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SUSTAINABLE CONSTRUCTION AND EMISSIONS MITIGATION STATEMENT

LAND OFF BURTON ROAD, TUTBURY, STAFFORDSHIRE

ON BEHALF OF
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1. EXECUTIVE SUMMARY

1.1 This Statement serves to establish how development at Burton Road, Tutbury will meet local aspirations to exceed the current national minimum standards relating to sustainable construction and mitigation of greenhouse gas emissions. These minimum standards have only just been significantly raised, within a trajectory to meet the world's most ambitious targets and timescales for net zero-carbon development.

1.2 Local Policy is set out in the East Staffordshire Borough Local Plan adopted in July 2006, since which time higher-level policy on sustainable development has radically evolved. No specific local targets for sustainable building or on-site renewable energy generation exist in adopted local policy, which pre-dates the emergence of the zero-carbon agenda.

1.3 In July 2007 the emerging LDF Core Strategy signalled the intent of East Staffordshire to consider an acceleration of the standards set out in the national trajectory to Zero-Carbon. However no specific Policy has been framed, nor specific standards established.

1.4 Since 2007, it has become clear to Government, through the work of the Zero Carbon Hub and other parties, that achieving the mitigation of all emissions through on-site means, whether energy efficiency or on-site renewable energy generation, is generally entirely technically infeasible. At this writing, Government has tasked the Zero Carbon Hub with investigating an appropriate minimum level of on-site mitigation for the Zero Carbon Standard, given the concerns, and indeed wider evidence, that the 70% of regulated emissions that had previously been signalled in December 2009 was not broadly achievable. This makes clear that achieving the goals of the sustainable development agenda is rather more difficult and complex than policy-makers had initially envisaged.

1.5 In addition, mechanisms to mitigate the residual emissions above this so-called "Carbon Compliance" level are entirely unclear. Until the time these aspects of the definition of zero-carbon development are resolved, the concept is essentially undefined and no practical means of assessing compliance exists.

1.6 The Adopted Local Plan of 2006 has been supplemented with a policy statement on greenfield land release, issued in December 2010, where the Council reaffirms its intent to ensure early release of development sites to meet housing need push on towards the intent of the national policy as far as possible, to act as exemplars within the Borough and to pathfind what it has become clear, is an extremely challenging national policy ambition. Specific expectations of new residential development concerning layout and development design, materials, water-use and waste minimisation, surface water runoff and flood-risk mitigation, and the benchmarking of development against the Code for Sustainable Homes are set out. However, no specific standards are proposed.

1.7 Since 2007, The Code for Sustainable Homes has been established, in parallel with the national Zero-Carbon policy trajectory, as a national benchmark for sustainable residential construction. At this time, the link between changes to national Building Regulations and the Code for Sustainable Homes has led to a major series of changes to the Code, which was substantially revised to take effect in October 2010, along with the introduction of revised Building regulations Parts L, F and J. National regulations across a broad range of other areas have also evolved, tending to catch up or even overtake the Code requirements at Level 3.

1.8 In addition, the Code sets mandatory standards and a mitigation hierarchy for surface water runoff that are especially prescriptive, and duplicate a much stronger national regulatory regime, which is now established under the Flooding and Water Management Act 2010, which itself effectively mandates Sustainable Drainage Systems as proposed at Burton Road. This regulatory duplication is itself contrary to Supplement PPS1; but more importantly, given the boulder clay substrate underlying most of the Burton Road site, is in practice technically impossible to achieve using the mitigation strategy set out in support of the Code.

1.9 These and future signalled changes to regulations over the lifetime of the development, especially emissions mitigation, further serve to undermine the usefulness or relevance of seeking to make the development compliant with the Code for Sustainable Homes as defined today.

1.10 In mapping the Code against national legislation and regulations and future committed changes, it is shown that **development at Burton Road will meet and exceed in virtually all respects those mandatory standards set out in the Code for Sustainable Homes at the Level 3 benchmark as currently defined**.

1.11 In particular, Peveril Homes commits to building:

- **low emissions dwellings, emitting no more than 20kgCO2/m2/annum**, and
- **pathfinding solutions towards the minimum Fabric Energy Efficiency Standard** supporting Zero-Carbon development by **aiming to achieve a space heat demand on most dwellings of no more than 52kWh/m2/annum.**

1.12 Both these metrics are established within the SAP2009 compliance tool and will be used to establish the new regulatory requirements from 2013.

1.13 In addition to current national policies regarding emissions mitigation; in parallel, draft policies have existed to support the specification of on-site renewable or low-carbon energy technologies to meet a proportion of predicted energy requirements. Since the announcement of the intent to revoke Regional Plans, which in the case of the Phase 2 Review in the West Midlands referred to such a target in its preferred options, Draft Revised Supplement PPS1 of March 2010 indicated that such targets would become obsolescent the closer the 2013 interim milestone on the national Zero carbon trajectory came.

1.14 In connection with this the Core Strategy Issues and Options Report of 2007, posited that all new development should seek to meet at least 10% of predicted energy demand from on-site renewable or low-carbon energy sources. It is technically feasible to secure 10% of predicted energy demand on the development on-site from renewable or low-carbon sources, however, it is not intended to commit to this until the actual implications on streetscene and aesthetics are known.

1.15 These technologies include solar thermal systems for hot water; and photovoltaics to provide renewable electricity. These measures have been assessed as being relatively viable options for the proposed for the development site, but are relatively expensive methods of emission mitigation. Communal biomass-fired heating is also

possible, but has been assessed as unlikely to be viable from either a practical or a financial perspective.

1.16 **Peveril will consider accommodating photovoltaic panels on as many plots as appropriate, and these may, at 2kWp rating, allow the 10% figure to be met across the site as a whole.**

1.17 However, **Peveril Homes preferred immediate approach is to maximise the scope for energy efficiency in line with the emerging hierarchy of measures within the national trajectory towards zero-carbon**, which will establish the learning and innovation required to meet the Future Minimum Energy Efficiency Standards which will take effect from 2016, and possibly as soon as 2013.

1.18 Finally, notwithstanding the above, **it is proposed that the 12 self-build plots will serve as focused exemplars to meet the emissions reduction and minimum energy efficiency standards for proposed 2013 regulations, and/or the emissions and energy efficiency standards of the Code at Level 4,** whichever are the most appropriate at the time reserved matters are sought.

1.19 The statement demonstrates that the sustainable construction, energy efficiency and renewable energy aspirations and requirements relating to the development site can be satisfied, within the technical and viability constraints offered by the site.

2. INTRODUCTION

2.1 In connection with the need for new development to make the maximum feasible contribution to reducing resource use and mitigating wider environmental impacts including climate change, all stakeholders in the development industry have signalled their strong intent to ensure development transparently meets the highest standards feasible and deliverable.

2.2 Peveril Homes is committed to developing its business to meet the challenges the sustainability agenda poses. The challenges involved are radical and fundamental, involving all parts of the business and its supply chain. Meeting relevant rapidly-evolving policy requirements, at Burton Road, Tutbury involves a broad set of technical, commercial and construction issues, even before any locally-determined aspirations are considered. The development will be designed and constructed to ensure that over its lifetime, it will exceed the current standards of the world's most ambitious policy trajectory towards sustainable and zero-carbon development, including milestones for emissions reduction that will be implemented from October 2010, 2013 and 2016.

2.3 Local Policy set out in the East Staffordshire Local Plan adopted in July 2006, broadly supported the then-prevailing 2001 Staffordshire and Stoke-on-Trent Structure Plan approach which at the time was expressed in terms of broadly encouraging energy and resource use efficiency.

2.4 At national level, Supplement to PPS1, *Planning for Climate Change* was promulgated in December 2007, also significantly altering the national policy context to explicitly support the achievement of sustainable development through the planning system, in a number of ways. This was strengthened and tightened in March 2010 when a Draft replacement PSS was issued, *Planning for a Low-Carbon Future in a Changing Climate.* Government has since signalled its intent to entirely review all PPS further and consolidate them into a single National Planning Statement, yet to be consulted upon.

2.5 Since 2007, East Staffordshire has been progressing its Core Strategy DPD towards Submission, with successive rounds of consultation, as higher-level Policy has been

promulgated. However, no substantive policy has been defined, much less tested for its appropriateness, and its technical and economic feasibility, in line with the requirements set out in Supplement PPS1 paragraphs 30-33.

2.6 In December 2010 an Interim policy Statement of Greenfield Land Release makes clear that the Council expects the highest ***viable*** level of sustainable design and specification. This signalled approach, while not adopted policy, nevertheless recognises that there is an innate tension, especially in the short term, between development financial viability, and housing delivery on the one hand, and seeking higher sustainable construction standards than the national trajectory.

2.7 Meanwhile, national regulations continue to progress on multiple fronts, and not only the national timeline towards new Zero-Carbon from 2016.

