change is proposed to the basic methodology for setting standards and the use of differentiated standards for different building types. The existing methodology of comparing the new building to a notional building will remain.

Analysis feeding into the consultation document considered four options for 2013 standards of which two are included for consultation:

i. **An 11% improvement on Part L 2010.** This overall level of improvement is achieved by applying packages of fabric and services efficiencies to the notional buildings, then aggregating the resulting improvements across the most common build types to achieve the 11% improvement. This results in a range of improvements in the individual building types modelled of 8-12% over 2010 Building Regulations.

ii. **A 20% aggregate improvement on Part L 2010.** This overall level of improvement is achieved when a more challenging package of fabric and services improvements is applied, and then a photovoltaic array equalling 1.6% of the floor area is added. Thus a 20 storey building would have a greater percentage of its roof area covered in photovoltaic panels than a 4 storey building with the same footprint/roof area. The range of resulting targets from the actual buildings modelled is somewhat wider for this option, from 15% in the five star hotel to 23% in the shallow plan office.

The consultation document makes it clear that the Government's preference is for a the 20% uplift. However, it also states that more work is needed to examine the effects of both the 11% and 20% uplifts and on the renewables potential for different buildings.

Definition of Allowable Solutions relating to 'zero carbon' buildings

Further information on measures which have potential to be listed as 'Allowable solutions', as produced by the Zero Carbon Hub.

On-site solutions

- Installation of smart appliances;
- Application of 'flexible demand' systems (supporting demand side management);
- Use of grid-injected biomethane linked to the site by Green Gas Certificates;
- Installation of communal heat accumulator (site based heat storage);
- Home electric vehicle charging;
- Electricity storage for the home (to store electricity generated from PV panels);
- On-site waste management (Vacuum waste collection systems);
- LED Street Lights for the site.

Near-site solutions

- Export of low carbon heat from site based district heating scheme (i.e. support for cost of pipe-work);
- Retro-fitting of low/zero carbon technologies to local communal buildings;
- Investment in creation or expansion of locally planned sustainable energy infrastructure (e.g. district heating or on-site wind turbines);
- Investment in local electric vehicle charging infrastructure;
- Investment in low carbon street lighting for local area;
- Local micro-hydro schemes;
- Communal waste management solutions;
- Local energy storage solutions.

Off-site solutions

- Investment in Energy-from-Waste plants (e.g. Anaerobic Digestion and Pyrolysis/Gasification plants);
- Investment in low carbon electricity generation assets up to a maximum determined scale e.g. excluding large scale off shore generation;
- Investment in district heating pipe-work to connect new loads to existing schemes or support new schemes;

- Investment in retro-fitting of low carbon technologies to communal buildings;
- Investment in embodied carbon reduction initiative Investment in low carbon cooling;
- Investments in energy storage and demand-side management/flexible demand projects to counter intermittent renewables.

Appendix 5 - regulated versus unregulated emissions

Arguments for and against specifying revised on-site renewable policy based on regulated emissions - domestic buildings

For regulated emissions	Against regulated emissions
Simple - level defined by Building Regulations No specific methodology needed unlike calculation of unregulated emissions which requires separate methodology	
Easier for developers to achieve	Softening of current policy But next revision to Building Regulations should improve carbon reduction through other measures (i.e. fabric and ventilation)
Lower cost to developer	Cost difference could be reduced on larger scale developments with economies of scale
	Reduces the carbon saving potential of 'Merton' policies Regulated account for 40-50% of domestic emissions
	Inconsistent with proposal that policy revisions should focus on those areas not covered by Building Regulations (namely hot water and unregulated emissions)
	Lower installed r.e. capacity as a result of these policies
	Reduces resilience of occupiers/buildings to future price increases.
	This policy could provide only means by which LPAs can address unregulated emissions.