2.8 While emissions mitigation, including through efficiency savings; and the scope to incorporate low-carbon and renewable energy technologies on-site key represents a central element of the sustainable development, any efforts to specify development to take account of a full range of environmental and resource impacts needs to be rather broader in its objectives. The Code for Sustainable Homes has been Government's national standard to benchmark and incentivise sustainable construction best practice. Since its creation in April 2007, other areas of sustainable construction covered by Code, including internal and external water usage, and Site Waste Management, have been brought within the scope of national regulations for the first time.

2.9 Notwithstanding this, in addition to achieving and exceeding the emissions reduction benchmark of 25% required from October 2010 by Building Regulations, the Borough Council's Interim Policy Statement sets a specific and broader range of aspirations and challenges to developers, to ensure that, where irreplaceable greenfield sites are released for much-needed residential and employment development, this loss is mitigated as far as possible. Thus, ESBC are seeking developers to advance a wide range of other sustainability measures to meet and where possible and feasible exceed rapidly tightening national standards. At this time these national minima are now broadly equivalent to those core standards laid down in Code at Level 3.

2.10 The overlap between the credit areas audited under the Code, and those requirements already or proposed to be in place to meet wider sustainability objectives laid down in national regional and local policy, are set out to demonstrate, in line with Supplement PPS1 paragraphs 11b, 30 and 32d; that the broader imperatives of sustainable development are being addressed by the development proposals, and that Peveril Homes take seriously their wider responsibilities that go beyond narrow regulatory compliance, and are signalled by the emerging approach of the local authority outlined in the Interim Policy on Greenfield Land Release

3. DESCRIPTION OF PROPOSALS

3.1 Permission is sought in full for a proposed development, in the form of a residentially-led mixed-use development, incorporating 224 residential dwellings, of which 212 will be a mix of 2-5 bedroom speculatively built dwellings, with a further twelve detached plots for sale for bespoke build. In addition the proposals incorporate a community building and changing rooms, and 14 employment units offering 19,400 sq. ft of internal space. The development is to be set within a landscape framework, together with associated public open space, allotments and green infrastructure, incorporating extensive Sustainable Drainage System measures.

3.2 The proposals incorporate two major vehicular accesses from Burton Road serving the development, and additional pedestrian and cycle access linking to existing residential development to the west.

4. POLICY OVERVIEW

4.1 In December 2006 Government announced its intent that all new dwellings would be zero-carbon from 2016, and a trajectory with interim milestones of 25% reduction in regulated emissions from 2010, and 44% from 2013. This will be set through national binding building regulations, with associated robust compliance metrics and mechanisms. This intent was confirmed in a Green Paper in March 2007.

4.2 **The target, and the timeline, remains the world's most ambitious by some margin**. This is made even more challenging by the fact that at the time of the announcement, virtually no such dwellings existed in the UK, nor many beyond, and the technical parameters that govern the achievability of such standards were, and remain, a matter where considerably more empirical research is needed. In particular, the uplift in performance beyond the 2013 standard is obviously very much more challenging than the already significant initial steps. However, less obvious is that the 2016 standard had been assumed to include all non-regulated emissions as well.

4.3 Since then, Government has established the Zero-Carbon Hub as the main private-public body addressing the barriers to delivering the policy, and establishing the technical and compliance basis for its implementation. It has become clear that defining the standard is more problematic than was originally anticipated.

4.4 A clear hierarchy of measures has been proposed, starting with a minimum challenging standard of fabric energy efficiency. This was announced in December 2009 as 39kWh/m^2/annum, apart from detached houses where a 46kWh/m^2/annum standard is applicable. This has been confirmed by the current Secretary of State.

4.5 Above this it has been intended that on-site low- and zero carbon energy supply would largely account for the next tranche of emissions mitigation, up to a so-called Carbon Compliance Level. A level of 70% of regulated emission has been stated as a possible level by the previous Minister, but it became sufficiently clear that the evidence was not yet available to support this figure, requiring the matter to be referred back to the Zero Carbon Hub for evaluation. In particular, the economic and viability impacts of where the standard is set have come under significant scrutiny.

4.6 This work made clear that the considerable doubts that the mooted 70% standard were technically achievable across most development scenarios were well-founded. A final report is imminent, proposing that an entirely new absolute metric of $kgCO_2/m^2$/annum is introduced, rather than the relative measure of improvements against a notional 2006 benchmark. The Hub has signalled in its draft Report to Ministers within the last few weeks that the emerging standards will need to be typology-specific, and range from an absolute emissions standard of $14kgCO_2/m^2$/annum for low-rise flats (about equivalent to a 44% improvement of 2006 standards), to 10 CO_2/m^2/annum for detached houses, equivalent to about 60%. However, the challenges involved have led to a delay in a final report, while a minimum standard for high-rise flats still cannot be set, given identified constraints on technical achievability. However, there remain divergent views on the appropriateness of even these standards, especially since regional climate variation has now been found to challenge some of the assumptions about the broad achievability of even the emerging recommended standards across significant parts of the UK. The Minister will announce a decision informed on the final report, later in 2011.

4.7 The balance of emissions beyond those the developer can mitigate on-site, are currently proposed to be addressed by so-called Allowable Solutions. These all involve off-site mechanisms. Treasury remains fundamentally concerned that such levies amount to additional taxation on the industry. Nor is it clear how emissions reductions from any such mechanisms proposed can be practically delivered or managed to secure transparent and synchronous emissions mitigation to attribute to a given development.

4.8 Therefore, considerable work remains to define the zero-carbon standard. Government's own Regulatory Impacts Assessments are disputed both by the industry, and other stakeholders. **Thus there is no clear basis on which any local policy to demand zero-carbon development in advance of the national trajectory can be determined as sound, in accordance with Supplement PPS1 Paragraphs 30-33.**

4.9 In the meantime, the interim 2013 milestone appears much more clearly defined, and broadly technically achievable, although there are significant additional costs involved to meet a 44% regulated emission reduction using current definitions and compliance tools.

National Planning Policy

4.10 Sustainable development and its subordinate focus on the reduction of greenhouse gas emissions, has become the main driving principle of policy towards the built environment, including planning policy.

4.11 In connection with the parallel rapid regulatory changes taking place with regard to National Building Regulations discussed above, since October 2010 all applications for Building Regulations approvals have separately had to demonstrate a reduction of regulated emissions of at least 25% over current regulatory standards.

4.12 Since 2006 the planning and wider policy environment has moved very rapidly, and remains exceptionally dynamic. The multiple interfaces between planning-based requirements and Building Regulations and other regulatory tools such as the Code for Sustainable Homes, is technically highly complex.

4.13 Supplement PPS1 and PPS22, both of which were promulgated in December 2007, make clear that authorities should set a requirement for a proportion of predicted energy requirements to come from decentralised renewable and/or low carbon sources. Supplement PPS1 additionally makes clear that LDD policy should support the ambitious national trajectory towards zero-carbon development (paras 8; 30).

4.14 Rather, LPAs are expected, through the preparation and testing of Local Development Documents, to evaluate the local opportunities to add to policies in the RSS, "such as where local circumstances would allow further progress to be made to meeting the planning objectives set out in (Supplement PPS1)" (para 11). Paragraph 31 makes very clear that while it *"**could** be appropriate for LPAs to anticipate levels of building sustainability in advance of those set out nationally,"* there is no presumption that any higher local standards must or even ought to be applied.

4.15 Paragraph 31 then goes on to advise that *"…when proposing local requirements for sustainable buildings, local authorities must clearly demonstrate the local circumstances that warrant or allow this."* Paragraph 32 elaborates on how such policies are most likely to be applied, with a policy "focus on development area or site-specific opportunities", rather than blanket policy impositions.

4.16 Finally, paragraph 33 of Supplement PPS makes explicit that any policy relating to local requirements for building sustainability should be set out in a tested DPD, not a supplementary planning document.

4.17 Only when such local circumstances have been established through the LDD process, are local requirements appropriate, and in those cases the requirements over and above national regulatory requirements need to be expressed in terms of nationally-recognised and described standards, such as the Code for Sustainable Homes.

4.18 Finally, Supplement PPS1 *Planning for Climate Change* which post-dates SPG, taking full effect from December 2007 makes clear in paragraph 11 that:

"-***controls under the planning, building control and other regulatory regimes should complement and not duplicate each other****.*

-specific and standalone assessments of new development should not be required where the requisite information can be made available to the Planning Authority through the submitted Design and Access Statement, or forms part of any… other regulatory requirement."

4.19 On March 10th 2010, Government issued replacement **Draft Supplementary PPS**, combining and sharpening that set out in Supplement PPS1 and PPS22. Entitled ***Planning for a Low-Carbon Future in a Changing Climate****,* the principles already established in national policy are reaffirmed and strengthened. In particular, Draft PPS explicitly reaffirms that local requirements for building sustainability should be:

- clearly related to local supportive circumstances;
- have regard to development viability
- not prejudice the delivery of housing as set out in trajectories, and

- be set out in tested DPDs, focused on specific areas and sites, rather than policies applying across LPA areas.

4.20 Finally Draft Supplement PPS also **reaffirms that local planning-based requirements should complement, not duplicate, other national regulatory processes.**

4.21 Revised RSS, the Draft Regional Plan has never assumed formal Development Plan status though it reached submission stage to Examination in Public, which took place in Summer 2009. The abolition of this tier of planning was always a major manifesto commitment of the incoming Government, and the revocation by the Secretary of State in July 2010, and subsequent legal challenges, make it entirely unclear how much weight its emerging policies can be considered to carry, especially given that since EIP, rather more comprehensive and weighty evidence is available nationally as to the achievability and costs implications of the national policy trajectory, which undermine substantially any provable case for local circumstances being commonly encountered that warrant any acceleration against the national trajectory.

4.22 The weight attributable to **RSS in development control terms is very hard to assess,** and legislation is before Parliament to finalise the abolition of this policy instrument.

Local Policy

4.23 Adopted East Staffordshire Local Plan policy, taking full effect from July 2006, somewhat pre-dates the subsequent development of policy at the National and Regional tiers. It has a horizon of April 2011. Much of this Plan was saved in September 2009 under the provisions of the Planning and Compulsory Purchase Act 2004.

4.24 **Within the saved policies of the Adopted Local Plan 2006, there is no current Policy that sets out specific standards regarding sustainable design and construction; nor the requirement for alternative and renewable energy sources to be considered, since the deletion of Policies CSP1 and CSP2, and NE24.**

4.25 Policy NE25 covered renewable energy, but only in terms of the siting of wind turbines. The policy has not been saved. The Policy is in the main directed at controlling inappropriate applications of such technologies on visual or amenity grounds, especially in rural areas. It makes no substantive requirement for such technologies to be specified as part of development proposals, to supply any target proportion of energy demand.

4.26 The lack of up-to-date local policy, within a wider context of the exceptionally dynamic development of policy at higher levels, will be resolved in due course by the LDF. This document has been under preparation for an extended period, with an Issues and Options Report issued in July 2007, but no further formal articulation of Policy intent as established under PPS12. The **policy approaches within it, which are little more than suggestions, therefore carry very limited weight, since the approach has not been taken forward over the last two years, nor have they been tested at Examination in Public.**

4.27 Question 35 under Section 12.8 addresses the policy questions then thought to be relevant regarding Climate Change:

> *Should the Council insist that all new development meets energy efficiency standards above those currently required by Building Regulations, such as the Eco Homes standard? Also, should the Council require that new developments over a certain size should generate more than 10% (the government suggested minimum) of its energy requirements from on-site or local renewable sources?*

4.28 The question has now been overtaken by events, as national policy has developed with regard to emissions reduction and sustainable construction and development more generally, most notably in Supplement PPS1 and its Draft Replacement.

4.29 In December 2010, the Council issued a Policy Statement on Greenfield Land Release to guide applicants on the Councils Policy aspirations in advance of further development of Policy, which is due to emerge during 2011. The material weight attachable to the document in development control terms is thus hard to establish, though it is intended “to guide applicants and… officers in coming to decision on these applications”.

4.30 Of four overarching principles, the fourth concerns sustainable design and construction:

> *The creation of new communities provides opportunities to ensure that all new developments are sustainable. They should be built to the highest viable energy efficiency standards. Local area-based low or zero carbon energy generation would also be expected, as well as design which allowed resilience to changing climatic conditions.*

4.31 In addition, the signalled approach to policy, is not offered with a definitive policy wording, but rather signals broad areas of concern with respect to the resource use and impacts of development, as follows:

(*a) be located and designed to minimise energy needs arising from the construction, maintenance and running of the building, through careful siting of buildings to minimise exposure, maximising opportunities for retention of existing buildings, and recycling building materials. Developments should use the appropriate materials, siting, form, orientation and layout of buildings to maximise the benefits of passive solar heating, cooling, lighting and natural ventilation*

(b) be designed so as to incorporate the best environmental practice and sustainable construction techniques appropriate to the type and size of development, utilising those techniques that minimise the use of non – renewable resources and which maximise the use of recycled and locally sourced materials.

(c) incorporate facilities to minimise the use of water and the creation of waste, and which maximise opportunities for recycling.

(d) limit any adverse effects on water quality, reduce water consumption and minimise the risk of flooding and promote the use of Sustainable Urban Drainage Schemes

(e) include the use of local and sustainable sources of materials, and where appropriate Site Waste Management Plans should be prepared to ensure that at least 25% of the total minerals used derive from recycled and reused content.

4.32 All these areas broadly reflect credit categories within the Code for Sustainable Homes, which is also referred to by the Statement immediately afterwards at point (f)

4.33 The signalled policy approach also does not seeks a Borough-wide target proportion of energy from on-site renewable or low-carbon energy sources. It does however "*expect local area-based low or zero-carbon energy generation*". This wording is very intriguing, appearing to preclude dwelling-integrated micro-generation, and direct developers towards development-scale, or indeed wider-scale distribution of locally-generated energy in the form of heat and power. This presents very specific technical, operational, regulatory and commercial challenges, especially for a development on the scale of that proposed, which will be covered specifically in this report at Chapter 7.

4.34 It is in any case entirely unclear what local potential exists, that means that local renewables endowments are at a level that would justify a specific local renewable/low-carbon energy standard, or a higher target on-site local standard for emissions mitigation in advance of the national trajectory.

4.35 Rather, the emergence of the proposed national Fabric Energy Efficiency Standard (FEES) represents a more immediate research and development challenge, for volume housing development, than the application of micro-renewables.

5. A BENCHMARK FOR SUSTAINABLE DEVELOPMENT AT BURTON ROAD, TUTBURY

5.1 Irrespective of the limited weight that can today be attached to the Emerging LDF Policy, Peveril Homes is fully committed to the sustainable development agenda, and is vigorously engaged in gearing up design and construction to meet the national trajectory to zero-carbon development, and the interim regulatory milestones in 2010, 2013 and 2016.

5.2 However, sustainable design and construction clearly involves a much wider range of considerations that renewable and low-carbon energy.

5.3 At its inception, Government sought to establish in the Code for Sustainable Homes a robust nationally recognised benchmark for sustainable development practice that exceeded contemporary regulatory minima, and sought to incentivise developers pathfinding, ***on a voluntary basis***, the standards of signalled future national policy set out by Government in *Building a Greener Future* at that time.

5.4 While since May 2008, Code "Rating" has been mandatory for all new residential development, the Code remains explicitly as a voluntary tool. Developers remain free to choose whether to formally assess the development, but if not it is Rated at Code for Sustainable Homes Level 0, signalling compliance with prevailing standards as set out in Building Regulations, and where relevant locally-set Policies articulated in the Statutory Development Plan.

5.5 However, Policy-making affecting development proposals has also been very rapid across a wide range of Government Departments, including DEFRA and CLG, covering new or increased mandatory standards, across a very wide range of areas, and compliance routes. This **rule-making has been extending national regulation across those areas once formerly only the preserve of the Code, and/or setting higher standards that previously were only set under the Code's voluntary standards.**

5.6 The result is that **standards articulated in Code are increasingly also mandated separately by national or other Policy, tending towards regulatory duplication**. Despite this, the relevant compliance methodologies are far from perfectly aligned.

While it was always anticipated that Code would evolve to ensure it remained with its original purpose to "keep ahead" of regulations, in practice this has proven to be very difficult either in concept or in practice.

5.7 In line with a major change to Building Regulations Parts L and F that took place in October 2010 to address the 25% regulated emissions reduction signalled by the national trajectory to Zero Carbon, and some other changes including the implementation of a maximum potable water use standard under Part G for the first time, a wide ranging consultation was launched in December 2009 about changes to the content and structure of the Code for Sustainable Homes. The nature of the changes proposed or suggested range from fairly minor ones, to others that in effect would very radically trim and/or otherwise redefine the Code, and its compliance route.

5.8 **The result is that, at this writing the purpose of the Code is effectively undermined, despite its recent revision, given that the national trajectory is so ambitious, and the standards and metrics the Code is supposed to signal are either still emerging, or framed and required within separate regulation, some of which are to be assessed under entirely different compliance mechanisms, notably for surface water drainage** under the Flood and Surface Water Act of April 2010.

5.9 Nevertheless, the Code does represent the nationally accepted benchmark for sustainable design and construction. Accordingly, **Chapter 6 sets out how the credit categories covered by the Code will be addressed by residential development at Burton Road, Tutbury, such that it can be transparently demonstrated that a broad range of sustainable development criteria have been met as defined by the Code for Sustainable Homes at Level 3.**

5.10 **With regard to the key area of emission mitigation, Peveril propose to follow a "fabric first" upgrade path.** This is in line with the hierarchy of measures set out in the emerging definition of Zero Carbon development, where a challenging minimum standard of energy efficiency has been established recently, at 46 kWh/m^2/annum for semi-detached and terraced homes, and 39kWh/m^2/annum for apartments and mid-terrace houses, to take effect from 2016 in national regulations. **An interim standard**

of 52kWh/m2/annum is being considered from 2013 for semi-detached and detached houses. Peveril propose *to aim to meet* this interim standard. This poses significant technical challenges, with regard to fenestration, air-tightness, ventilation and linear thermal bridging in particular, that we are not aware have ever previously been tackled within the sub-region on a large-scale development aimed at the general housing market.

5.11 This standard would be likely to significantly reduce as-built emissions below the new national minima.

5.12 **The exact thermal performance can only be ascertained by detailed modelling under the SAP2009 tool, which has only just become available, and audited by post-completion testing. In addition, the Council's other design quality aspirations may to a degree limit how far such standards can be achieved. Thus, while the national regulatory benchmark will be met, equivalent to Code minima at Level 3, exactly how far beyond it development could go, is still not entirely clear.**

5.13 **In addition, it is proposed that the 12 self-build plots will go rather further.** They represent a clear opportunity for experimentation in sustainable design and specification. Therefore the mandatory energy standards of Code for Sustainable Homes at Level 4 will achieved as a minimum**.**

5.14 With regard to the small area of mixed-use non-residential development that comprises the changing pavilion and employment development, the Code for Sustainable Homes would not in any case be applicable. Today, BRE's Environmental Assessment Method (BREEAM), would be the effective equivalent. Government has been consulting about BREEAM's replacement with a Code for Sustainable Buildings, in conjunction with the UK Green Building Council.

5.15 The energy requirements of non-domestic buildings vary widely, by use and configuration. Accordingly it would be very difficult to establish a benchmark estimate of the likely energy impacts of this very small element of the development in advance of specific proposals being generated in detail.

5.16 However, **it is proposed that the mixed use element at Burton Road would meet the minimum requirements of BREEAM "Very Good", or its broadly equivalent rating under the Code for Sustainable Buildings**.

6. BENCHMARKING DEVELOPMENT AGAINST THE CODE FOR SUSTAINABLE HOMES

6.1 **Today there is no substantive local planning policy requirement that development should be assessed under the Code for Sustainable Homes**.

6.2 However, East Staffordshire Borough Council **clearly seeks to set an appropriate aspiration exceeding new national and regional targets for sustainable design and construction, while having regard to viability and housing delivery.**

6.3 Supplement PPS1 Planning for Climate Change in paragraph 31 explicitly requires that local policies for sustainable building over and above national standards should be expressed in terms of national accepted benchmarks, and the Code for Sustainable Homes for residential development was given as a clear example. This has been strengthened by Draft Supplement PPS *Planning for a Low-Carbon Future in a Changing Climate*, issued for consultation on March 9th 2010.

6.4 In addition, given that the full range of credit criteria required under the Code may not be justifiable or warranted, and given the potential for the additional costs of full Code Assessment may weigh unjustifiably upon viability, contrary to the other wider aspirations of PPS, the Draft also explicitly signals that LPAs may consider requiring ***only*** the standards of the mandatory energy and water credit areas of the Code. Given that the compliance routes for these areas are now directly with those for Building Regulations parts L and G respectively, this would create a streamlined pathway to require any acceleration of standards against the national trajectories in those areas.

6.5 However, **the Code still does offer a very useful framework for developer proposals to establish and signal that a full range of sustainability criteria have been addressed by the proposals,** or how they will be addressed in subsequent applications for reserved matters.

6.6 **The current interplay between national regulations and the Mandatory Criteria currently set within Code at Level 3 are shown in fig 6.1.**

Table 6.1 Comparison of mandatory areas at CfSH Level 3 with national minimum standards

Mandatory Code Credit area at level 3	Code requirement	Building Regulations or national requirement	Burton Road will deliver
ENE1	25% reduction in regulated emission over current standard	Part L 2010: 25% reduction in regulated emission over current standard (from Oct 2010)	25% reduction in regulated emission over 2006 standard.
WAT1	Max 105l/person/day potable water use	Part G 2009: Max 125l/person/day potable water use (from April 2010)	Max 105l/person/day potable water use
SUR1	Nil detriment in surface water runoff	Emerging Flooding and Surface Water Management Act 2010 standards	Flooding and Surface Water Management Act 2010 standards; including Sustainable Drainage Systems
WAS2	Site Waste Management Plan in place	SWMP Regs 2005: Site Waste Management Plan in place (from April 2008)	Site Waste Management Plan in place. Peveril Homes operating divisions have plans in place well exceeding the minimum standards

6.7 In addition to the mandatory credit areas, the Code covers a range of other areas and standards against which discretionary points can be awarded, in further support of Regional and emerging local policy objectives. The Code as currently defined at Level 3 across all credit areas is compared with current and signalled future national regulation in table 6.2.

6.8 The following section outlines in more detail the likely application of current Code standards to development at Burton Road, to establish that a full range of sustainable development criteria are to be addressed, but in such a way that redundancy in regulatory compliance is avoided.

6.9 **From table 6.1 it can be seen that in the most important areas, development can and will transparently comply with the framework set out under the Code for Sustainable Homes.**

Achieving Equivalent performance to the Mandatory Credit Areas

6.10 The Code requires that minimum performance standards are achieved for key Credit criteria. At Code Level 3, this demands:

- **Meeting Current Part L 2010 (25% minimum reduction in regulated emissions over 2006 TER) (ENE1)**

This is separately required to fulfil national Building Regulations Part L1A, since October 2010. SAP2009 has only been finalised relatively recently, and the nature of dwelling energy modelling to meet the requirements of both Code and Building Regulations is in effect plot-specific, taking account of a very wide variety of parameters affecting building energy performance. Thus the exact specification to be taken forward cannot be laid out at this time, and in any event would be separately mandated through the Building Control process.

This development will be among the very first in the nation meeting the newly defined national 25% emissions reduction benchmark through Building regulations. Furthermore, the specification and calibration of the revised SAP2009 compliance model will in practice mean that **building performance is higher and more robust than a dwelling designed to meet the same nominal standard under SAP2005.**

In summary, development at Burton Road, Tutbury, will incorporate from the outset dwelling designs specifically prepared to meet the new requirements. All aspects of dwelling format, layout, internal space disposition and fenestration will be considered to maximise thermal efficiency; and take advantage of passive solar gain as far as is rational.

The specification of development will further seek to improve the thermal performance of dwellings, with uprated insulation to roofs, walls, windows/doors and floor build-ups. Thermal losses will be reduced by construction to very high levels of air-tightness. The use of proprietary enhanced details at apertures and junctions will reduce the non-repeated linear thermal bridging parameter in SAP to a standard which represents a radical improvement and which challenges current best practice.

Heating systems will incorporate efficiency measures including seasonal load compensation, and zoned heating controls, coupled to very high efficiency condensing boilers with a SEDBUK rating of up to 91%.

These measures are likely to lead to fabric energy efficiency standards that should meet the 2013 minimum levels of 43kWh/m^2/annum for mid terrace houses, and approach the 52kWh/m^2/annum for end-terrace and detached units.

The specification outlined should, in fact, reduce primary energy use and associated emissions significantly beyond the 25% relative improvement required by revised Part L. An 8% further reduction would qualify for 1 additional discretionary credit under ENE1, and even the minimum 25% achieved through fabric would qualify for discretionary credits under category ENE2.

- **reduction of potable water use to no more than 105 l/person/day (WAT1).**

A separate requirement will take effect under Building Regulations Part G from October 2010, which mandates a maximum water use of 125 l/person/day, calculated by a new methodology with which the Code aligns. **At levels 3 and 4 the Code requires a somewhat more onerous 105l/p/d. This will be achieved by development at Burton Road** by flow restrictors on taps, particularly in bathrooms/wc; flow restrictors on showers, and reduced capacity baths as required and appropriate.

- **The achievement of nil detriment in terms of discharge of surface water runoff (SUR1)**

The technical standards to meet this mandatory credit area are extremely complex. However, the Environment Agency today has a statutory function in this area, supported where applicable by other Statutory bodies such as Internal Drainage Boards. While until now Code requirements have tended to exceed those that meet EA requirements, in 2010 the **Flooding and Surface Water Management Act** was published. This is effect:

- mandates the application of Sustainable Urban Drainage Systems (SuDS) to new developments,

- sets the basis for national standards for such systems,
- the conditions for their adoption.
- requires the establishment of local SuDS Approving Bodies nationally, from which approval for all surface water drainage strategies and designs must be achieved, irrespective of planning approval.

National legislation has therefore become the vehicle whereby best practice benchmarks on flooding and surface water management are established and compliance is assessed.

The mandatory standard for surface water runoff category within Code has controversially, and without consultation, included a nil detriment standard from runoff volumes, as well as for rates, for a 100-year return interval rainfall event. **This goes well beyond new rigorous national specification standards for SuDS**. At Burton Road, Tutbury, much of the site is underlain by Boulder Clay, with the remainder underlain by drift deposits over low infiltration capacity bedrock, of the Mercian Mudstones series. This seriously limits how far SuDS can address runoff volumes, as opposed to rates. Mitigating surface runoff volumes by re-use of rainwater though rainwater harvesting, especially at 1:100 year return intervals, is practically entirely infeasible, given the volumes involved, even before other practical issues are considered. **It is becoming very clear this is a broad problem for developments assessed across England under the Code, and is a matter for serious ongoing discussions between Government, BRE and the Industry.**

It is proposed that a full SuDS-based surface water drainage system will be integrated, to the standards required today by the relevant statutory body, and the Master Plan and submitted site layout clearly demonstrates the main elements of that strategy.

However, the narrowly based criterion within Code cannot be met.

- **The use of a Site Waste Management Plan meeting statutory standards (WAS2).**

This requirement has been **separately mandated by law since April 2008** on virtually all projects of commercial scope.

Achieving Equivalent performance to the Discretionary Credit Areas

6.11 In addition to the mandatory credit areas, the Code covers a range of other areas and standards against which discretionary points can be awarded. The Code as currently defined at Level 3 across all credit areas is compared with current and signalled future national regulation in table 5.2.

6.12 Table 5.2 makes quite clear that the rapid evolution of other regulation **tends towards making a separate standalone assessment under the Code redundant, in terms of paragraph 11 of Supplement PPS1.**

6.13 However, it is acknowledged that ESBC has signalled in the December 2010 Interim Policy Statement both that new greenfield development should go as far as viable in terms of sustainability, and has equally set out areas of attention that are broad and go beyond the detailed scope of national building regulations. Finally the Cod itself is explicitly mentioned, though not at a prescribed standard.

6.14 Accordingly, Table 5.3 sets out the strategy for ensuring that the intent of the Interim Policy Statement is transparently met or exceeded by development proposals at Burton Road, Tutbury in that development will be specified to address areas covered by Code over the full range of discretionary credit areas.

Table 6.3 Specification of development at Burton Road, Tutbury against credit areas within the Code for Sustainable Homes

Credit Category/Heading	Potential points creditable in Code	Measures at Burton Road, Tutbury
Energy & CO_2 Emissions		
ENE1 Dwelling Emission Rate	1/10	**Energy Statement makes clear a minimum 25% reduction over current minimum requirements will be met, as part of Building Regulations Part L1A. Credits for a further 8% improvement of DER over TER will be sought on main development and 25% on all 12 self-build plots (baseline for Level 4).**
ENE2 Fabric Energy Efficiency	3.5/9	**Energy Statement makes clear that high standards of energy efficiency will be pursued. SAP2009**

	minimum	**once issued is likely to confirm that for most detached dwellings at least 3 credits would be awardable based on 57 kWh/m^2/annum heat load target metric, and 5.5 credits based on 42kWh/m2/ann for other dwelling types. For self build plots minimum 5/9 points required**	
ENE3 Energy Display Devices	2/2	**At least one of the two credits will be sought. Gas display devices not yet available.**	
ENE4 Drying Space	1/1	**All dwellings will be supplied with external drying space as required under CSH Tech Guide for this credit area**	
ENE5 Energy-labelled White Goods	1/2	**All dwellings will be supplied with homes user guides as required under CSH Tech Guide for this credit area**	
ENE6 External lighting	2/2	**This is to be achieved to applicable CSH Technical Standard**	
ENE7 Low-Carbon and Renewable Energy	1/2	**Development could achieve a minimum of 10% of predicted energy requirement from on-site renewable or low-carbon sources. 2kWp Photovoltaic Panels on selected appropriate plots, TBC, which will gain at least 1 credit for those plots.**	
ENE9 Home Office	1/1	**This will be achieved to applicable CSH Technical Standard**	
SUB-TOTAL	**12.5/31**	**Weighting 1.17**	**POINTS 14.625**
Potable Water Use			
WAT1 Internal water consumption	3/5	**ES & SS state the development will achieve a water consumption level of 105 litres/head/day.**	
WAT2 External water consumption	1/1	**rainwater butts to be provided for all private and communal external spaces**	
SUB-TOTAL	**4/6**	**Weighting 1.5**	**POINTS 6.00**

Sustainable Sourcing of Materials			
MAT1 Environmental Impact of Materials	12/15	**Materials to be specified and procured as laid out in BRE Green Guide to specification to meet the credit criteria.**	
MAT2 Basic building elements	4/6	**All materials to be procured according to Peveril Homes Sustainable Sourcing Guides and Policy to meet credit requirements.**	
MAT3 Internal finishing elements	2/3	**As above**	
SUB-TOTAL	**18/24**	**Weighting 0.3**	**POINTS 5.40**
Surface Water Runoff and Flood Risk			
SUR1 Surface water runoff	0/2	**Standards of National Legislation will be met, which will supersede the standard in this area**	
SUR2 Risk of flooding	2/2	**Flood Risk Assessment submitted, compliant with PPS25 and site is outside notifiable flood risk zones.**	
SUB-TOTAL	**2/4**	**Weighting 0.55**	**POINTS 1.1**
Waste Management			
WAS1 Household waste storage	4/4	**This is to be achieved to applicable CSH Technical Standard**	
WAS2 Site waste management	2/2	**Waste Management Statement submitted, mandatory SWMP. Further co0mmitment to reduce, sort and recycle site waste. Site to be registered for BRE SmartWASTE or similar metric tool.**	
WAS3 Composting	1/1	**Composting facilities provided to all plots**	
SUB-TOTAL	**7/7**	**Weighting 0.91**	**POINTS 6.4**
Pollution			
POL1 Insulant global warming potential	1/1	**Peveril Homes Group sourcing of insulation products already complies**	

POL2 Nitrogen Oxide emissions	3/3	**Peveril Homes Group sourcing of gas-fired boilers already complies**	
SUB-TOTAL	**4/4**	**Weighting 0.7**	**POINTS 2.8**
Health and well-being			
HEA1 Daylighting	2/3	**Dwellings to have natural daylight to meet credit criteria**	
HEA2 Sound transmission	3/4	**All development to exceed standards of Building Regulations Part E through use of Robust Details**	
HEA3 Private space	1/1	**Development complies**	
HEA4 Lifetime Homes	0/4	**Peveril Homes AH ranges comply with Lifetimes Homes Standards**	
SUB-TOTAL	**6/12**	**Weighting 1.17**	**POINTS 7.02**
Management			
MAN1 Home user guide	3/3	**This is to be achieved to applicable CSH Technical Standard**	
MAN2 Considerate Constructors	1/2	**Site to be Registered, may achieve credit sufficient for 2 points to be awardable.**	
MAN3 Site Impact	2/2	**SWMP will be provided. Commitment to operate specific site management procedures to monitor and reduce site-related transport emissions, site-related water use, dust, and water pollution.**	
MAN4 Security	0/2	**Secured by Design principles to be incorporated**	
SUB-TOTAL	**6/9**	**Weighting 1.11**	**POINTS 6.66**
Ecology			
ECO1 Ecological Value of site	1/1	**Ecological Assessments indicates low ecological value**	
ECO2 Ecological Enhancement	1/1	**Ecological Assessments indicates enhancement**	

		potential to be taken forward as agreed with client	
ECO3 Protection of features	0/1	**Ecological Assessment indicates a point may be awarded, however loss of some hedgerow requires further confirmation.**	
ECO4 Change in ecological value	2/4	**Ecological Assessments indicates change in ecological value of -1.56**	
SUB-TOTAL	**4/9**	**Weighting 1.33**	**POINTS 5.32**
TOTAL POINTS AWARDABLE		**Level 3 =55 net of SUR1**	**POINTS 55.325 minimum**

6.15 As detailed, **development as specified would if assessed meet the 55 points minimum requirement** for Code for Sustainable Homes Level 3, net of the two points attributable to credit area SUR1. In a few areas, extra credits might actually be delivered over the lifetime of the development.

6.16 Therefore, **the specification outlined demonstrates that development at Burton Road, Tutbury will in all substantial senses, meet the standards required of Code for Sustainable Homes Level 3 on the main development.**

7. SCOPE FOR ON-SITE AREA-BASED DECENTRALISED SUSTAINABLE HEAT/POWER GENERATION

The case for Combined Heat and Power/District Heating at Burton Road

7.1 The ESBC Interim Policy Statement on greenfield release of December 2010 states an expectation that, amongst other things, that within new developments on greenfield sites:

*"Local **area-based** low or zero carbon energy generation would also be expected."*

7.2 This language is not very precise in meaning, but in its sense appears to refer to comprehensive approaches to supplying low-carbon or renewable energy across an area, rather than dwelling-centric approaches. Typically such solutions are driven by the distribution of heat around a district heating network, rather than power, since power is already centrally-generated and distributed to users around local networks.

7.3 Thus**, this section examines comprehensively the technical, commercial and legal issues surrounding on-site power generation, and the attendant use of heat generated as an unavoidable by-product of electricity generation by its local area-based distribution through district heat networks.**

7.4 Much of the discussion that follows reflects knowledge only recently becoming more broadly understood by policy-makers in the energy sector. The most seminal analysis, a major research paper by Finnish industry experts Pöyry supported by AECOM, for the Department of Energy and Climate Change, was only published in April 2009. Most recently, in February 2010, UKGBC and the Zero-Carbon Hub released jointly a major technical and policy paper, *Sustainable Community Infrastructure,* which sets the technical and commercial issues more firmly within the realm of planning and delivery of new development.

The Principal Merits of On-Site Decentralised Energy Generation

7.5 Historically urban power supplies were typically generated within the locality, with municipal enterprise playing a major role. After WW2, the concept of a national grid sought to link the major demand centres with large-scale generating plant, nearly all coal-fired, offering the scope to develop progressively larger-scale thermal

generating capacity near to coal supply and cooling water. The maximum efficiency of such plant is typically about 32-34%. For Gas combined-cycle thermal plants it is rather higher, typically over 40%. However the bulk of the energy value of the fuel is turned to heat, which is rejected to the local environment and thus wasted.

7.6 Decentralised power generation has as its main advantage the opportunity to distribute this heat to be used within the built environment, by using local heat networks, also referred to as district heating. A secondary benefit is that the losses in long-distance power transmission are also reduced (about another 3-5%).

District Heating: the Concept and UK Experience

7.7 The identification of community-scale solutions to drive a reduced dependence on fossil fuels is actually not new. Perhaps unsurprisingly, the last time Government seriously sought to transition the UK towards community energy provision, and district heating in particular, was, in the absence of the climate change agenda, in response to the other two components of the energy trilemma that arose with the oil price shocks in the 1970s, and exposed the UK's vulnerability to disruptions in supply.

7.8 Even then, the UK had already gained significant experience in community heat networks. Many of these remain in existence today, contrary to the perception that such systems are all but unknown in the UK. They typically break down into two categories, major residentially-driven schemes delivered mostly with large council estates in the 1970s, such as in Manchester and Leicester, some of which have now been extended to draw in adjacent large anchor loads; and more complex schemes that date from more recently, that typically are anchored with Local Authority loads and have been extended to draw in major energy intense users, usually in or near city centres, such as Birmingham, Southampton and Woking.

7.9 Most have succeeded, and indeed have in most cases steadily expanded, proving that ***in the right contexts*** the concept is applicable in the UK and can be made to work in the current policy environment.

7.10 Other notable examples have failed, and the reasons for this should be understood.

7.11 England's largest DH system, at Bretton Township in the Peterborough New Town which covered approaching 4,000 dwellings built between 1971 and 1975, was decommissioned in 1985 after just 14 years of operation essentially for economic reasons, though the relatively low neighbourhood density was a key factor.

7.12 Other major failed projects generally dated from the 1970s which were associated with radical experiments in built form, such as the system serving Southgate in Runcorn.

7.13 Most community energy systems built in the UK to date at any great scale have been driven by large-scale public sector specification and procurement, mainly by local authorities. In virtually all of the cities concerned, the correspondence between DH and unpopular single-tenure estates which have become singularly associated with crime and deprivation, which without question has tainted district heating by association.

7.14 Much more recently, a clear new trend has emerged, as certain local authorities have leveraged their own relatively energy-dense demands in or near high-density mixed use areas, almost all in town or city centres, to act as a nucleus of an energy network, usually driven by Combined Heat and Power.

7.15 In addition, interest in biomass-fired heat-only systems to serve very small communal networks has increased, especially in rural areas, and where stewardship can be managed by a Social Landlord, such as Glenshellach near Oban, Argyll; and Rocks Green at Ludlow, Shropshire.

7.16 This experience does however, tend to circumstantially support conclusions that ***might*** be drawn about the conditions necessary to support large-scale deployment of low-carbon community infrastructure investments:

- **public-sector stewardship and funding models**
- **monolithic land or asset ownership, ideally in the public sector**
- **very high density**
- **preferably mixed uses**

None of these conditions are met at Burton Road, Tutbury.

The National Policy Framework

7.17 Government have within the last year signalled a very much greater interest in the deployment of decentralised power generation within the built environment, coupled with the distribution of heat through district heat networks. This interest has emerged even as other stakeholders have in parallel sought to define the issues surrounding what would represent a sea-change in urban energy supply.

7.18 As well as the Zero-carbon agenda for new development being led by CLG, DECC have published the Heat and Energy Management Strategy (HEMS), after consultation. This addresses the bigger challenge of reducing the carbon emissions arising from existing dwellings. Given the limits of practicality and costs of addressing hard-to-treat housing, reflecting the age of stock, heat networks are seen as an important element of this strategy.

7.19 DECC recognise the need to incentivise the production of renewable heat. The **Renewable Heat Incentive**, due to take effect from April 2011, on which consultation has recently taken place, however, represents just that described by its name. It is all but blind to low-carbon heat produced as a by-product of power generation, even though today that heat is wasted, and separate heat supply is required. In the UK today, the use of such waste heat in virtually every circumstance would displace fossil-fuel-fired boilers. In fact, perversely, heat generated from gas-fired CHP is proposed to attract a levy, just like a conventional system, even though that same heat if rejected to the environment would not be taxed at all. In addition, the RHI is directed at meeting EU-driven renewable energy targets, not the larger problem of decarbonisation. Therefore, it **incentivises production of renewable heat**. In most domestic circumstances**, the *generation* of renewable heat is quite cost-effective. *It is the economics of providing means of distribution that represent the main problem*, as will be discussed below.**

7.20 The Draft revised Supplement PPS1 issued by CLG on March 9th 2010 also signals the emerging strong view from CLG that the planning system needs to address the opportunities to deploy such networks in a comprehensive and rigorous manner, as part of LDD preparation.

7.21 While helpful in setting the scene, these statements on Government's behalf actually do relatively little to actually create the conditions necessary to make delivery possible on specific sites. These relate to the economic, commercial and legal realities of generating and distributing heat around a community.

7.22 Providing major infrastructure such as heat networks requires policy and legal certainty about the nature and level of returns that can be expected for the system over the long term. While progress is being made, such certainty does not yet exist, mainly because policy-makers split between various government departments are themselves unclear on how far, and how quickly, the roll-out of heat networks within residential contexts could address national policy objectives.

The Economics of CHP and Residential Heat Networks

7.23 The costs of distributed power and heat generation break down into two categories: energy centres and "prime movers" (i.e. the equipment); and the distribution network.

7.24 The costs of the energy centres can be offset against savings in the procurement of individual domestic boilers and controls. In theory gas connections could be foregone to dwellings, though there would be some resistance to all-electric cooking in the marketplace, and many developers would resist this.

7.25 While a large centralised plant is clearly more economic than individual units, making direct comparisons is difficult. Generating plant is not the same as a boiler. The depreciation curve is over about 6-8 years. Large district systems involve the need for constant control and monitoring, and significant overheads can accrue. In addition, land is taken up by the energy centre, displacing developable area which would otherwise have some worth.

7.26 Leaving aside this basic discussion on capital costs of plant, there are far more fundamental economic problems integrating CHP into residential developments. In

fact, the recent history of CHP in a residential context has been poor to disastrous. Most reputable CHP suppliers and experts consider that where CHP has been incorporated in to residential developments it has often either been mis-sold, mis-specified or badly installed and commissioned, and indeed all the above.

7.27 Indeed, the industry generally does not see communal CHP being an appropriate solution to meet the bulk of energy needs in residential developments; they **are fundamentally incompatible.**

7.28 The **first** conflict arises from the fact that power generation cannot be decoupled from heat generation. 94% of CHP installations were industrial in 2006: they specifically generate heat and power for large industrial facilities, often process plant such as oil refineries and chemicals works, that consistently demand large amounts of heat as well as power on a constant basis.

7.29 **Secondly** the plant generally needs to be run constantly at optimum efficiency, to achieve the required carbon savings, and also sufficient revenue at minimum costs. CHP engines, in common with most mechanical plant, respond poorly to being "cycled" (turned on and off repeatedly). Of the 8760 total available hours annually most consultants suggest that the plant really needs to be running 6-7000 of those hours. This maximises the revenue stream available per unit installed capacity, and reduces the maintenance cost substantially and lengthens the operating life before replacement.

7.30 **CHP economics therefore depend mainly on the demand profile for the outputs of both heat and power.** The uptake of the full capacity of the installation over time is pivotal, which is to say, a facility with a constant balanced high heat and power load allows CHP to deliver its economic and environmental benefits.

7.31 **Residentially-led developments never offer such a demand profile**. Not only that, in the kinds of high-density schemes that communal systems may suit, the overall demand for heat in particular is very modest indeed. Yet heat is the bulk of the output of a genset, typically in the power:heat range 1:1.4.

7.32 At Burton Road, Tutbury, the heat loads on what is a lower density predominantly detached mix would be some what higher than for apartments. However at 2010

Building Regulations, and certainly with the approach proposed by Peveril Homes that heat load will now exceed 52 kWh/m^2/annum, thermal performance will exceed very significantly even that achieved under current Regulations. For much of the year space heating loads would be nil or minimal. Therefore the **CHP plant would be best specified to meet base heat loads, in effect domestic hot water demands**.

7.33 The winter heat loads could be met with heat-only centralised boilers. A further benefit might be the ability to part-fire with harder-to-handle but more sustainable fuel sources, such as biomass, though this presents its own challenges, many of them not trivial. However **the unavoidable result would be that on-site power generation over the year would be very modest indeed**, as shown in table 8.1 below.

Table 8.1 Notional Optimum Prime Mover Mix Output for residentially-led development at Burton Road, Tutbury, kWh per annum (estimated)

	DHW contribution	Space heat Contribution	TOTAL Annual Heat output	Annual Power output
Gas-fired CHP	543954.3	0.0	**543954.3**	**388538.8**
Biomass heat-only (baseload)	95991.9	319797.8	**415789.7**	**0.0**
Gas-fired backup	0.0	241251.0	**241251.0**	**0.0**
TOTAL	639946.3	561048.8	**1200995.0**	**388538.8**

7.34 From this it can be seen that the power takeoff from an appropriately sized installation at about 390MWh/annum is about 32% of the magnitude of the heat output deliverable; or put another way, of the 1589.6 MWh per annum of all energy output, power accounts for less than 25%. Depending on the operating regime specified, which is a a matter of some considerable technical debate within the context of residentially-led developments, this actually might be considered optimistic.

7.35 Technically, this is not a problem. Economically though, it is. The value of heat per kWh is very low compared with power. The bulk of the revenue stream for the energy centre would be associated with heat. This would seriously reduce the potential revenue accruing from the installation.

7.36 Worse still, the on-site demand for power would be very low during the day. What modest power outputs the installation produced over the day would mainly be sold to the grid on an export tariff. In effect this supply would represent a contribution to base load, and the supply tariff would reflect this at a relatively low rate. Given it would be most likely that the installation would be gas-fired, it would not attract fiscal incentive through the Feed-in Tariff which takes effect in April 2010.

7.37 **High-density mixed-use developments,** where the daytime demand from retail and commercial is balanced to some extent by the evening and night time demand from residential users, is much **more likely to make a meaningful CHP installation appropriate**.

7.38 The much bigger difficulty for all distributed community energy models is actually not technical at all. It is the costs of distribution infrastructure, and managing customer-facing functions including service, metering and billing.

7.39 The amount of value that could be captured over time in a revenue stream across a system driven primarily by heat demands would necessarily be very low. So low are they, historically the costs of metering have been unjustifiable, and a flat charge was imposed. The corollary was that there was absolutely no incentive to save heat, and on the large-scale council estates typically involved this led to high wastage.

7.40 One difficulty lies with the **transaction costs of customer service and billing**. Where a landlord collects rent, charging additionally for communally-provided heat adds a modest transaction cost. Where this is not the case, and on houses in particular, a whole customer-facing infrastructure needs to be put in place. Legacy utility companies can spread this high fixed cost over a vast number of consumers. That is not true for local ESCos. While specialist companies do exist that do this, there is relatively little expertise and even less competition in the marketplace. This entirely contrasts with the commercial sector where such high transaction costs do not accrue.

7.41 Also, the costs of the distribution pipework, even provided as part of the wider site servicing package, would be very high. **At 35-45 dwellings per Hectare, this would well exceed £9000 per dwelling, and could well be more**, based on typical

pipework costs of £1050-1000 per linear metre flow/return, exclusive of connections and consumer units.

7.42 There is no way the revenue stream would capitalise a meaningful initial cash contribution to fund this infrastructure.

7.43 The costs would have to be borne either out of land value, or via some other commercial mechanism within the ESCo business model.

7.44 One such mechanism is that fixed annual service charges be used to boost the viability of the ESCo business model. This prevents artificially high unit prices for heat being charged. While the supply of heat to domestic customers is currently not directly-regulated, such charges (dubbed “carbon reduction charges” by some nascent ESCo businesses) fall into a grey area regarding consumer protection legislation as set out in the Competition Acts and the Landlord and Tenant Act 1985. This latter would apply inasmuch as to protect the ESCo business model, all property would almost certainly have to be sold leasehold, to ensure that the risk of lease forfeiture existed as the main incentive to avoid bill default.

7.45 While a quite large number of established players will design build and operate an energy centre, and sell the energy, they will only take responsibility “up to the Energy Centre wall”. Dealing with distribution and customer-facing sets up costs and liabilities they could never assume.

7.46 The most recent and seminal major work on the economics of Community Heat Networks within the UK was undertaken by AECOM (formerly Faber Maunsell) and specialist engineering consultancy Poyry, published in 2009.

7.47 This makes clear a large number of very important general points:

- Apart from retrofit to high-rise apartment blocks, there is no commercial case for district heating in the UK at current costs, under virtually any circumstances or at any scale

- The cost per tonne of carbon abated is extremely high, and much higher than for other technological strategies to mitigate emissions, which remains the key intent of national and subordinate policy.

- Costs are much higher in the UK than other markets where DH is more widespread and better established. This is put down to the immaturity of the marketplace and the lack of effective competition in the supply chain. The high costs of pipework are singled out in this respect, while there is in effect no supplier of plastic pipe in the market, to allow for lower-temperature systems to be cost-effectively delivered.

External Support of the Costs of Community Energy at Tutbury

7.48 **The Planning Authority appears to signal that it accepts that viability issues must be considered in establishing the maximum deliverable sustainability specification on new greenfield developments. However, there have been several signals by Government that external funding and fiscal support for decentralised low- and zero-carbon energy generation will be made available. Thus while the ability of land values to support developer contributions at the level needed to "gap fund" viability shortfall in and ESCo model, may not be realistic at Tutbury, some discussion of the contribution this external support might make is warranted.**

7.49 In a climate of acute fiscal tightening, probably unprecendented in recent history, it is already clear that the continuation of central government funding streams of this kind depends on its level and scope of application being curtailed.

7.50 The former Government announced two major initiatives since then to support investments in decentralised renewable energy generation. These are explicitly intended to replace all other incentivisation and grants regimes, such as the Low-Carbon Buildings Programme.

7.51 The first, the Feed-in Tariff (FIT) took effect in April 2010. The second, on which consultation closed on April 26th 2010, incentivises production of renewable heat (The Renewable Heat Incentive, or RHI). Both are aimed at supporting attempts to meet EU Directives on renewable energy generation by 2020. They are not

specifically directed at the wider imperative of decarbonising the built environment, as currently defined by wider policy initiatives. As a result, while DECC has sought opinion on RHI offering an uplift for installations connected to district heating, this would only apply if the heat source was renewable.

7.52 Vigorous industry representations have been made to redirect the Incentive towards the provision of District heat network infrastructure.

7.53 Perversely the kind of energy mix likely to represent the only technically robust solution on a residentially-driven scheme such as this, involves:

- Gas fired CHP, which would attract no FIT or RHI incentive, but which WOULD attract a levy (in effect an additional tax) to support RHI payments elsewhere
- Biomass heat-only. It is proposed that this would attract RHI. However, for installation above 500kWth, the proposed rate is derisory, and is directed not at heat for homes, but the incentivisation of large-scale biomass for process plant and industry. It would not support the economics of the system meaningfully as currently envisaged by Government.
- Back-up gas fired boilers. These would attract the same levy as gas CHP.

7.54 This assumes that specification of a biomass-fired element is technically or economically appropriate. As discussed elsewhere, this might well prove feasible but without local supplies of biomass provably in place, may not be appropriate.

7.55 The incoming Government almost immediately upon election in Summer 2010 placed a hiatus on RHI, with its level and structure still requiring final definition, given it is now considered to be unaffordable by Ministers in its previously proposed form.

Legal and Regulatory Constraints

7.56 Any Community Energy Enterprise must operate within the regulatory confines of the sector. To date, the planning system, and indeed the housebuilding sector, has had absolutely no need to understand these constraints.

7.57 Today, if energy is to provided at development scale, and procured via a development-scale business model, it is necessary that the regulatory issues are understood just as much as the theoretical technical ones.

7.58 Any producer of power (or supplier of gas) is regulated by the Energy Acts. These sit within European legislation, which in essence protects the consumer and enshrines in law the right of any residential customer to switch supplier within the marketplace, at will. In 2008 the so-called *Cityworks* judgment, strongly reaffirmed this right, and prevents any residential customer being ties to a single electricity supplier. As a result, any ESCo will be denied exclusive access to the relatively high revenue stream per unit power that the development would offer at completion. This seriously exacerbates risk within the business model, which depends on such revenues being predictable and sufficiently high.

7.59 Heat, in contrast to power, is today essentially unregulated in any specific sense. This is because to date most heat has been supplied as part of landlord contracts, usually through local authority estates departments, and latterly HPs (RSLs) and ALMOs. However, it is the case that any ESCo needs to cover itself against non-payment of charges, especially since it cannot absorb such risks across a huge customer base, even if it can cut off the defaulter easily. Indeed historically, the big economic problem with communal systems has been non-payment, and tenants failing to meet bills. They are progressively cut off, but the high fixed costs of system operation remain in place, causing charges to other customers to be progressively raised, causing a negative feedback effect over a number of years.

7.60 To cover this risk, ESCos generally demand that a fixed standing charge is levied "stapled" legally to a leasehold, which is forfeited on non-payment. This tends to prevent dwellings being sold on a freehold basis. While this is typically not an issue with flats, the sale of houses on leaseholds is neither very common, nor well-received by the marketplace. Without a strong alternative means of covering against default, the ESCo business model is further prejudiced.

7.61 Even then, legal opinion today is that the terms of an exclusive long-term contractual arrangement between a householder/occupant and a single company for heat fall within the scope of the Landlord and Tenant Act 1985, where a leasehold is involved.

This makes it very difficult for that supplier to pass on added costs to a consumer, unless that consumer has the ability to change supplier. This would not be the case. As a result any heat supplier is exposed to considerable commercial risk that it could not pass on increased costs to consumers, which again threaten the business model.

7.62 Today there is a large lacuna in both direct and indirect regulation in the supply of heat to domestic consumers, and until this is resolved it is not clear that a community energy model will be viable in most mixed-tenure residential developments.

Economic System and Asset Scale

7.63 It is generally accepted that larger-scale schemes offer greater scope for the incorporation of community-scale energy and infrastructure solutions. No doubt in part the intent of ESBC Policy Statement, is to prevent early proposals for large scale urban extensions avoiding the opportunity to examine, and where appropriate to catalyse community-scale solutions that could only be provided at the scale of the Sustainable Urban Extension as a whole.

7.64 At 224 units, and less than 20,000 sq ft of employment, the proposed development at Burton Road does not come close to the scale regarded as appropriate for community-level schemes by any authority with expertise in this area.

7.65 **In fact, the minimum scope for a scheme is not one where there is any industry consensus**. Much depends upon the business model that is being pursued by the protagonist.

7.66 Those focused on the ownership of generating assets claim that they can support scheme of 400-500 units, but typically these are apartments schemes where the costs of distribution infrastructure is a relatively low proportion of scheme costs.

7.67 The Poyry Report suggests that scope of about 500 units is the practical minimum for the smallest pre-assembled CHP genset packages, but even this assumes relatively high heat loads, including high-rise apartments, given that densities of 100ha are also stated by Poyry as being the minimum appropriate to contain distribution infrastructure costs within the community energy business model.

7.68 Given the fact that thermal performance of dwellings at Burton Road will significantly reduce space heating demands, **it is likely that nearer 1000 units would be the practical minimum to effectively use merely all the output heat of the smallest available CHP plant.**

7.69 The scale of energy demands of the entire urban extension upon completion would be more attractive to a communal energy business model, but the lack of mixed uses represents a serious limitation. This is exacerbated by the fact that for building regulations approvals secured after 2013, which may account for a significant proportion of the wider development, it is likely further interim minimum energy efficiency standards would reduce space heating loads down to still lower levels, approaching "passive" standards.

7.70 In practice industry interest among ESCo providers declines rapidly below 2500 units, and there is evidence that as the economics within the UK residential new-built context have become better understood by the energy sector, the real interest is in schemes of much larger numbers of dwellings, especially where there is a low intensity of mixed uses to balance demand profiles, and where densities are low, making the costs of heat networks prohibitive.

7.71 **In short, the scale of development at Burton Road will not in fact be likely to attract a credible ESCo player at this time, nor in the foreseeable future.**

Specific Constraints at Burton Road Tutbury

7.72 Development at Burton Road Tutbury involves a residential development of about 200 dwellings at relatively low density, and limited mixed uses. The scope for CHP is thus precluded, and therefore without the use of biomass or other renewable fuel or waste to supply the heat-only plant, the carbon savings attributable to community energy could not be secured.

7.73 The phasing of development, given the footprint of the site, is undetermined. It is unclear that the limited anchor loads during the day provided by the employment area will be securable by any ESCo to support economic and efficient co-generation during the residential build profile.

7.74 Bilateral contracts between developers and ESCos are proving to be difficult, complex and expensive to secure. On one pioneering high-density scheme in London legal costs to appoint the ESCo exceeded £1.2m, and were greater than the capital costs of the main energy centre. It took over two years to agree. These fixed costs of entering into contact with ESCos remain very high, though they are starting to reduce. On a small scheme like Tutbury, spreading this over a limited scope of development in itself would prejudice viability.

7.75 **Then there is the secondary issue of development delivery and phasing**. Any communal system needs to be available to the first resident, even if successive occupancy may spread out over an extended period depending on the size and type of development.

7.76 Large-scale district heating systems need to be delivered up-front, but if the delivery of occupied units is extended over a considerable period the energy centre cost is being carried over that whole period, while in the interim the operating costs are spread over a revenue stream that starts from a tiny base. Many larger ESCos actually swop in different plant as the demands on an energy centre increase, to mitigate this problem, but it cannot be entirely avoided.

7.77 Any energy centre generally is therefore only viable at full development occupation. In the case of the Tutbury development, the timing of this is a matter of some speculation.

7.78 Some kind of **guarantee of minimum demand is therefore generally required** by the ESCo, usually in the form of the minimum occupancy or demand level being underwritten by the developer before full occupancy, especially if capital contributions towards plant costs are expected from the ESCo, to be supported by the future revenue stream. Thereafter it also can be achieved by incorporating a relatively high standing charge for energy into the apartment management fee or some variation on that theme. At New Islington Millennium Community, Manchester, **heat was initially not be metered but billed as a flat standing charge irrespective of use**. This will tend to address the problem of private sector buy-to-let voids. In practice this is not very green as it does not incentivise energy conservation. It also tends to increase

ESCo primary fuel costs significantly as a result. Therefore a metering solution has been pursued after all.

7.79 **The scale of development at Tutbury does not present a viable technical alternative to a single large energy centre.** On very large schemes, one solution would be to integrate smaller-scale installations within single blocks, or at the densities proposed at Tutbury, **for individual development blocks**. These could then theoretically subsequently be linked together at full build-out. This has never been achieved in the UK. It creates all kinds of commercial and technical dependencies at the interface between systems, and in practice would require all parties to be signed up to a single player at the outset, assuming one could be found. In such a strategy, the viability would then be further seriously challenged as unit plant costs rise, along with the need to provide multiple very small-scale (probably heat-only) energy centres, which may well become redundant once the full system is integrated. The fact that the development is residentially led, leading to the need for a mix of gas-fired CHP, biomass boilers, and heat-only gas backup in each energy centre, further aggravates this problem, as providing this generation mix cost-effectively further incentivises the need to achieve appropriate scale.

7.80 **For all the reasons discussed above, it is the case that no credible energy supply partner could be found, on appropriate and secure commercial terms, to specify, provide and operate a communal energy installation at Burton Road, Tutbury, notwithstanding the aspirations of the Planning Authority.**

8. CONCLUSION

8.1 Development at Burton Road will be delivered to meet radically-redefined national standards and policy requirements that have only emerged since the Local Plan was Adopted in July 2006

8.2 In addition, since April 2007, national planning policy has clarified the conditions under which local authorities could expect to require development to make accelerated progress towards meeting standards faster than the world's most ambitious trajectory towards zero-carbon, or impose additional requirements in parallel to or in addition to those demanded by other regulations. In particular, PPS makes clear that such requirements must be evidence-based; and proposed and tested through the Development Plan system.

8.3 In the light of this, Peveril Homes has embraced the sustainability agenda, and recognises the rightly high importance attached to these issues both nationally and locally. Burton Road will be among the first to meet the new standards required from October 2010.

8.4 **Residential development at Burton Road will also, in meeting existing and emerging national standards, also meet or exceed essentially the mandatory requirements of the Code for Sustainable Homes at Level 3.** This includes the potable water use reduction to 105 litres/person/day, and a reduction of regulated emissions, to meet the mandatory 2010 Part L, which will be further exceeded by 8%. Peveril Homes expect to achieve a target dwelling emissions rate of no more than 20kgCO_2/m^2/annum, and a space heat demand of no more than 52kWh/m^2/annum on most dwellings.

8.5 **In addition the self-build** plots will meet the emissions reduction standards at Code Level 4, being a further 25% reduction on current Part L standards, to meet the criteria set out at Level 4 of the Code, and the standard proposed from 2013 for Part L.

8.6 This report also details how the wider discretionary credit areas within the Code will be addressed. However full formal Code assessment will not be sought.

8.7 **Peveril are seeking, in line with the Councils aspirations, to achieve exemplar development at Burton Road.** This will be focused on fabric energy efficiency, in line with the emerging standards and hierarchy within the national definition of Zero-Carbon development. A fabric energy efficiency standard of 52kWh/m2/annum is being targeted, for detached and semi-detached dwellings, the vast majority of the mix, within the constraints of design and viability.

8.8 However, Peveril Homes will additionally consider the application of 2kWp PV panels as a renewable energy solution to appropriate properties, where these do not compromise design aspirations, and where their siting is not technically compromised. This will further significantly reduce the emissions rate from the applicable properties, and may, subject to technical and commercial viability, be able to achieve a 10% reduction in emissions from across the site.